

Farmers Active Participation in Water Conservation: Insights from a Survey among Farmers in Southern Regions of West Azerbaijan Province, Iran

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ABSTRACT

Nowadays, a paradigm shift can be observed from economic and technical investments to social-behavioral dimensions in order to increase efficiency of exploiting water resources. The purpose of the present study was to identify and analyze factors affecting Farmers Active Participation in Water Conservation (FAPWC). In this regard, a theoretical framework was developed for analyzing farmers participatory behavior. This study was a descriptive-correlational and causal relationship research which was conducted through a survey technique. The statistical population of the study included irrigated farmers in southern regions of West Azerbaijan Province in Iran. A sample of 378 irrigated farmers was selected using proportional stratified random sampling method. Data were collected using eight 5-point Likert-type scales. Validity of the scales was confirmed by a panel of experts, and their reliability was demonstrated by Cronbach's Alpha coefficients which ranged between 0.60-0.89, indicating internal consistency of the study scales. Parametric tests were used to analyze the data. The results of this study showed that the variables of moral norms of water conservation, social pressures, place attachment, social responsibility towards consequences of activities, quality of agricultural extension services, and satisfaction of water resources management had significant impacts on FAPWC. Moreover, the independent variables could predict 43.6% of variance changes in FAPWC. An attempt was made to examine the factors affecting FAPWC beyond the psychological individual-based (micro) analyses in order to develop the research framework and consider factors such as the effect of farmers' social environments and, consequently, present policy implications at micro- and macro-levels separately.

Keywords: Agriculture, Moral norms, Participation, Water conservation.

INTRODUCTION

Water scarcity is one of the most important problems that threaten environmental sustainability. (Valizadeh *et al.*, 2016; Hajihosseini *et al.*, 2016; Salehi *et al.*, 2017). Water scarcity refers to a condition characterized by insufficient water resources to satisfy the average, long-term total demand requirements by all sectors, including the environment (Gehrig and Rogers, 2009). It should be noted that water is of importance and great value because of its impact on ecological functions, programs of socio-economic development, cultural and

religious values, natural beauty as well as the worldwide limited water resources (Yazdanpanah *et al.*, 2012). However, water demands in some developed and developing countries have grown to the extents that are beyond the power and capacity of water supply providers (Valizadeh *et al.*, 2016). Furthermore, this issue has led to the emergence of several managerial problems and difficulties in the domain of water resources management in some regions (Yazdanpanah *et al.*, 2014; Bijani *et al.*, 2017; Mirzaei *et al.*, 2017). In addition, policy-makers of water resources management have recently diverted their attention from economic

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and technical investments to consumers (Hurlimann and Dolnicar, 2010). This issue is a paradigm shift in the domain of water resources management in which social and behavioral dimensions along with economic and technical investments should be taken into account in order to increase efficiency of exploiting water resources (Yazdanpanah *et al.*, 2014; Bijani *et al.*, 2017; Shiri *et al.*, 2011; Abbasian *et al.*, 2017).

In recent years, paradigm shift and authorities in charge of water resources management have moved towards demand-driven approaches (Bijani *et al.*, 2017). These changes have been much more intense, especially in the domain of agriculture, because the agricultural sector with 90-93% of fresh water consumption compared with health and domestic sectors (5-6%) and industrial sector (1%) is taken into account as the most consumer of fresh water (Forouzani and Karami, 2010; Yazdanpanah *et al.*, 2014; Bijani and Hayati, 2015; Valizadeh *et al.*, 2016).

In Iran, water scarcity is rooted in multiple causes (Yazdanpanah *et al.*, 2014). For example, Balali *et al.* (2009) state that the most critical reason for water scarcity in Iran is repeated droughts accompanied by population growth, leading to an increased pressure on natural resources. Yazdanpanah *et al.* (2014) also point to the effects of climate changes and Iran's geographic conditions (being located in a dry and warm region). In addition, Madani (2014) also refers to improper decisions of the government and water resource management authorities as another water challenge factor in Iran. This researcher highlights that, more than anything, the water scarcity in Iran is the result of decades of bad management and the concentration is on immediate development to achieve interim economic benefits. Given the existing political instability and insecurity within Iran, decision makers are more interested in populist development actions which produce immediate economic impacts. For instance, the representative of a region and/or city in the parliament can pressure the water authorities to finance a dam construction project to help the farmers in his region. If the project is accomplished, it can boost the regional economy alongside the legitimation of the representative. Locals would then be willing to support the same person in the next election round, while the long-

term environmental impacts are not associated with immediate economic benefits and political popularity.

Iran has always suffered from a seriously inefficient agriculture that mainly depends on irrigation (Yazdanpanah *et al.*, 2014). The drivers of inefficient agriculture in Iran include cheap price of water, changes in rainfall patterns, mismatching the cropping patterns with water availability conditions, etc. It is apparent that the continuation of the current water use trends in the agricultural sector will exacerbate the water crisis. Iran seriously needs its agriculture to be modernized/industrialized and become economically efficient (Madani, 2014). Agreed by a large number of researchers (Azizi Khalkheili and Zamani, 2009; Yazdanpanah *et al.*, 2014; Bijani *et al.*, 2017; Salehi *et al.*, 2017), the lack of attention to consumption behavior of individuals and members of the community, especially the agricultural community, has been considered as the most significant reason for the emergence of water problems and issues. The farmers are the owners of the agricultural lands and doing and initiating any water use program (i.e. installing new irrigation technology, changing cropping patterns, waste water use, etc.) depends on their tendency and decision (Yazdanpanah *et al.*, 2014). It can be said that these problems are the products of rapid investment and growth in one sector without considering the dynamic relationships.

