RESEARCH PAPER

Factors affecting on maintenance of the irrigation network in alborz dam viewpoint of members of water user association (WUA)

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Abstract
The aim of this research is the investigation of effective factors on maintenance of irrigation network in Alborz Dam viewpoint of members of Water User association (WUA). The type of this research is applied and it is used the method of description-correlation. The members of Water User association were selected as statistical society (N=306) and use the method of cluster sampling by appropriate assignment. Validity of the instrument was established by a panel of experts consisting of senior faculty members and research committee advisors. Reliability analysis was conducted by using Cronbach alpha formula and result was 0.93. The results showed that 14.4, 54.6 and 31 percent of respondents expressed that their situation in maintenance of irrigation network were weak, moderate and good respectively. Also the results of the multiple regression analysis (stepwise method) revealed that social, management and psychological factors explained a variation of 23.9 percent of irrigation network maintenance.

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Introduction

Iran is located in a very sensitive position from the different views in the basis of the management of water sources. During the last three decades, this country has invested a lot in basic constructions, thatapply 100 dams with saving capacity of 30 billion cube meters and irrigation networks for watering and providing drinkable water for urban areas (The Executive Branch of Agricultural Organization project, 2009). After one period of fast extension of watery territory in the world that took place between 1950s until the beginning of 1980s (Kahrizi & Sangdel, 2001). In many developing countries, the governments designed and performed the irrigation network without cooperation of beneficiaries (Kord, 1996). As a result and because of permanent infirmity of the irrigation network turnover by the management of government agencies, limited involvement of water user in the management of irrigation network and inability of many governments to collect sufficient water prices from farmers in the late of 1980s transfer power to manage water consumer associations or other NGOs changed (Shokri *et al.*, 2011). The issue of water scarcity is a growing global problem. So that some future crisis, world water crisis, experts say. The growing demand for water in the work, on the one hand, and the restrictions on the importance and sensitivity of the renewable water resources management caused water has increased (Poor Atashi, 2007). On the one hand, water restriction channel and poor performance and on the other hand, its impact on water productivity in agriculture need to provide an effective method to optimize utilization of the irrigation channel requires (Shari, 2010). Considering that more than %90 of water used in agriculture used in agriculture where as the mechanisms and procedures necessary to resolve operational issues, improvement, utilization management, maintenance of irrigation, drainage network in the establishment and improvement of water productivity is evident (Osareh, 2002). Irrigation network consists of a series of water channels that lead agriculture water from its source (dam) to the location of the usage (farm land or garden). It can be traditional or modern (MahmoodiKaramJavan, 2009). Financial burden arising from the cost of irrigation network on the country annual budget and the inability to solve many of the problems caused that through state-led management system, many governments are trying to take responsibility for managing irrigation networks, public water suppliers, and local services including those transferred to WUAs. WUAs include set of farmers and agricultural water users that have lands with defined and clear boundaries and receive water from a common source (harness and channel the water output) (Ghanaat, 2009) and as NGOs partnership are responsible for operation and maintenance of water distribution networks to provide sub-irrigation (MahmoodiKaramJavan, 2009). Mohammadi *et al* (2013) concluded that more than %70 of farmers was faced with water shortage. There are significant negative relationships between farmers' perception of water scarcity and variables such as depth of water in wells and also there are significant positive relationship between these variables and challenges such as water conveyance channels and water volume. Hosseini *et al* (2011) showed the factors influencing the adoption of indigenous knowledge in agriculture water management. These factors, on the amount of their impact, are classified into four groups, namely, social factors, educational factors, economical factors and administrative factors. Ommani (2011) showed the expanding role in promoting the realization of sustainable water resource management in agriculture. %52.8 of respondents said they were very important to protect water resources in support of sustainable water resources management in agriculture. Hosseini *et al* (2010) concluded that seeing other farmers using indigenous knowledge will affect them. They also said that farmers would prefer to see sample farmers to adopt irrigation techniques. Management factors contribute to the adoption of indigenous knowledge in agriculture water management, too. Fraiture & Wichelns (2010) expressed that while at the same time in different areas of water scarcity in agriculture is rising, water

