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**AN INVESTIGATION OF STRATEGIES TO STABILIZE THE ACTIVITIES OF
WATER USER ASSOCIATIONS (CASE STUDY: DAARION IRRIGATION PROJECT-
SHUSHTAR)**

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ABSTRACT

The aim of this study was to examine the ways to stabilize the activities of water cooperation in the irrigation project of Daarion in Shustar County. This research was a descriptive-survey study and is of casual-correlation studies as well as being applied in terms of purpose. The study population included all the project's beneficiaries (N=84) which were counted by census. The research instrument is a questionnaire containing questions that its face validity is confirmed and the reliability with a Cronbach's alpha of 0.84 was approved for various variables. The research findings indicated that there is a significant relationship between the independent variables of education level of farmers, farming experience, farm income, yield, land area and classrooms learning with the variable of stability of water cooperation. In addition, there is a significant difference between the mean sustainability of the activities of water cooperation based on participating in the training and extension courses, the type of operating system and type of irrigation system. On the other hand, the results of the factor analysis revealed that the five managerial, educational, social, technical and economic factors totally explain 69.12% of the factors affecting the sustainability of water cooperation resulting from variation in the dependent variable. Furthermore, other results of the factor analysis showed that the barriers affecting the sustainability of water cooperation are resulted from interaction of the five factors including social barriers, economic barriers, cultural barriers, bureaucratic and institutional hurdles, and technical and cultivation barriers that these factors totally explain 73.30% of the total variance of the obstacles affecting the sustainability of water cooperation.

Keywords: participation, water cooperation, irrigation, sustainability, participatory management.

INTRODUCTION

Water is known as the most important factor limiting agricultural development in most countries. So countries located in arid and semiarid regions have to take specific strategies for a correct and optimal use of water. Forecasts by FAO show that during the twenty-first century, in the Middle East and Iran, the amount of rainfall will decline (FAO, 2007). Therefore, use of mechanisms and procedures in order to meet the problems, limitations, and improve water resource management is necessary. According to studies, one way to optimize the use of water resources refers to farmers' participation in establishment, maintenance and operation of irrigation and drainage networks (Joorablu et al., 2006). The agricultural sector plays a vital role in Iran economy because covers 27 percent of GDP, 22 percent of employment and 25 percent of non-oil exports. Employment in the agricultural sector and the importance of agriculture in the economic development is of important ideas of economists (Poursina, 2010).

The importance of group activities in various fields including agriculture, natural resource management and rural development programs have been proved in developing countries (Menizen, 2004). Therefore, in

order to sustainable development and management of water resources, the involvement of public sector is vital so it is essential to apply policies related to the management of natural resources including water, use knowledge, experience and views of indigenous communities as key stakeholders in protecting resources that this aim will be achieved through public participation. (Madulu, 2003)

Water cooperation mainly focuses on the management of agricultural irrigation (Lin, 2002). Water cooperation is a local organization which acts as a supplier of maintenance services in rural communities. Improving the efficiency of agricultural water use with increasing knowledge, attitude and skills of farmers is the institutional duty of this organization. In general, participatory irrigation management improves the delivery of water services, maintenance, irrigation development in the region, and reducing environmental impacts, increasing agricultural productivity and farmers' income (Yercan, 2003).

Water cooperation is an approach to reach sustainability in management of the optimal use of water in agriculture to improve food security, farm income and raise living standards, especially for smallholders. So

farmers can take the improvement strategies of agricultural water productivity including the improvement of plant species, changing cropping patterns, improvement of agricultural practices, irrigation management and irrigation methods as well as increase their yield and quality of agricultural products (Starkloff, 2001). This change through the development of local water management by water organizations, is generally water cooperation (Vermillion, 2002). These organizations are created within the law by organizing producers in order to construct, operate, develop, install and maintain installations and water supply networks or parts of it in an effective way through this channel. (Falah, 2006)

Several studies have been conducted in this area. Krishna and Ayhoy (2002) in a study in Rajasthan- India, in terms of the role of farmers' participation in watershed management, concluded that cohesion, trust and informal networks affect watershed management, in addition, these factors, plus to literacy, have a significant relationship with the management of watersheds and developmental achievements. Sheikhi (2008) in a study to determine the factors influencing participation in farmers' cooperatives concluded that there is a significant relationship between literacy and

education, and the extent of their participation. However, there is no significant relationship between members attended in training courses. Grout and Engel (1998) believe that the use of mass media and social participation in other social institutions has a significant positive relationship with the extent of their participation in the co-operative.

On the other hand, Emami Bandpei and Hussaini (2006) explains age, literacy, experience, ownership rate, and educational and promotional activities as factors affecting participation in cooperatives. A study by Shahroudi et al. (2007) in Khorasan Razavi Province shows some variables such as education, cultivated acreage, annual income, promotional contacts, social capital factors, and the region's irrigation situation in terms of water cooperation, have a positive and significant relationship with farmers' attitudes toward participation in water cooperation.