Although many parts of Iran have faced serious water crises in recent years, this issue has been special for West Azerbaijan Province due to its extensive and generally traditional farming as well as its proximity to Lake Urmia (Ghalibaf and Moussavi, 2014). Lots of factors have similarly affected water scarcity in this region; nevertheless, the role of on-farm agricultural activities and excessive water use in this sector cannot be overlooked in the occurrence of such a crisis according to experts. For example, Mojarrad-Ashnaabad (2013) in a study concluded that the amount of rainfall and water resources available in this region were higher than the required volume and the agricultural sector with an approximately 90% water use had played an important role in causing water shortages in this region. Thus, it seems that farmers should be considered as the main target audiences in terms of policies adopted for water

conservation and programs of water resources management.

The important point worth mentioning in this respect is that some experts suspect the effectiveness of individual behaviors to achieve the goals of sustainable development (Bamberg *et al.*, 2015; Valizadeh and Bijani, 2017) and argue that individualistic approaches are flawed because they do not consider context, infrastructural framework, as well as social and participatory activities. Accordingly, efforts should be made to focus on farmers active participation targeting commitment to consumption patterns and sustainable production instead of concentrating on changing individuals' consumption behaviors (Bamberg *et al.*, 2015).

Only a few studies have been conducted on "farmers active participation in water conservation (FAPWC)" in Iran (e.g. Salehi *et al.*, 2017; Valizadeh *et al.*, 2016; Yazdanpanah *et al.*, 2014; Yazdanpanah *et al.*, 2012) and there is no comprehensive recognition of the effective factors as well as the mechanisms and procedures to reinforce such behaviors. To fill the gaps and to address such needs and the existing issue in the study site; initially, this study aimed to identify some of the most important factors affecting the FAPWC and, secondly, to facilitate the implementation of the research results through presentation of some policy-making insights and observations to managers of water resources, relevant organizations, and even farmers.

Development of Theoretical Framework

Numerous views and models from different academic branches have been used to understand and explain the environmental behaviors such as the FAPWC. Accordingly, a review of the related literature indicated that researchers had employed different theories like Norm Activation Theory (NAT) (Schwartz, 1977), Value-Belief-Norm Theory (VBN) (Stern, 2000), as well as Theory of Planned Behavior (TPB) (Ajzen, 1991). However, Jaffee (1998) has reiterated that the employment of such individual theories is inherently restrictive and they have caused researchers only pay attention to personal, psychological, and mental characteristics of individual behaviors. In this

case, researchers may become blind to socio-economic environment and infrastructural conditions and characteristics (the effects of the activities of some organizations on individual behaviors) that may affect the behavior of people. This is one of the defects of the mere use of such theories for the analysis of behaviors such as the FAPWC. In addition, studies have shown that the given theories (NAT, VBN, and TPB) have been combined in most of the investigations to compensate for the weaknesses of each other while an overview of all these theories suggests that they have been concentrated on individual (micro) level and their combining and developing into another theory will only result in a micro-level theory which does not pay enough attention to environmental, social, and infrastructural dimensions (in addition to individual ones). It should be noted that the independent variables used to reinforce behaviors such as active participation in water conservation are all regarded as individual variables. In this regard, the present study attempted to review the related literature on farmers' active participation in conservation of natural resources such as water and to develop a different framework using previous theories in order to compensate for a part of the constraints for such theories.

The general purpose of this study was to identify and analyze the factors affecting the FAPWC. This type of participation is defined as "water conservation behaviors to achieve or to help achieve collective goals of agricultural community in particular, and those of other individuals in general". Moreover, the literature review demonstrated that individuals' "moral norms" are considered as one of the most important predictors and/or determinants of humanitarian (altruistic) behaviors such as active participation in water conservation (Schwartz, 1977; Pradhananga *et al.*, 2015). Accordingly, and given the NAT as well as the nature of the variable active participation in water conservation (as the dependent variable in the present study), the variable of personal norms to conserve water was specified as one of the non-mediating predictors of the FAPWC. Schwartz (1977) also defined personal norms in the form of a strong feeling of moral obligation which could direct individuals to participate in collectivistic behaviors (Bamberg and Möser,



2007). Besides, numerous studies have been done (Harland *et al.*, 2007; Pradhananga *et al.*, 2015; Pradhananga *et al.*, 2017) in which there is evidence of the impact of personal norms on conservatory behaviors among people. According to these investigations, moral norms are determined through important activators such as perceived social pressures (Bamberg and Möser, 2007; Zhang *et al.*, 2014), social responsibility towards consequences of the given activities (Schwartz, 1977), and place attachment (Gosling and Williams, 2010; Mullendore *et al.*, 2015). In this respect, other investigations (Schwartz, 1977; Stern, 2000; Bamberg *et al.*, 2015) have also indicated that assuming a sense of social responsibility, looking for its origins in “self”, and having personal norms related to active participation in conservation of water resources will be activated among people as they become aware of the consequences of their actions such as no active involvement in conservation of water resources. This has, in turn, resulted in reinforcing and motivating farmers to participate actively in water conservation.

Moreover, Willy and Holm-Müller (2013) argued that lots of farmers’ behaviors are heavily dependent on governing attitudes and values within the society in which the farmers are living. In this respect, research studies have suggested the significant effect of farmers’ social environments on their behaviors (e.g., Willy and Holm-Müller, 2013; Yazdanpanah *et al.*, 2014). In this study, the impact of farmers’ social environments (including family, those around them, etc.) on the FAPWC was formulated into “perceived social pressures”. Since Pradhananga *et al.* (2015) and Pradhananga *et al.* (2017) had put forward social pressures as one of the most important activators of moral norms; at first, this variable was indirectly linked to the FAPWC by moral norms, and then, it was directly related to farmers’ participation via its relative and direct impact predicted by research studies.

