The impact of social and economic factors on farmers' willingness to participate in the management of use and maintenance of the irrigation network at the downstream area of Sattar Khan Dam, Ahar

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Abstract
Water is considered as one of the most vital factor in human survival. Absolute limitation of this vital substance as a renewable source and placement of considerable parts of country lands in arid and semiarid areas have caused agriculture section confront wide limitations of water resources. Hence water resource management, maintenance and preservation are considered vital for our country. To achieve this goal, beneficiaries' cooperation is considered essential in irrigation management. Present investigation was carried out in coastal lands of Ahar Sattar Khan Dam. The main aim of present study is to explain factors influencing beneficiaries' tendency to cooperate in utilization and maintenance management of irrigation channel. Statistical population of present investigation involves all 1624 beneficiaries of Ahar Sattar Khan Dam coastal lands. Number of beneficiaries needed for sample size calculated using Cochran reviewed formula. 260 beneficiaries were selected by classifying and proportional sampling method. Research method of present study is survey and data were gathered using questioner and interview. Questioner reliability was acceptable calculating Alpha Kronbach coefficient (0.78). Results obtained from this investigation indicated that 77.5% of beneficiaries are inclined to cooperate in irrigation management and 22.5% were reluctant. There is a meaningful relation between willingness to participate and the variables of the extent of land ownership, agricultural income, number of children, non-agricultural income and gender. Results of legit regression showed that about 80 percent of dependent variable changes were related to the extent of land ownership, agricultural income, non-agricultural income and agricultural history.

Keywords: Ahar Sattar Khan Dam, water, beneficiaries, cooperation, irrigation channel, tendency

1. Introduction

Iran with the average raining of 260 mm liter is a dry country and the water resources are limited. According to the statistics, the agricultural sector with 92% usage from 93 billion cubic meters of extracted water is the biggest water user in the country (Zarei Dastgerdi, 1388). Studies show that the irrigation efficiency in agricultural sector is just 30%. In other words, just 27 billion m^3 of water out of 90 billion m^3 of available water are used (Esfandiary and Bayat, 1387). It seems that the most important cause of low water efficiency rate is the separation of farmers from the body of management of water resources. In Iran System of Exploitation, irrigation formations and participation of water users in exploitation of water resources have a rich history. Following the land reforms, the irrigation formations which managed the water resources vanished and problems rose in the development and management of water resources and the vacancy of these organizations was felt. Following these problems the government established numerous companies such as agricultural cooperative companies, joint stock companies or cooperative companies of rural production. These companies didn't get any success and government had to tolerate maintaining, distribution and exploitation of water resources. This process grew the authority of government but bore some problems for irrigation networks (Arabi and Mohebi , 1387) some problems in irrigation and drainage networks are weak maintenance of irrigation systems, water wastage and lack of incentive for water saving (Haydarian, 1384). So in order to solve these problems, the most solution that countries use is corporate management of irrigation. The most important necessities for irrigation corporate management in different countries involve lack of government investment in irrigation systems, improper and unsuitable maintenance of irrigation systems, the inability of the government to collect enough money from water consumers and the poor performance of water for irrigation systems (Tabraee et. al, 1390). In this regard, many efforts in different countries have been made to transfer management of irrigation systems from the government to the private sector or local organizations.

Taking the importance of underlying issue, beneficiaries' cooperation absorption policy has been considered in agenda of water and agriculture sectors since 1991. It has been widely focused in country's developmental programs, though no desired results have been obtained till now. Beneficiaries have not indicated wide tendency in managing irrigation systems, considering these channels management and maintenance as government's task. Although unified and systematic cooperation of beneficiaries' associations for managing water, which results in transferring water management finally, requires necessary legislation and state supports, beneficiaries' tendency to cooperate in water management is one of the most important necessities. Because in all cases cooperation should originate from individual's internal willing and if they recognize that their cooperation will solve one of their economic and social problems, then they would never hesitate (Saleki 1990).

In this regard investigation and improving factors influencing beneficiaries' tendency to cooperate in irrigation management is necessary to provide appropriate solution for local areas and rural people's widespread and comprehensive presence in maintenance and utilization management of irrigation systems.