Baghaei and colleagues (2008) in a study entitled individual and social factors affecting the participation of villagers of Sarcheshmeh Hunejan watershed in watershed plans, concluded there is a positive and significant relationship between age, social status, social participation, attitude toward partnership, modernization, trust to

different people and the willingness to work together with the variable of villagers' participation in watershed management plan. So paying special attention to these factors should be on the agenda of politicians, planners and agricultural experts. Monfared's research results (2012) entitled "Determinants of participation of farmers in cooperatives of production: a case of Bushehr Province", indicated that the promotional- educational services, technical knowledge, use of media, attitude toward cooperative employee and relations of Agriculture Jihad Organization staff with a significant correlation of 99%, are related to the participation of farmers in cooperatives. In addition, Ahmadvand et al. (2012) study entitled "Possibility of establishment of water cooperation: a case of Study Kovar Plain in Fars Province", showed that exposure to sources of information, level of knowledge and information, attitude to the reference group, and the attitude of farmers to water cooperation were identified as important and significant factors in predicting their desire to form a water cooperation. Samian and colleagues (2002) also in a study entitled "Factors affecting the success of rural cooperatives: a case study of the chosen cooperatives in Hamadan County", showed that there is a significant positive relationship

at 0.99 between education, management, member satisfaction, government policies, and tend to membership in cooperatives.

The success and effectiveness of water cooperation depend on this successful establishment based on studying them. Evidence has shown that if context studies for water cooperation not to be conducted in a proper way, creation, establishment, continuity and consolidation of this in rural and agriculture communities in the country will fail (Amini and Khayati, 2006). Therefore, planning, design and management of water resources systems for the realization of sustainable development goals in a region require public participation. Determining new and relevant strategies for the realization of the dimensions and various levels of public participation in network management requires deep and comprehensive analysis, utilizing participatory approaches and this is not met unless through the strategy of participatory planning and management and the transfer of authority to local communities that should be of particular interest (Fekri Ershad, 2005).

MATERIALS AND METHODS

This study is applied research and in terms of methodology, is a descriptive and correlational study. The studied region of farmers refers to the sub-irrigation and

drainage network of the Daarion 3 District where includes a part of Shushtar Myanab West Land between Arab Asad and the main drainage of Myanab to Zahuabad and Bakisheh Villages. The population consists of all farmers of the project Daarion 3 (N = 84) which through a consensus, all members of the cooperative were studied. In this study, collection of the required information was conducted in two main parts. The first section which includes a review of literature and history of the conducted using the library method, applying academic books related to the subject, the papers in the proceedings of scientific conferences, dissertations and search for information and translation of electronic resources on the Internet, and so on.

The second part includes the collection of statistics and data related to the studied variables in the population which was conducted by a questionnaire. The main instrument for data collection in this study was a questionnaire. To determine the validity of the study, the face validity method was applied. The questionnaire was presented to a panel of experts and its validity was met after some corrections. In this study, Cronbach's alpha coefficient was used to assess the validity of the measuring

instrument. The obtained coefficient showed the reliability of the tool was desirable (0.84)

RESEARCH FINDINGS

Checking the correlation between the dependent variable and independent variables showed that there is a significant positive relationship between the independent variables of education, farming experience, farm income, crop yield, land area, and learning from courses with the variable of the sustainability of water cooperation. There was no significant relationship between the independent variables of age of farmers, family members, enjoying the facilities, land possession with the variable of the sustainability of water cooperation. So we can conclude that among the independent variables of farmers' age, family members, enjoying the facilities, land ownership of the studied farmers, no significant role in the sustainability of water cooperation was observed and they could not be considered as significant independent variables in the research area.

Based on the results of factor analysis, it was revealed that with a high confidence of 99%, a total of 69.21 percent of the factors affecting the sustainability of water cooperation is caused by variance of the five managerial, educational, social, technical and economic factors

Table 1: Correlation of the sustainability of water cooperation with the independent variables

independent variables	dependent variables	r	sig
farmers' age	the sustainability of water cooperation activities	-0.029	0.795
family members		0.081	0.462
Education		0.333	0.002
experience		0.414	0.000
Farm income		0.296	0.006
Yield		0.455	0.000
enjoying the facilities		-0.384	0.772
Land area		0.364	0.001
Acquisition of courses materials		0.455	0.000

**Significance level of 0.001 *Significance level of 0.05

Table 2: the details the factors derived from the factors affecting the sustainability of water cooperation

Factors	Eigenvalues	The percentage of the explained variance	The percentage of total variance
First factor	6.22	20.09	20.09
Second factor	3.63	12.76	32.85
Third factor	2.52	12.56	45.42
Forth factor	1.95	12.15	57.57
Fifth factor	1.59	11.65	69.21