Gosling and Williams (2010) also proposed another idea to better reinforce responsible behaviors in individuals such as active participation in water conservation and maintained that recent research have suggested more intangible incentives such as “place attachment” playing an important role in the development of environmental behaviors by

farmers. The given researchers similarly refer to place attachment as a positive connection or an emotional bond between a person and a particular place. It seems that place attachment in farmers has been always taken into account as one of the components overlooked in social studies in the field of agriculture in general and conservation of water resources in particular. Accordingly, this variable was considered in the present study as one of the activators of moral norms in the domain of the FAPWC.

Initial exploratory observations in the study site and the review of the related literature suggested the presence of other variables and factors affecting farmers’ behaviors. For example, Azizi Khalkheili and Zamani (2009) referred to the variable of attitude to the staff of Department of Water Affairs and reiterated that the level of satisfaction of farmers with the activities of this department and its staff was one of the most significant factors involved in the formation of farmers’ participatory behaviors. In this regard, the level of satisfaction in farmers of water resources management was taken into account as one of the most important predictors of the behavior of active participation in conservation of water resources. Moreover, the initial exploratory observations in the study site reflected that the farmers were strongly affected by change agents of agricultural extension in the domain of active participation in water conservation. In this regard, the variable of quality of extension services was marked as another variable influencing the FAPWC. Finally, the theoretical framework of this study was developed on the bases of the results of the literature review of relevant theoretical and experimental studies on the socio-economic environmental factors that reinforce or undermine FAPWC, and it is represented in Figure 1.

MATERIALS AND METHODS

Research Design

This study was a non-experimental research with an applied purpose. In terms of the time of the data collection, it was a cross-sectional survey and also a quantitative research considering the nature of the data. Moreover, it

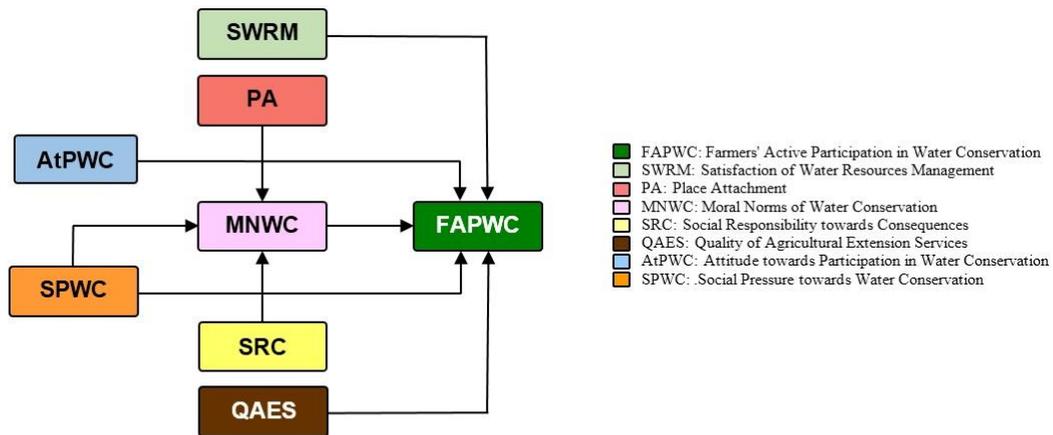


Figure 1. Theoretical framework of the study

was a descriptive-correlational and causal relationship research in terms of the method of data analysis.

Study Site, Statistical Population, and Sampling Method

This study was conducted in the southern region of West Azerbaijan Province in Iran. This province is one of the leading regions in the field of agricultural production and it is of agricultural-ecological importance due to its suitable soil for farming and its proximity to Lake Urmia (Statistical Centre of Iran, 2017). The statistical population in the present study included 23750 farmers. Farming in the study area was totally irrigated and the study sample

was selected from the irrigated farmers. The sample size in this study was estimated by a total number of 378 individuals using the Krejcieis and Morgan's Table (1970). Since the study site could be separated into different categories in terms of population variance (because the categories have different population sizes and category variance was different in terms of active participation in water conservation), stratified random sampling method with proportionate allocation was used (the categories consisted of 11 sub-counties) (Figure 2). In the pilot study and primary evaluations of the study site and population, it was observed that farmers' water conservation behaviors were variant in different geographical areas. For example, in some sub-counties farmers were more intent to use water conservation technologies and in some sub-

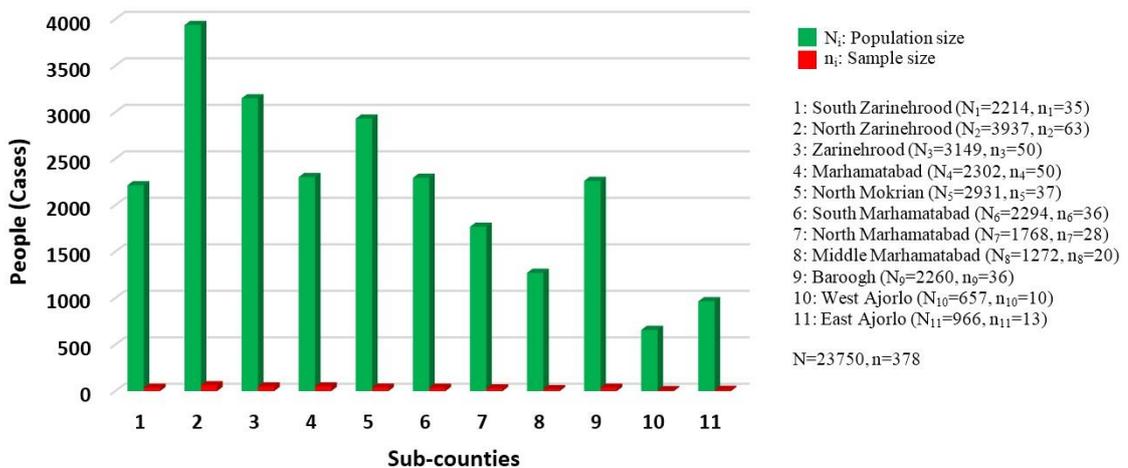


Figure 2. Categories in sampling: population size and sample in each sub-counties



counties farmers were more intent to repair the old canals. In addition, regarding that in the study population of this research the distribution and density of population were so variant in different geographic areas (in sub-counties), we tried to categorize the general study population to different strata with respect to the density of population. Afterwards, the sample was stratified in direct proportion to the size of the stratum/sub counties as compared to the population.