demand by the users is extremely competitive to get water. Narayan (1995) showed that in all cases, community empowerment, capacity building, enhancing skills and awareness and interested groups with regard to their participation in water management and how to achieve it, have a positive impact on the development and maintenance of cooperative activities of water users. And also according to Tabrai *et al* (2011) transfer of operational management and maintenance of irrigation and drainage network extraction reduce the area of water resources and improve agriculture statues. They also expressed that the major problem about the management transfer is water shortages and lack of planning for the optimal use of water resources. MahmoodiKaramJavan (2009) showed in a research that there is a significant relationship between the educational level of farmers, incomes satisfaction levels, social status, the ability to predict the results of participation, history of agriculture, understanding the benefits of oarticipation, extent of land and overall service satisfaction with the rate of participation in irrigation network management and extension programs. Moradi and Tavakoli (2008) showed skyrocketing costs of operation and maintenance of irrigation and drainage networks and also inadequacy of water fees for the costs was the first motivation for participation in the management of irrigation and drainage networks. Additional factors such as utilization management and poor, improper maintenance, failure to satisfy farmers, lower performance and accelerating the erosion process network make governments more determined to transfer network management to farmers. Azizi (2007) showed that devolution of irrigation management not only helps to reduce the financial burden of government but also improve network management system. It results in increased productivity and enhanced sensitivity to the maintenance and conservation network. This will have great benefit for farmers.

Developing, operating and maintaining an irrigation networks almost always requires joint action by the water users. In traditional irrigation networks, farmers would get together to build a diversion weir across a river or dig an access canal, because these were things they could not accomplish on their own. Without a capacity for organization and decision making among the users, it was simply not possible to complete a scheme. This capacity helped users to develop an organization capable of operating and maintaining the networks.

This study was aimed at investigation of effective factors on maintenance of irrigation network in Alborz Dam viewpoint of members of Water User association (WUA). In order to achieve this objective, specific objectives are presented as below:

• Study of Status of maintaining Alborz Dam Irrigation network
• Study of relation of variables related to the research with maintaining Alborz Dam irrigation network
• role of research variables on maintain of irrigation network in Alborz Dam

Method of research
Research method
In relation to objective, this research is functional, since the results can be employed by programmer and policy makers. In order to reach precise and reliable data we used quantitative method. Because this research simply investigates existed conditions and defines them and there is no possibility to control or manipulate the variables, it is descriptive. Because the gathering of information about the views, beliefs, thoughts and behaviors or group characteristics of a society is statistical and also it is under recognition, so it is measuring. Furthermore, because it investigates and analyzes the relations between independent and dependent variables, it is correctional.

Statistical population
Statistical society of this research included members of members of Water User association in Alborz Dam

(N=306). Use the method of cluster sampling by appropriate assignment.

Validity and reliability

To determine the validity, several versions of questionnaire were given to the members of the faculty of the Department of Agricultural Extension and Education and WUA members. Also a pilot test was conducted to determine the reliability of the survey instrument. In this test, the mentioned questionnaires were given to 20 persons of members of the association. After gaining the data concluded the Cronbach alpha coefficient for all the variables with ordinal scale of 0.93.