1.1 Research background

Mohammadi (1382) has done a study entitled "Factors Affecting the Participation in Watershed Management Plans" in the villages of Bushehr province. The variables examined in this study consist of social cohesion, social awareness, motivation, social confidence, socioeconomic status, farming experience. Using regression and correlation, the correlation between these variables has been approved. Salavati (1375) in a study titled "The participation in irrigation networks in the provinces of West Iran" has concluded that factors such as age, number of pieces of irrigated land, the type of irrigation network, the area of irrigated land, the educational achievements of farmers, the types of agricultural products and agricultural revenue have great effect on the participation of beneficiaries in the management of irrigation systems. Afshar and Zarafshani (1387) in Kermanshah conducted a study entitled "Analysis of willingness to participate in irrigation management" and concluded that variables such as the amount of land ownership, level of education, the status of irrigation facilities, attitude towards participative management of irrigation and age were the most important factors in determining the beneficiaries' willingness to participate in irrigation management. Dabbaghi (1390), in a study entitled "Factors affecting the rate of beneficiaries' participation in the implementation of the dam and Qeysaraq irrigation system in Saraab city" conducted by multiple regression method has concluded that there is a significant relationship between the rate of participation and the independent variables of the number of dependents, the amount of land ownership, beneficiaries' motivation, awareness of the objectives of the plan, the non-agricultural income and satisfaction with the performance of executive bodies.

Axelrod (1950) cites the biggest differences in community participation among the groups as differences in education, occupation of the head of the family and income of the family. According to his research, the participation of families with high agricultural revenue and highly educated people is twice higher than low-income families and individuals with low education. De Long et al (2000) in a study entitled "irrigation methods in poor villages" made in rural South Africa concluded that the main reason for unwillingness of the poor rural people to participate in irrigation projects is that they fear the confrontation with unknown situations and possibly the loss of their minimum. Aim et al. (2001), according to a study conducted in Korea entitled "the participation of farmer organizations in irrigation management" stated that 54.2 percent of beneficiaries considered the participation in irrigation management as difficult and almost impossible and stated the cause of this problem as low sense of collectivism. Tanaka and Sato (2005), in a study entitled "Management of irrigated areas" in Japan concluded that farmers

considered the issue of justice and make it their priority. This study shows that the use of beliefs and traditional customs (such as the role of the village headman and traditional and rooted groups in the region) have an enormous impact on success of participative management.

2. Conceptual framework

In the M'in dictionary the word willingness means to express the desire, tilting towards something, orientation, desire, affection and feeling. Based on psychological resources and according to the researchers such as Kim and Hunter, the desire to do a behavior is the best predictor of that behavior (Kroger et al., 2000). The most famous and most important theory that has been proposed in this context is owned by Aghen and fishbine. They think a behavior is predictable, understandable and explainable in a manner that we pay attention to the intention of the person's behavior. In other words, the behavior occurs in a continuum of factors and the loop before the behavior is the behavioral intention.

Today, the term participation has many applications and is used in various fields. Many of program targeted absorption of participation of a level or levels of community in development projects and a lot of programs are planned based on community participation in the implementation of all or part of it. Few would disagree with the fact that participation by people is the key for the success of any rural development plan. The issue is not emphasize the importance of is participation, but in the context of sustainable rural development, is to reach an agreement on the concept of this term, provided that such action is both valid and feasible. Despite the antiquity of participation among human societies and act on it, the term participation and partnerships entered the culture of development for the first time in the late 1950s and it took a long time to enter the rural arena. The issue of participation of villagers in rural development programs is an issue whose starting point goes back to the 1970s and 1980s (Bagheri, 1389). Acceptance of the principle of equality is the fundamental idea of participation and its purpose is people's consultation, cooperation and collaboration to improve the quantity and quality of life in all of the social, economic and political aspects. Participation is a process through which people achieve change and provide transformation in themselves. Craft and Birasfvrd have considered the developments such as the emergence of new social movements, contemplation and review of human requirements, re-emergence of citizen idea and the post-modernism as the incentive to attention to the notion of participation (Niazi, 1383).

Participation is based on the fundamental belief that all people have the right to feel responsibility on the matters relating to them, think about them, express their thoughts without fear and influence the decisions affecting their lives.

- In fact, participation in the eyes of experts is of such credibility that some consider development equivalent to participation. Therefore, sustainable rural development without

adopting the ways in which public participation is seen as infrastructure is impossible. Participation is in fact a lever that leads persons with disabilities towards abilities and changes their potential abilities into actuality and adds to their power to take advantage of the life.

- Participation can be considered the process of empowerment of the disadvantaged and the excluded. This view is based on the identification of different social classes' differences in terms of political and economic power. Participation in this regard presupposes to develop democratic, independent and self-reliance institutions for the poor (Bagheri, 1389). German scholar Kurt Lewin believes that participation reduce the resistance of people against change, modernization and innovation the increases their compatibility. In a participatory environment, conflicts are replaced by cooperation.