Survey Instrument

The research instrument was a self-administered questionnaire which its validity was confirmed by a panel of agricultural extension and education experts as well as specialists of Department of Water Affairs in West Azerbaijan Province. The Cronbach's Alpha coefficient was also employed to determine the reliability of the study scales. To this end, a pilot study was performed in an area outside the study site (including 30 farmers). Table 1 illustrated the study variables, operationalization methods, and their Cronbach's Alpha coefficients. After conducting the pilot study and making the required revisions in the research instrument, the questionnaire was prepared for the main survey.

The dependent variable examined in this study was the FAPWC referring to the behaviors and activities to achieve or help achieve collective goals within the agricultural community (other people in society). In this respect, 10 items were used to measure this variable through a 5-point Likert-type scale scored from 1 (strongly disagree) to 5 (strongly agree). All the independent variables except the variable of satisfaction of agricultural extension services were also measured in the form of a 5-point Likert-type scale rated from 1 (strongly disagree) to 5 (strongly agree) (encoding for satisfaction of extension services was from 1 (very low) to 5 (very much)). It should be noted that the operationalization process of the variables was performed based on the conceptual definitions as follows (operationalization metrics of all the variables can be observed in Table 1).

Moral Norms of Water Conservation (MNWC): Inspired by the definition of Schwartz (1977), moral norms of water conservation was

defined as a personal (moral) obligation to participate in conservation of water resources.

Social Pressures towards Water Conservation (SPWC): It refers to understanding of expectations by the agricultural community and those around farmers in terms of conservation of water resources (Yazdanpanah *et al.*, 2014).

Social Responsibility towards Consequences (SRC): It implies the sense of social responsibility in an individual to reduce the risks or consequences of problems or misuses such as water scarcity (Stern, 2000).

Attitudes towards Participation in Water Conservation (APWC): According to the definition by Ajzen (1991) and Monfared *et al.* (2015) for such an attitude, the attitude towards participation in water conservation was conceptualized as favorable or unfavorable evaluations by farmers to participate in conservation of water resources.

Place Attachment (PA): Gosling and Williams (2010) defined place attachment as a positive connection or an emotional bond between a person and a particular place such as agricultural land and place of living.

Satisfaction of Water Resources Management (SWRM): It refers to the desirability of farmers' attitudes towards management of resources and services offered by it.

Quality of Agricultural Extension Services (QAES): Kahuro *et al.* (2012) defined this variable as the favorable or unfavorable assessment by farmers for agricultural extension activities.

Data Analysis

From the 378 questionnaires distributed, a total number of 345 questionnaires were collected, out of which 23 cases were discarded due to their missing data and, finally, 322 questionnaires were analyzed in this study. The SPSS Software (Version 22) was also employed for data analysis. The statistical methods used to analyze the data included some descriptive statistics (frequency, mean, etc.), Pearson correlation test and path analysis. Normal distribution of variables is a requirement for the linear

Table 1. Survey items and Cronbach's Alpha coefficients.

	Items	Source
AtPWC: Attitude (Towards participation in water conservation) ($\alpha= 0.83$)		
1	Participation in water conservation is important but only under drought.	Bijani and Hayati (2013)
2	I think that currently participation in water conservation is unnecessary.	Yazdanpanah <i>et al.</i> (2014)
3	Increasing agricultural crops is more important than participation in water conservation.	Self-administrated
4	I believe that farmers' participation in water conservation is wise.	Self-administrated
5	Participation in water protection is favorable.	Yazdanpanah <i>et al.</i> (2014)
6	Participation in water conservation seems to be useful.	Self-administrated
SPWC: Social pressure (Towards water conservation) ($\alpha= 0.70$)		
1	My family thinks that I should participate in water conservation activities.	Pradhananga <i>et al.</i> (2015)
2	If I participate in water conservation activities, my family will approves me.	Yazdanpanah <i>et al.</i> (2014)
3	My family believes that participation in water conservation activities is favored.	Yazdanpanah <i>et al.</i> (2014)
4	If I make attempt for water conservation, I will be criticized by my friends and acquaintances.	Self-administrated
PA: Place attachment ($\alpha= 0.82$)		
1	My farm is my favorite place to be.	Gosling and Williams (2010)
2	I wouldn't want to farm anywhere else.	Gosling and Williams (2010)
3	My farm reflects the type of person I am.	Gosling and Williams (2010)
4	I feel my farm is a part of me.	Gosling and Williams (2010)
FAPWC: Farmers' active participation in water conservation ($\alpha= 0.89$)		
1	Participation in agricultural extension courses that are related to water conservation	Azizi Khalkheili and Zamani (2009)
2	Participation with other farmers to dredge of the irrigation canals	Self-administrated
3	Participating in maintenance of canals	Azizi Khalkheili and Zamani (2009)
4	Participation in paying for water conservation activities	Bijani and Hayati (2013)
5	Participation in repairing old canals	Yazdanpanah <i>et al.</i> (2014)
6	Participation with other farmers to use water-saving technologies	Yazdanpanah <i>et al.</i> (2014)
7	Participation with research departments about new water conservation methods	Bijani and Hayati (2013)
8	Encouraging other farmers to participate in agricultural extension classes that are related to water conservation	Yazdanpanah <i>et al.</i> (2014)
9	Encouraging other farmers to irrigate at night/evening or morning	Yazdanpanah <i>et al.</i> (2014)
10	Cooperation with other farmers in cultivating more tolerant crops	Yazdanpanah <i>et al.</i> (2014)
MNWC: Moral norms of water conservation ($\alpha= 0.83$)		
1	I feel that I am a better person if I conserve water resources.	Yazdanpanah <i>et al.</i> (2014)
2	I have a feeling of obligation towards water conservation.	Pradhananga <i>et al.</i> (2017)

Table1. Continued ...