Variables

The independent variables were: attitude toward irrigation network, social, management, educational, economical, and psychological factors. Dependent variable was maintenance of irrigation network. In order to determine the attitude we measured 11 questions, 9 questions for social factor, 13 questions for management factors, 11 questions for educational economical factors, 7 questions for economical factors and 7 questions for psychological factors (none=0, very low=1, low=2, average=3, high=4, very high=5)

Findings

Status of maintaining Alborz Dam Irrigation network

Status of maintain of irrigation network in Alborz Dam were measured by 13 questions with a range of Likerts 6 items. The scoring of the mentioned range was 0=nothing, 1=very little, 2=little, 3=average, 4=high, 5=very high. Thus, the maximum score of maintaining irrigation network is 65 and the minimum score is 0. Table 1 shows average, standard deviation, the coefficient of variation associated with the status of each questions related to the situation of maintain of irrigation network in Alborz Dam among the respondents. Based on the mentioned table, the first until the third priorities were the management of the increasing water storage in dams, organizing and development of members of the downstream dam and avoid unexpected accidents and natural disasters in channel. Priorities of other items can be seen in Table 1.

Table 1. Prioritizing the items related with the maintain of irrigation network in Alborz Dam.

item	average	Standard deviation	Coefficient of variation	rank
The management of the increasing water storage in dams	3.31	0.88	0.265	1
organizing and development of members of the downstream dam	3.01	0.87	0.289	2
Avoid unexpected accident and natural disasters in channel	3.01	0.90	0.299	3
Management of Alborz Dam project and the water amount of the dam	2.91	1.06	0.366	4
Visit and inspect ongoing irrigation facilities	2.80	1.05	0.374	5
Proper distribution of Alborz Dam water channel between farmers	2.75	1.04	0.377	6
Timely supply of water	2.70	1.03	0.383	7
Cleaning, outfit, modernization and integration of farm lands	2.66	1.07	0.404	8
Efficient use of irrigation facilities	2.64	1.07	0.407	9
Proper management of the irrigation in dams	2.73	1.16	0.424	10
Additional water withdrawal by creating drainage	2.51	1.07	0.424	11
Cleaning water channels and management of optimal use of water	2.48	1.06	0.427	12
Construction of roads between farms	2.41	1.15	0.479	13

The range of Likerts 6 items: 0=nothing, 1=very little, 2=little, 3=average, 4=high, 5=very high

The status of maintaining the irrigation network viewpoint of the respondents showed in Table 2. According to the mentioned table, 14.4% of the respondents said that the status of maintaining of irrigation network was weak, %54.6 expressed moderate and %31 said it was good.

Table 2. The status of maintaining the irrigation network in view of the respondents.

status	Frequency	Percent of frequency	Cumulative percentage
Very weak (0-13)	0	0	0
Weak (14-26)	44	14.4	14.4
Moderate (27-39)	167	54.6	69
Good (40-52)	76	24.8	93.8
Very good (53-65)	19	6.2	100
Total	306	100	-
M = 35.9	SD = 9.3		

Relation of variables related to the research with maintaining Alborz Dam irrigation network

Rate, intensity, direction and significant levels for variable related to the research with situation of maintaining irrigation network showed in Table 3. As the table shows attitude, management factors, educational factors and psychological factors have positive and significant relationship with maintaining irrigation network in the level of %99. In order to economic factors with maintain the irrigation network positively and significantly of the level of %95.They will have negative and significant relationship with the maintaining the irrigation network of the annual income at the level of %99.

Role of research variables on maintain of irrigation network in Alborz Dam

In order to predict the role of research variables on maintain of irrigation network in Alborz Dam, we used step by step regression. Analyzing the regression enables the researcher to predict the variance of dependent variable through independent variables and determine the role of every independent variable

in explanation of dependent variable. In step by step method, the strongest variables enter the equation one after another. This process goes on until the errors of meaning exam reaches to 0.05 errors. Results showed social, management and psychological factors enter the equation in steps one and three, respectively. This means that social factors have the highest influence on maintain of irrigation network. This factor alone explained 21 percent of variance in dependent variable. Social and management factors communally explained 22.3 percent of variance in dependent variables, in step two. And in the third step, social, management and psychological factors explain %23.9 of the dependent variables, totally.

Table 3. The relation of variables related to the research with maintaining Alborz Dam irrigation network.