In recent decades, the attention to the phenomenon of participation and emphasizing on its role as one of the most important factors of development is to a great extent due to the experience of failure of development programs in the 1950s and 1960s. In reviewing programs, the lack of utilization of public participation is assessed as the main cause of failure of development programs. What the sequence of development planning in past decades suggests is that this program is largely based on centralized and top-down designing. The insufficiency of these approaches is that most people have rarely been involved in development planning and have not had an active role in development programs. But in 1980s, the focus of many social planning thinkers has shifted to new planning based on partnership down- top designing (Niazi, 1383).

Today, participation is seen as the basic and integral component of development. Development in general, is a complex, comprehensive and planned developmental process which in occurs in socio-economic, political and cultural life of a society and guides it from the status quo towards desired situation. Accepting the new concept of development and working toward its realization is to accept the features the age of reason and intellect in which lies rational action, calculating and planning. So to set the process of any kind of development, it is necessary to create harmony between goals and means of achieving them, use all of the potential natural and human resources as appropriate and calculated and value all these resources in their various aspects.

In other words, participation is one of the conditions for the realization of economic, social and political development and focuses on the people's active, creative and effective role in the development process. In fact, participation is a process involving a variety of actions of individuals and groups to achieve self- and community- determination involvement and influence in the decision-making about a public affair (Abdullahi, 1383).

In Iran, where water resources have limited potential and the agricultural development is subject to it, it is evident that the water current harvested water and harvestable water will not meet the agricultural development trend and supply food to growing community population. So what is important in this context is to optimize water use management together with the demand

management in industry, agriculture, drinking and the environment to allow sustainable development in all economic sectors, particularly agriculture. This is possible at the present time by adopting proper policies, among which the most important is the transfer of irrigation network management to the private sector or beneficiaries or get their participation in the operation and maintenance of irrigation network. The beneficiaries' participation in all stages of development of irrigation and drainage networks in with regard to the purposes that can be imagined in participation and self-assistance of the beneficiaries is very important and effective. This role could be setting priorities during the study phase, helping to meet financing, human resources and other needs and providing facilities in the implementation phase and finally, in the utilization of networks phase, cooperating and taking responsibility on how best to implement the developed plans (Hayati et al., 1389). Accordingly, the research hypotheses are as follows:

1. The individual characteristics of beneficiaries are effective in their desire to participate in the management of irrigation network.

2. The economic characteristics of beneficiaries are effective in their desire to participate in the management of irrigation network.

3. The social characteristics of beneficiaries are effective in their desire to participate in the management of irrigation network.

3. Research Methodology

The research is descriptive and correlational. The research is field research in terms of control, and in terms of collecting required data is survey. The population in this study consists of beneficiaries of Sattar Khan Dam irrigation downstream network which includes three areas of development made up of 32 villages with 1624 beneficiaries. The sample size was calculated through Cochran's formula and its corrected formula and they were selected by the stratified sampling of 260 beneficiaries. In order to collect data for the study, various tools were used. In documentary section, articles, magazines, Quarterlies, monthlies, dissertations and books were used; and in the field section, questionnaires and interviews were used which were completed by reference to the selected samples in the visited villages. The main instrument -the questionnaire- consists of six parts as follows:

The first part - general questions including general and individual profile, work experience, education, land ownership, occupation and income

The second part - questions relating to the satisfaction of individuals with the current status of irrigation management

The third part - questions about people's attitudes to participation in irrigation management

The fourth part - questions relating to people's personality traits, including self-esteem, individualism, fanaticism and responsibility

The fifth part - questions about the possibility of a collaboration platform that includes paying the water right, participating in meetings and training classes and quality use of water, and

The sixth part - questions about people's willingness to participation, which includes tendency to maintenance and repairing the facilities, establishment of cooperatives for irrigation water distribution and paying the irrigation costs by beneficiaries. To assess the reliability of the answers, Cronbach's alpha is used, which is equal to 0.78, and is optimally reliable. The reliability of the questionnaires was initially estimated by content validity method. So after being designed, a questionnaire was given to 17 experts in East Azerbaijan Province Regional Water Authority and university of Tabriz professors and after gathering their views, the final questionnaire was made accordingly. SPSS software was used for data analysis; and to explain the effect of the defined independent variables on the willingness to participate as a dependent variable, the logit regression model was used.