Continued of Table 1 ...

	Items	Source
3	I feel I should do something useful for water conservation.	Self-administrated
4	I feel that I can help in improving the current bad situation when I participate more in conserving water resources.	Yazdanpanah <i>et al.</i> (2014)
5	I am personally committed to use conservatory activities on my agricultural land.	Self-administrated
6	I am committed to do anything to help in lowering the vulnerability of water resources.	Self-administrated
QAES: Quality of agricultural extension services ($\alpha= 0.61$)		
1	Providers of agricultural extension services can satisfy my information requirements in the domain of water issues.	Kahuro <i>et al.</i> (2012)
2	I am satisfied with providers of agricultural extension services.	Kahuro <i>et al.</i> (2012)
3	Providers of agricultural extension services seem reliable.	Kahuro <i>et al.</i> (2012)
4	Change agents of agricultural extension offer trainings in the field of modern irrigation methods.	Kahuro <i>et al.</i> (2012)
5	Providing information by change agents of agricultural extension helped me to do irrigation better.	Kahuro <i>et al.</i> (2012)
6	I receive regular trainings from the change agents of agricultural extension concerning the principles of optimal irrigation.	Kahuro <i>et al.</i> (2012)
7	If I need extension services, I know where to access it.	Kahuro <i>et al.</i> (2012)
8	I can communicate with providers of extension services whenever necessary.	Kahuro <i>et al.</i> (2012)
9	I usually meet providers of extension services in the agricultural land.	Kahuro <i>et al.</i> (2012)
10	The number of extension service providers in the region is sufficient.	Kahuro <i>et al.</i> (2012)
SWRM: Satisfaction (Of water resources management) ($\alpha= 0.78$)		
1	Transparency of rules and regulations of the Department of Water Affairs	Self-administrated
2	Ease of access to experts of the department	Self-administrated
3	Behavior, guidance, and accountability of those in the Department of Water Affairs	Self-administrated
4	Seriousness in providing services	Self-administrated
5	Equal and fair treatment to all audiences	Self-administrated
6	Providing appropriate and on-time training activities in terms of doing such activities	Self-administrated
7	Attraction of participation and cooperation by stakeholders in water management projects	Self-administrated
SRC: Social Responsibility (Towards consequences) ($\alpha= 0.60$)		
1	We are committed to conserve water resources.	Self-administrated
2	Water conservation is our duty and it is not exclusively the government's responsibility.	Self-administrated
3	Current problems in water management are due to the incompetency of managers and have nothing to do with farmers.	Self-administrated

regression analysis. In this context, we used the well-known test of normality, namely, Kolmogorov-Smirnov test. The results revealed that the variables were normally

distributed and suitable for the linear regression analysis.

RESULTS AND DISCUSSION

Descriptive Statistics

The descriptive statistics in this study revealed that, from the total number of 322 respondents examined, 5.4% (17 cases) were female and 94.6% (298 cases) were male (7 respondents had not answered this item). Also, the mean age of respondents was 41.99 years. Another demographic variable examined in this study was “attending training courses related to water management” whose findings derived from the survey showed that 107 farmers (33.2%) had taken such courses and 215 individuals (66.8%) had no history of attending such courses. The level of education in this study was measured in the form of a variable with a ratio scale (based on years of schooling) and the results suggested that the mean level of education was 7 years. The analysis of the preliminary findings associated with the variable of “presence or absence of non-agricultural activities” suggested that 38.6% of farmers (122 people) had other occupations in addition to farming; while 61.4% of them (194 people) introduced farming as their main occupations (6 respondents had not answered this item). Moreover, the mean of experience of agricultural activities in the surveyed sample was 17.33 years.

Relationships among Variables

The relationships among the study variables were measured by using Pearson correlation

coefficient (Table 2). The results of this stage of the analysis showed that the moral norms were positively and significantly correlated with the FAPWC ($P < 0.01$; $r = 0.349$). The findings were also confirmed by the results of studies by researchers such as Nordlund and Garvill (2003) and Pradhananga *et al.* (2015). Examining the correlations between the four variables demonstrated that the three variables of social pressures towards water conservation ($P < 0.01$; $r = 0.202$), quality of agricultural extension services ($P < 0.01$; $r = 0.208$), and satisfaction of water resources management ($P < 0.01$; $r = 0.524$) were positively and significantly correlated with the behavior of active participation in water conservation, while the variable of attitudes towards participation in water conservation did not significantly correlate with farmers' participatory behaviors ($r = 0.088$).

In the meantime, the values of correlation coefficients of the variables of satisfaction of water resources management and social pressures towards water conservation were greater than that of the variable of quality of agricultural extension services. Moreover, the relationships between the three variables of place attachment ($P < 0.01$; $r = 0.227$), responsibility towards consequences ($P < 0.01$; $r = 0.546$), social pressures towards water conservation ($P < 0.05$; $r = 0.115$), and the variable of moral norms of water conservation were positively and significantly correlated.

Causal Relationships among Variables

The results of multiple regression analysis

Table 2. Correlation matrix of the theoretical framework variables.