Sariables	Pearson correlation coefficient	Significant level
Rate of annual income	-0.149**	0.009
Rate of farm land	0.002	0.967
attitude	0.174**	0.002
Social factors	0.459**	0.000
Management factors	0.429**	0.000
Educational factors	0.171**	0.003
Economical factors	0.136*	0.017
Psychological factors	0.233**	0.000

*p<0.05   **p< 0.01

Table 4. Regression analysis to maintain of irrigation network.

Steps	R	R Square	Adjusted R Square	F	sig
1	0.459 [a]	0.210	0.208	80.91	0.000
2	0.473 [b]	0.223	0.218	43.54	0.000
3	0.489 [c]	0.239	0.232	31.69	0.000

a: Social factors

b: Social factors and Management factors

c: Social factors, Management factors and Psychological factors

Table 5. standardized and non-standardized coefficient of maintain of irrigation network.

variable	B	Beta	t	Sig
Social factors	0.37	0.25	3.01	0.003
Management factors	0.25	0.21	2.63	0.009
Psychological factors	0.19	0.13	2.53	0.012
Constant	4.35	-	1.06	0.289

Dependent variable: maintain of irrigation network

Based on the amount of β in the table 5, the regression equation can be written as follows:

$$Y = 0.25 X_1 + 0.21 X_2 + 0.13 X_3$$

Social factors = X_1
Management factors = X_2
Psychological factors = X_3

Discussions and conclusions

Results indicate that there is no significant relationship between the amount of agricultural land and the irrigation network. Also based on the results and attitude to maintain the irrigation network, social, management and educational factors had positive significant relationship with the preservation of the irrigation network at the level of %99. But economical factors have positive significant relationship with the preservation of the irrigation network at the level of %95. Annual income has negative significant relationship with the preservation of the irrigation network at the level of %99. It means that to maintain the irrigation network and with improvement in the attitude, social, management, educational, psychological and economical factors also heals the status of this network. Although, the situation of the irrigation network with improved annual income does not improve. Also, the intensity of this relationship is moderate for social and management factors and it is low for educational factors, economical factors, psychological factors, the rate of annual income and the attitude to the maintaining of the irrigation network. These results were confirmed by (Iftekhar, 2011)., (Hayati *et al*, 2010)., (MahmoodiKaramJavan, 2009)., (Ghanaat,

2009)., (Moradi and Tavakoli, 2008)., (Heydarian, 2007)., (AbdollahiEzzatAbadi, 2007)., (Ghalavand, 2006)., (Besharat *et al*, 2006)., (Khorshidifar, 2005)., (Sohrab and Abbasi, 2005)., (Momeni, 2003)., (Mojtabavi and Sasanian, 2003)., (Heikooi, 2002)., (Mahdavi, 2002)., (Tavakoli, 1999)., (Kaveh, without date)., (Ghasemi, without date)., (Mohammadi *et al*, 2013)., (Ommani, 2011)., (Hosseini *et al*, 2011)., (Hosseini *et al*, 2010)., (Steger, 2005)., (Narayan, 1995)., (Bos and Nugteren, 1982).The regression results reflect the impact of social, management and psychological factors on the maintenance of the irrigation network.

Due to effect of social factors on maintaining the irrigation network, it is recommended that increase the mutual cooperation between the government and members of the organization. Also, these members are encouraged to join the NGOs to feel responsible for the efficient use of the water irrigation and the irrigation network rules. Also Due to the management factors on maintaining the irrigation network, it is recommended to increase organization members' confidence and improve activities related to the irrigation, water management, soil and environment. According to effect of the educational factors on maintaining the irrigation network, it is recommended to use the knowledge of water and soil experts more, use radio and TV programs related to the irrigation affairs and also the services of consulting firm. In final According to effect of the psychological factors on maintaining the irrigation network, although positive attitudes of members of the association change group visits to the irrigation districts, it is recommended to create the required fields to promote awareness, capacity building educational and cultural activities which are beneficial to the members of the association.

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