4. Research Results

The results of the study are expressed in two parts: descriptive and inferential.

Table 1: descriptive results of the individual and economic characteristics of the beneficiaries

Variable	**Group with tendency to cooperate**				**Group with no tendency to cooperate**			
	average	**Standard Deviation**	**minimum**	**maximum**	**Average**	**Standard deviation**	**minimum**	**maximum**
Age	45.9	12.9	25	77	50.8	13.28	41	60
agricultural History	33.4	14.07	3	65	37.2	17.4	2	50
Land ownership(per hectares)	4.8	1.2	1	12	3.9	1.4	1	7
Agricultural income(million Rails per each	3.4	1.4	1	8	2.8	1.6	1	5

month)								
Other incomes	3.7	2.4	1	10	2.05	1.6	0.5	7
Number of children	3.6	1.6	1	7	3.2	1.7	2	8

Results obtained from table 3 indicated there is a large difference between variables of land ownership, agricultural income and other variables among two groups of having tendency to cooperate at irrigation management and group with no tendency to cooperate in such management in a way that average land ownership in group with tendency is 4.8 hectares and in group with no tendency is 3.9 hectares. The income amount for group with tendency is 3400000 Rails and in group with no tendency is 2800000 Rails per each month.

Table 2: Frequency distribution of social features characteristics of the beneficiaries

Variable		**Variable Category**		**Partnership Group**		**Disengagement Group**	
				Frequency	**Frequency percent**	**Frequency**	**Frequency percent**
The main occupation	farmer	162	79. 4	50		84. 7	
	Worker	8	3. 9	0		0	
	Employee	18	8.8	2		3. 4	
	Freelancer	15	7. 4	0		0	
	Retired	1	5	7		11. 9	
Gender	Male	200	98	54		91. 5	
	Female	4	2	5		8. 5	
Education	Illiterate	50	24. 5	14		23. 7	
	Primary school	65	31.9	14		23. 7	
	8^{th} school	42	20. 6	17		28. 8	
	Diploma	21	10. 3	11		18. 6	

	Associate degree	11	5. 4	1	1. 7
	Bachelor's degree	12	5. 9	2	3. 4
	Master's degree	3	1. 5	0	0

The results of Table 2 show that the main occupation of 79.4% of the participation group and 84.7% of the disengagement group is agriculture, and the gender of 98% of the participation group and 5.91% of the disengagement group is male. In the participation group the primary school has the highest frequency with 31.9% and the master's degree has the lowest frequency with 1.5% and in the disengagement group, 8th school was the most frequent with 28.8% and the Bachelor's degree was the lowest with 4.3%.

Testing the research hypotheses

The results of Table 3 show that all the variables in the factors independence test except age, main occupation and education are significant both with willingness and unwillingness.

Table 3: Factors influence test (independent two-sample t-test) on the existence of willingness and unwillingness

The impact of the following factors on willingness and unwillingness	**The type of test**	**value**	**P-value**
Age	T statistics	1. 4	0.16
main occupation	T statistics	0. 009	0. 993
Land ownership	T statistics	-3. 867	0.0001**
The agricultural income	T statistics	-2. 999	0.003*
Other incomes	T statistics	-2. 221	0. 028*
The number of children	T statistics	-3. 334	0. 001**
agricultural history	Chi-2	------	0.0001**

Gender	exact Fisher	------	0. 029*
education level	Chi-2	------	0. 254

* at 95% ** at 99%

The results of Logit model assessment

In order to identify factors that explain the dependent variable, the explanatory variables were placed in different models based on theoretical framework and literature. Finally, among the different models, the best model was chosen according to the goodness of fit, significance of the regression and significance of explanatory variables. The variables were entered in Logit regression simultaneously. Among the six variables, four variables were significant and two variables were excluded from the model.

In this part we will examine linear relation test of dependent and independent variable. Statistical hypothesis is $H_0: \beta_i = 0$ against$H_1: \beta_i \neq 0$. If our hypothesis is null hypothesis then it means that there is no regression line slope and if hypothesis 1 is correct it indicates the existence of linear slope. Considering point estimation of β_1 it can be easily indicated that β_1 is linear combination of Y_i

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6$$

$$Y = -11/074 - 1/161X\_1 + 4/412X\_2 - 0/39\ X\_3 - 1/858X\_4 + 3/434X\_5 + 0/34X\_6$$

Where Y is the willingness and unwillingness to cooperate, X_1 is agriculture history, X_2 is agricultural income, X_3 is gender, X_4 is non-agricultural income, X_5 is land ownership and X_6 is number of children.