	FAPWC	MNWC	PA	SRC	AtPWC	SPWC	QAES	SWRM
FAPWC	1							
MNWC	0.349**	1						
PA	0.460**	0.227**	1					
SRC	0.294**	0.546**	0.254**	1				
AtPWC	0.088	0.033	0.080	0.185*	1			
SPWC	0.202**	0.115*	0.194**	0.342**	0.110*	1		
QAES	0.208**	0.014	0.049	0.107	0.112*	0.185**	1	
SWRM	0.524**	0.003	0.303**	-0.017**	-0.027	0.002	-0.073	1

FAPWC: Farmers' Active Participation in Water Conservation
 MNWC: Moral Norms of Water Conservation
 PA: Place Attachment
 SRC: Social Responsibility towards Consequences
 AtPWC: Attitude towards Participation in Water Conservation
 SPWC: Social Pressure towards Water Conservation
 QAES: Quality of Agricultural Extension Services
 SWRM: Satisfaction of Water Resources Management

* Sig. level: 0.05 error
 ** Sig. level: 0.01 error



revealed that the causal framework of the study could predict 43.6 and 30.8% of the variance changes in the FAPWC and moral norms of water conservation, respectively (Table 3 and Figure 2). To perform the calculations associated with path analysis, multiple regression analysis with the enter method was used. In the first phase of the causal analysis (based on the theoretical framework of the study), the direct effects of variables of moral norms, quality of agricultural extension services, satisfaction of water resources management, social pressures towards water conservation, and attitudes towards farmers' active participatory behaviors were examined. The results in this phase indicated that all of these variables could have significant effects on the FAPWC. However, the variables of satisfaction of water resources management ($P < 0.001$; $\beta = 0.515$), moral norm of water conservation ($P < 0.001$; $\beta = 0.329$), quality of agricultural extension services ($P < 0.002$; $\beta = 0.134$), and social pressures ($P < 0.001$; $\beta = 0.133$) had the highest values of standardized effects on the dependent variable, while attitudes towards participation in water conservation ($P < 0.071$; $\beta = 0.062$) did not have any significant impacts on the FAPWC. The positive and the significant impacts of moral norms and social pressures on farmers active participation had been also confirmed by other studies (Valizadeh *et al.*, 2016; Pradhananga *et al.*, 2015).

In the second phase of the path analysis, the effects of place attachment, responsibility towards consequences, and social pressures on moral norms among farmers were examined.

The results of this analysis phase indicated that the variables place attachment ($P < 0.031$; $\beta = 0.105$) and social responsibility ($P < 0.001$; $\beta = 0.552$) had significant and positive impacts on moral norms, while social pressures towards water conservation did not demonstrate significant impact on moral norm of water conservation ($P < 0.060$; $\beta = -0.094$)

Indirect and Total (Causal) Effects of Independent Variables on Dependent Variable

Examining the indirect effects (Table 4) of independent variables on the dependent variable (in accordance with the theoretical framework) suggested that place attachment ($0.105 \times 0.329 = 0.034$) and social responsibility towards water conservation ($0.552 \times 0.329 = 0.181$) had the highest indirect impacts on the FAPWC. The significant indirect effects of the two variables of place attachment and social pressures also indicated the key role of these variables in the formation of the FAPWC (Figure 3). In addition, social pressures towards water conservation did not have significant indirect effect on farmers active participation in water conservation ($-0.094 \times 0.329 = -0.03$).

Furthermore, examining the total (causal) effects demonstrated that the variables satisfaction of water resources management (0.515), moral norm of water conservation (0.329), social responsibility toward consequences (0.181), quality of agricultural

Table 3. Calculation of direct effects on FAPWC and MNWC.

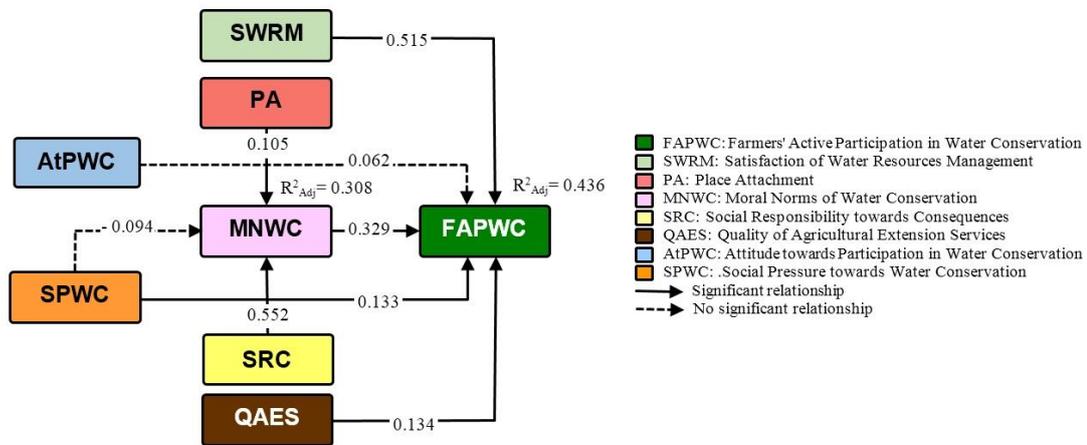
	Independent variables ^a	B	Beta (β)	t	Sig. t
Direct effects on the FAPWC	Constant	-3.86	---	-1.31	0.188
	MNWC	0.400	0.329	7.78	0.001
	SPWC	0.303	0.133	3.09	0.002
	AtPWC	0.080	0.062	1.45	0.147
	QAES	0.132	0.134	3.12	0.002
	SWRM	0.837	0.515	12.237	0.001
		Sig. $F = 0.001$	$F = 50.58$	$R^2_{Adj} = 0.436$	$R^2 = 0.445$
Direct effects on the MNWC	Constant	8.19	---	4.33	0.001
	PA	0.157	0.105	2.16	0.031
	SPWC	-0.176	-0.094	-1.89	0.06
	SRC	1.405	0.552	10.89	0.001
		Sig. $F = 0.001$	$F = 48.29$	$R^2_{Adj} = 0.308$	$R^2 = 0.314$

^a Variables are defined under Table 2.