Table 3: factors extracted from factor analysis of the factors affecting the sustainability of water cooperation

Factors	Related variables	Loadfactor of each variable
First managerial factor	Transparency of costs	0.765
	Existence of exerts for advice	0.882
	report farmers after the planting season	0.772
	Transfer of management to the members of the cooperation	0.736
	Less involvement of people outside the organization	0.737
Educational factors	legal registration of organizations and incorporated as an entity	0.811
	Education of effective use of water, pesticides and fertilizers to farmers	0.814
	Learning how to solve problems of water rights	0.833
	Irrigation network maintenance training facilities to farmers	0.828
Social	Information about financial problems in the cooperation	0.801
	Members participation in decision making	0.872
	Making regular meeting between president and members	0.772
Technical	Presence of various Ethnicities and groups	0.81
	Suitable location for water cooperation	0.841
	Facilitating access to water needed by cooperation	0.821
	Stability of water use for agriculture	0.68
Economic	Gradual transition of network management to organizations	0.781
	Water pricing based on volume of water consumed in farms	0.835
	Loans and credits, as well as the distribution of fertilizers and pesticides	0.753
	Financing water cooperation with the aids of members and regular savings	0.826
	Assignment a part of the water rights obtained from farmers to cooperatives to finance	0.675

CONCLUSION

RECOMMENDATIONS

There is a significant positive relationship between farmers' education and

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sustainability of water cooperation. The findings obtained by Shahroudi and colleagues (2007), Sheikhi (2008), Samian et al (2012), Ahmadvand and colleagues (2012)

and Krishna and Ayhoy (2002) also confirm this.

There is a significant positive relationship between experience in agriculture and sustainability of water cooperation. The findings obtained by Aghapour (2007), Sharifi (2009), Chandran and Chakachery (2004), Azizi Khalkhili (2009) also confirm this.

There is a significant positive relationship between farming income and sustainability of water cooperation. The findings obtained by Aghapour findings (2007), Setoodeh Nia et al. (2009) and Sharifi (1388) also confirm this.

There is a significant positive relationship between crop yield and sustainability of water cooperation. The findings obtained by Totunchi (2010) also confirm this.

There is a significant positive relationship between land area and sustainability of water cooperation. The findings obtained by Khoushab abd Namazi (2006), Ahmadvand and colleagues (2012), Vermilion (2000) also confirm this.

There is a significant positive relationship between land area and sustainability of water cooperation. The findings obtained by Emami Bandoei and Hussaini (2006) also confirm this.

There is a significant different in the activities of water cooperation in terms of participation in educational and promotional programs. The findings obtained by Emami Bandoei and Hussaini (2006), Shahroudi and colleagues (2007) and Monfared (2011) also confirm this.

There is a significant different in the activities of water cooperation in terms of operating system. The findings obtained by Valy (2002), Aghapour (2007), Coupon and colleagues (2002) also confirm this.

There is a significant different in the activities of water cooperation in terms of the. The findings obtained by Valy (2002), Aghapour (2007), Coupon and colleagues (2002) also confirm this.

-Due to there is a significant positive relationship between farmers' education and sustainability of water cooperation, so using the experiences of farmers and experts experienced and familiar with the customs in the regions, the participation motivation will increase among farmers.

-Due to there is a significant positive relationship between experience in agriculture and sustainability of water cooperation so providing appropriate solutions, such as crops insurance and multiple use of water cooperation, is relevant

to prepare a context for increase in farmers' income.

-Due to there is a significant positive relationship between farmers' education and sustainability of water cooperation thus, with appropriate planning, it is possible to train skilled and qualified manpower for use in cooperation for success and sustainability of cooperation.

-Due to there is a significant positive relationship between learning in courses and sustainability of water cooperation thus, the necessary training to perform operation and maintenance of networks to be provided to farmers and this training should be provided in a timely manner and before beginning operations.

-Due to there is a significant positive relationship between crop yield and sustainability of water cooperation thus, using well-yield items and well-cultivated method and therefore, increase in crop yield, the sustainability of cooperation activities will increase.

-Due to there is a significant positive relationship between land area and sustainability of water cooperation thus, releasing joint and shared land, beside of creating and fostering a sense of ownership among farmers, the sustainability of cooperation activities will increase.

-With regard to the fact that there is a significant different in the sustainability activities of water cooperation in terms of operating system so by developing so by releasing joint and shared land and inducing a sense of possession among farmers, the sustainability of cooperation activities will increase.

-With regard to the fact that there is a significant different in the sustainability of activities of water cooperation in terms of participation in educational and promoting courses, therefore, by developing programs as well as training and extension services, and using appropriate teaching aids, media, workshops and periodic visits, to prepare a context for growth and increase in knowledge of farmers.

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