Hypothesis test for intercept of regression line

For test

$$\begin{cases} H_0: \beta_0 = 0 \\ H_1: \beta_0 \neq 0 \end{cases}$$

Null hypothesis indicates that regression line has no intercept. Considering results obtained from logistic regression it was observed that $-p = 0/002 < \alpha = 0/05$Moreover it has intercept in significance level of 0.05of regression line

.Considering non-significance of X6 and X 3, the underlying formula changes as following:

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_4 X_4 + \beta_5 X_5$

.$Y = -11/074 - 1/161X\_1 + 4/412X\_2 - 1/858X\_4 + 3/434X\_5$

Table (9): The results of logit regression

Variable name	B	significance	the total stretch of the given weight	the final effect
Intercept	-11.074	0. 002	-2. 16	---------
Agricultural history	-1.161	0. 035	-1. 65	-0. 013
agricultural income	4. 412	0. 0001	0. 257	0. 028
Non-agricultural income	-1. 858	0. 0001	-2. 18	0. 0023
land ownership	3. 434	0. 0001	2. 28	0. 018
Gender	-0. 390	0. 433	1.1	0. 00011
Number of children	0. 340	0. 580	0. 73	0. 0023
Nagelkerke R Square=0.793		Log likelihood = 87.284		

Nagel Kirk R^2 indicates that 79% of variation of dependent variable is explained by four variables agricultural history, agricultural income, rates of land ownership and non-agricultural income. The results of table indicate that the variables of agricultural history and non-agricultural income have significant and negative effect on the beneficiaries' willingness to participate; i.e. by increasing them, their willingness to participate decreases. Meanwhile, the variables agricultural income and land ownership have a direct and positive relationship with the beneficiaries' willingness to participate.

5. Conclusion

Next, the factors affecting the beneficiaries' willingness to participate were analyzed, the results of which are expressed. The first factor is the history of agriculture. The estimated coefficient (-1.261) shows that first, this variable is negatively correlated with beneficiaries' willingness to participate; i.e. with increase in agricultural history, the beneficiaries' willingness to participation is reduced. According to the total stretch of the given weight (-1.65), it can be said that on average, with one per cent increase in agricultural history if other conditions are constant, the beneficiaries' willingness to participate decreases by 1.65%. The ultimate effect obtained from this variable is (-0.013). In interpreting this coefficient it can be said that with one unit increase of beneficiaries' agricultural history, willingness to participate decreases by 1.3%. This is consistent with the results obtained in the study of Mohammadi (1382). The next variable that was analyzed was agricultural income. This variable has direct and significant relationship with the beneficiaries' willingness to participate, in the sense that if the beneficiaries' agricultural income increases, the beneficiaries' willingness to participation increases. To interpret this variable with the coefficient of the total stretch of the given weight that is equal to 0.257, it can be said that keeping other factors constant, with 1% increase in the agricultural income of beneficiaries, the beneficiaries' willingness to participate increases by 0.257%. Regarding the ultimate effect of this variable which is equal to 0.028, it can be said that with one unit increase in agricultural income of beneficiaries, the beneficiaries' willingness to participate increases by 2.8%. The results of Axelrod (1950) and Salavati (1375) confirm this. Another variable is non-agricultural income. Considering the estimated coefficient (-2.958) shows that, firstly, this variable is negatively correlated with the beneficiaries' willingness to participate; i.e. with the increase in non-agricultural income, the beneficiaries' willingness to participate decreases. According to the total stretch of the given weight (-2.18) we can say that, on average, with 1% increase in non-agricultural income, if other conditions are constant, the beneficiaries' willingness to participate decreases by 2.18%. The final effect obtained for this variable is equal to 0.0023. In interpreting this coefficient, it can be said that with one unit increase in non-agricultural income of beneficiaries, the beneficiaries' willingness to participate decreases by 0.23%. This research is in line with Dabbaghi (1390). The last variable that was analyzed was land ownership. This variable has direct and significant relationship with beneficiaries' willingness to participate, so that by increasing the amount of land ownership, the beneficiaries' willingness to participate increases. The total stretch of the given weight for this variable is 2.28. It means, keeping other factors constant, with 1% increase in the land ownership, the beneficiaries' willingness to participation increases by 2.28%. The ultimate effect of this variable is equal to 0.018, which means that with one unit increase in land ownership, the beneficiaries' willingness to participation increases by 1.8%. This research is also consistent with Afshar (1387) and Salavati (1375).

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