Table 4. Analysis of direct, indirect, and total (causative) effects of the variables on FAPWC.

No.	Variables ^a	Direct effects	Indirect effects	Total effects	Model compliance with the theoretical framework ^b
1	PA	---	0.034	0.034	√
2	SRC	---	0.181	0.181	√
3	MNWC	0.329	---	0.329	√
4	AtPWC	0.062	---	0.062	×
5	SPWC	0.133	-0.03	0.130	√
6	SWRM	0.515	---	0.515	√
7	QAES	0.134	---	0.134	√

^a Variables are define under Table 2. ^b √: Compliance with the theoretical framework, ×: Non-compliance with the theoretical framework.

**Figure 3.** Causal analysis model derived from the path analysis

extension services (0.134), and social pressure towards water conservation (0.130) were respectively endowed with the greatest amounts of causal effects, while attitudes towards participation in water conservation (0.062) and place attachment (0.034) had no significant effects on farmers active participation. One of the main reasons for no direct causal effect of attitudes on farmers participation could be that variables such as intention towards participation had mediating roles in the relationship between these two variables.

Policy Implications and Outcomes

Given the prominence and importance of social and behavioral dimensions of water management, there are attempts in this section to facilitate the applications of the study results in executive domains (resources management)

based on the findings in previous phases. Since the present study was to examine the factors affecting the FAPWC beyond psychological individual-based (micro) analysis, factors such as impact of farmers' agricultural environment (social pressures), quality of services provided by Deputy of Agricultural Extension and Department of Water Affairs (water resources management) as well as place attachment were added to the given framework. The policy implications and outcomes in this section are presented separately in both micro- and macro-levels for their ease of use.

Individual (Micro-) Level of Policy Implications

a. The results of the analyses showed that the variable of moral norms was one of the most important predictor of the FAPWC while the



findings of the investigation into the regression effects in this study suggested that the amount of moral obligation among farmers towards active participation in water conservation could be determined through psychological individual-based variables such as place attachment. In addition; place attachment not only could increase farmers' obligation towards participation in water conservation but also reinforced such an active and real participation through establishing a positive connection as well as a link between farmer, agricultural land, and place of living. Accordingly, it seems that understanding of farmers' place attachment and awareness of its quantity and quality are of importance for managers and organizations in charge of water resources management (such as Department of Water Affairs). This awareness can also contribute to the identification of target audiences and designing appropriate communication plans in order to establish behavioral changes at the individual-based level.

b. The variable of responsibility towards water conservation refers to the sense of responsibility among farmers to reduce the risks of water scarcity as well as the practices to justify the existing problems. In this respect, it should be noted that if farmers do not assume any responsibilities towards the current water problems and issues and also know all these issues as the consequences of mismanagement by authorities, the possibility of activating the feeling of moral obligation among them to play a role in lowering the negative effects of water crisis is likely to reduce. To reinforce the sense of responsibility among farmers to participate in conservation of water resources, it seems that change agents of agricultural extension and the public participation units in the relevant organizations (for example, the Ministry of Energy of Iran) can play significant roles because they can explain multiple administrative, economic, and technical dimensions to farmers via enlightenment training programs and convince them that some of the existing issues and problems related to water scarcity are consequences of agricultural activities and overconsumption of water in this sector. Thus, farmers can have an important role in solving the problems through assuming responsibilities in this area. Besides, training programs to increase farmers' responsibility towards participation in

water conservation can be implemented by holding discussion and debate sessions and even involvement of the representatives of farmers in decision-making and management of water resources. In this case, a sense of individual responsibility can be established among farmers in order to practice water resources conservation.

Macro-Level Policy Implications

a. The results of the regression analysis indicated that the variable of social pressures was one of the most important activator of farmers' active participation in water conservation (however it doesn't have significant effect on moral norm of water conservation). According to Yazdanpanah *et al.* (2014) and Pradhananga *et al.* (2015), social pressures refer to senses that the farmers have concerning the expectations of agricultural community and those around them. Thus, the presence of the desirable social pressures towards water resources conservation can further farmers' feeling of obligation in order to actively participate in water conservation. This requires their "context / social environment, and attitudes and beliefs". In order to accomplish this issue (creating appropriate norms for water conservation can make a person committed to participating in water conservation), it was suggested to develop values, norms, and beliefs among agricultural community and farmers (not the farmers by themselves) in the domain of conservation of water resources. Given the development and reinforcement of values, norms, and beliefs in water resources conservation among farmers; there is no need for direct intervention and person-to-person communication in line with behavioral changes. Thus, social environment can indirectly (through social pressures) reinforce the farmers to participate in water conservation. It should be noted that face-to-face contacts and holding enlightenment courses on the necessity of participation in water conservation are considered as the starting points in the development and reinforcement of value-based and normative factors which can provide the desirable social pressures for active participation in water conservation.

b. The results of the correlation also showed that the quality of agricultural extension services

was positively and significantly associated with farmers' active participation. In addition, the results of regression analysis indicated the significant and positive effect of this variable on the FAPWC which could confirm the above findings. These results meant that, from the farmers' perspective, the quality of services provided by the Agricultural Extension Organization and in the related fields (such as the availability, suitability of ratio of the number of field staff to the number of farmers, holding various training courses, etc.) can have a significant impact on their active participation in water conservation. Accordingly, it seems that the quality of agricultural extension services and its intervening factors are important sources of gaining information, raising awareness, building trust, and thus participating actively in water conservation. Therefore, it is suggested that Deputy of Agricultural Extension increase the quality of agricultural extension activities in agricultural regions which would also require the support of the Ministry of Agriculture because the given deputy is affiliated with it.

c. The results of the regression analysis showed that satisfaction of water resources management (Department of Water Affairs) in the region was the strongest predictor of farmers' active participation in water conservation. Such results highlighted the issue that the quality and manner of interactions and services provided by governmental structures and bodies such as the Department of Water Affairs (controlling agricultural water resources) were of the significant determinants of the FAPWC. Accordingly, such organizations were suggested to focus and invest further in reinforcing farmers' satisfaction of their activities such as transparency of rules and regulation, facilitated accessibility, seriousness in service provision, etc. in order to increase satisfaction of water resources management in the region. The note worth mentioning in terms of such concentration and investment is that field (exploratory) studies in the region examined are required to be conducted to understand farmers' expectations of the Department of Water Affairs in order to direct investments towards meeting such expectations in the next phases.

d. Finally and based on the results of the regression explanations, the variables used in the framework of this study could predict a

significant proportion of variance change in the FAPWC and the moral norms (43.6% and 30.8%, respectively). This issue demonstrated the ability and the relative importance of the study framework (in general) and the variables employed in it (in particular) to improve farmers' participation in conservation and management of water in the region. In this regard, water resources managers and organizations involved in this issue are suggested to pay more attention to the potentials of independent variables used in this study considering the social-psychological dimensions to predict the FAPWC. Although lots of problems and issues associated with water resources management are context-specific, the framework of the present study, given the results obtained in this study, could be useful and contributing in the agricultural sector in the southern region of West Azerbaijan.

CONCLUSION

The results of this study led to the development of understanding how to formulate and create the FAPWC. In this regard, the findings suggested that it is required to pay considerable attention in examining behaviors such as FAPWC to the psychological characteristics (such as moral norms, social responsibility, attitudes towards participation in water conservation) as well as the dimensions beyond pressures and impacts of farmers' social environments and even the quality of services provided by agricultural extension organizations and agencies in charge of water resources management (existing structures and organizations in society) on farmers' behaviors. It should be noted that farmers' behaviors do not occur in a vacuum and they can be simultaneously influenced by these factors. The evidence in this respect was associated with the results obtained in this study suggesting the direct and positive impacts of the variables of moral norms, quality of agricultural extension services, satisfaction of water resources management, social pressures, place attachment, and responsibility towards the FAPWC. On the other hand, the framework used in this study contributed to the development and broadening of understanding in terms of the complicated interactions between behavioral-cognitive variables of active participation in



conservation of water resources. However, there were limitations in this study as follows.

The first limitation was associated with the wide range of variables found by the researchers during the review of the related literature and formulation of the theoretical framework. The second limitation was related to the variance of the agricultural community examined in terms of language and culture which had made the establishment of communication in the process of the survey very difficult. The third limitation concerned the relatively small sample size (although the required sample size for the study was examined) and the generalizability of the results. Thus, replicating this study with larger sample size could give higher power of generalizability to this study. The fourth limitation is related to the ensuring about the clarity of self-administrated questionnaire for the participants. This point should be considered in future research. Because, in the study area about 60% of respondents were found with low level of education. Finally it should be noted that a survey design was used for data collection in this study. However, the use of such a method had its own limitations and researchers are suggested to employ combined methods for investigating the FAPWC in further studies in order to have a more comprehensive view to this issue.

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مشارکت فعال کشاورزان در حفاظت آب: بینش‌هایی از یک پیمایش در میان کشاورزان جنوب استان آذربایجان غربی، ایران

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چکیده

امروزه، توجه به تغییر پارادایم از سرمایه‌گذاری‌های اقتصادی و فنی، به ابعاد اجتماعی - رفتاری در راستای افزایش بهره‌وری در بهره‌برداری از منابع آب سوق پیدا کرده است. هدف پژوهش حاضر، شناسایی و تحلیل عوامل مؤثر بر مشارکت فعال کشاورزان در حفاظت آب (FAPWC) بود. در این راستا، چارچوب نظری مناسبی برای تحلیل رفتار مشارکتی کشاورزان توسعه داده شد. این پژوهش از نوع پژوهش‌های توصیفی - همبستگی و علی - رابطه‌ای است که با استفاده از فن پیمایش انجام گرفت. جامعه آماری، کشاورزان جنوب استان آذربایجان غربی در ایران بودند که ۳۷۸ نفر از آنها با استفاده از روش نمونه‌گیری تصادفی طبقه‌ای با انتساب متناسب به عنوان نمونه انتخاب شدند ($N=23750$). ابزار پژوهش، پرسشنامه‌ای بود که روایی آن توسط پانلی از متخصصان به تأیید رسید و پایایی دسته‌گویه‌های آن با استفاده از ضریب آلفای کرونباخ ($0.89 \leq \alpha \leq 0.98$) محقق گردید. نتایج حاصل از پژوهش نشان داد که متغیرهای هنجارهای اخلاقی در زمینه حفاظت آب، فشارهای اجتماعی، دلبستگی مکانی، مسؤولیت‌پذیری نسبت به عواقب فعالیت‌ها، کیفیت خدمات ترویج کشاورزی و رضایتمندی از مدیریت منابع آب، اثرات معنی‌داری بر FAPWC دارند. فزون بر این، متغیرهای مستقل توانستند ۶۵/۸ درصد از تغییرات واریانس متغیر FAPWC را پیش‌بینی کنند. در پایان سعی شد در راستای توسعه‌ی چارچوب پژوهش، عوامل مؤثر بر FAPWC فراتر از تحلیل‌های روانشناختی فردی (خرد) صورت گیرد و عواملی مانند تأثیر محیط‌های اجتماعی کشاورزان نیز مد نظر قرار گرفته و بر این اساس، پیشنهادهای سیاستی در دو سطح خرد و کلان به صورت مجزا ارائه گردیده است.