STRUCTURAL EQUATION MODELING OF RICE FARMERS' PARTICIPATION IN ENVIRONMENTAL PROTECTION

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Abstract. Rural areas are of high importance on account of vicinity to nature and the effects these places leave on or receive from the nature. Environmental protection, thus, does not realize without participation and contribution of the people who live in such places. The present study aimed at providing a structural equation modeling of rice farmers' participation in environmental protection. The rice farmers who live in the Iranian county of Sari comprised the statistical population of this research (N = 24502) out of which 290 were selected as statistical samples based on Cochran Formula. The needed data was collected via a questionnaire of which the validity had been already approved by the experts. The Cronbach's Alpha coefficient for the whole questionnaire was obtained at 0.937. The average age and work experience of the participants were 48.53 and 23.82 years, respectively. The social feature and information resources comprised and explained totally 27.1 percent of the variance of participation of the rice farmers in environmental protection.
Keywords: *attitude, environment, social awareness, sustainability, Sari, Iran*

Introduction

In addition to disturbing human peace and security, environmental disaster threatens today the human existence as well. On this ground, environmental protection is a very serious and challenging issue to propose and investigate in political and scientific circles (Valaei, 2005). The principled environmental protection is an effective approach that have come from the experience of environment activists throughout the world, and it seems complying with its principles, frameworks and methods would contribute achieving a sustainable development in protection of the environment (Mahmoudi and Veisi, 2005). The environmental responsible behavior is a key factor in the process of environmental sustainable development in modern and developing communities. In order to reduce the environmental threats and risks, governments are expected to prepare and develop environmental protection plans in various scales and people, also, are expected to contribute to implementation of the prepared plans (Salehi, 2008). Public support is effective on conducting environmental plans to succeed. This needs the public knowledge and information to increase which could be fulfilled via providing people with relevant educations (Azmi and Motiei Langroudi, 2011).

Participation is power sharing in decision making on a plan (Aref, 2011). Participation is essential for urban and rural development, and is an indicative of positive social consequences, developed collective cooperation, talent and creativity growth, and increased accountability and commitment (Farmohammadi et al., 2007). A systemic attitude to rural development represents the notion of participation natural and completely fundamental (Malek Mohammadi, 1995).

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Given the fact that most of the farmers in northern parts of Iran make livening via cultivation and sale of rice, they, in order to achieve an increased product amount and avoid plant pests and diseases, use agricultural pesticides abundantly. This leaves much adverse impacts of pesticides upon environment and non-target organisms (Tabari, 2008). According to the statistics of Agriculture Jihad Management of Sari (2015), the county has 28864 hectares of land under rice cultivation out of which 23436 hectares have been exposed to chemical control activities that harm the environment. There have been conducted a number of studies on public participation in environmental protection of which some instances are elaborated in the lines to come.

Parhizgari et al. (2016) demonstrated that the variables of education, slope of land, being informed of protection procedure, annual gross income, receive grants, and participation in extension courses have positive and significant effects and the variables of age and employment in the fields other than agriculture leave negative and significant effects on the probability of participation of the farmers in using soil and water conservation practices.

A study by Khoshfar et al. (2015) revealed that five variables of use of radio, interact with others, local and trans-local social communications, participation in village-related programs, and age have been effective on the environmental awareness of people more than other factors.

Abbasi et al. (2013) concluded that the public participation willingness was 54.1 percent which was considered high. Also, there were significant differences between the aforesaid public willingness in different parts of the city in a way that the residents of relative outlying parts showed higher interest in participation compared to those of central and outlying areas. Based on the stepwise regression analysis, four variables of attitude to investment in development and preservation of green space, public perception on usages of green space, the number of the received saplings, and education were effective on willingness to participation.

Moradi et al. (2013) concluded that there was a significant relationship between the willingness of farmers and the variables of age, gender, occupation, and education of users. In another research, Najafian and Namdari (2012) concluded that social factors are more effective than economic ones on the performance of women in protection of environment.

Findings of a study by Falsafi (2011) revealed that there is a positive and significant correlation between family size and the variable of internalization of participation, and that, there is also a direct and positive relationship between internalization of participation of farmers and farmers' participation in implementation, evaluation, financial matters, and their benefits of the project.

Koushki et al. (2011) found out that educational-managerial, socio-psychological, and economic-supportive factors affect the participation of rural women. Veisi and Majd Al-din (2010) believed that participation mechanisms include environmental cooperatives, take part in environmental programs, participation in specialized meetings and seminars, participation via establishment of local and national entities and organizations, and volunteer participation at the time of unexpected environmental disasters.

Findings of a research by Rahmani and Majidi (2009) unveiled that the participation of women has a reverse correlation with age, number of children, and work hours, and has a direct relationship with education, family expense, and duration of residence.

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Rafiei and Amirnezhad (2009) demonstrated that the variables of training, income, education, number of family members, and age affect the protection of Caspian Sea environment. Zare et al. (2009) found out that the most frequent discussed issue by the audience in order to win public involvement is to inform and educate people on the concept of participation.

Husseini et al. (2007) showed that there is a positive and significant relationship between the dependent variable of participation in rural areas in sustainable management of water and soil resources and the independent variables of number of family members, number of travels to city, experience of villagers in previous plans, positive attitude to the plan, compatibility of plans with the needs of the villagers, awareness of villagers of objectives of the plans, credit gain incentives, need for social cohesion, and awareness of aftermaths of destroying natural resources. Also, the results revealed that there is a negative and significant relationship between participation of villagers and the amount of income from a second job.

Qasemi (2005) observed a relationship between participation rate of family heads in rural areas in development projects and the variables of satisfaction, social cohesion, achievement motivation, membership in public entities of the village, travel, use of mass media, garden and farmland ownership, income, wealth, and socioeconomic status.

Mirdamadi et al. (2010) found out that there is a positive and significant relationship between public participation in different phases of Hableh Rood project and the variables of increase of awareness on objectives of the project, acceptance rate of the project, establish social groups, increased accountability, increase of family income, production rise, access to new credits, increase of the volume of the extracted water, environmental protection, and prevention from flood and soil erosion.

Coulibaly-Lingani et al. (2011) demonstrated that participation in decision making and economic interests are two main factors affecting the forest management participation. Gender, family size, income resource, land ownership, and technical helps seemed effective factors upon participation in the program.

Maraga et al. (2010) indicated that prediction of socioeconomic benefits, age, and education are considered as important factors of public participation in the project. A study by Allahyari (2009) revealed that individual attitude of people is a key factor in various activities or acceptance of technologies.

Eneji et al. (2009) demonstrated that local residents showed a low contribution in forest protection and benefiting from self-protection plans and maintained that the reason stems from their own social conditions and also stance of government to environmental protection.

Mendoza (2006) indicated a positive and significant correlation between protection technologies acceptance and participation in the related programs and the variables of age, education, income, participation in local organizations, and other socio-psychological factors. Also Dolisca et al. (2006) found out that there is a relationship between family members and participation rate of women.

The main questions of this research are "What are effective factors on participation of rice farmers in environmental protection?" and "How much the aforesaid factors are effective on increase of participation of rice farmers?" in order to elaborate on the theoretical framework of this study, first different dimensions of the research problem and their interrelations were identified, and then, a theoretical model proportionate to

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features of the problem and the conducted study on theoretical fundamentals was developed. The theoretical model of the research was achieved as is shown in *Fig. 1.*

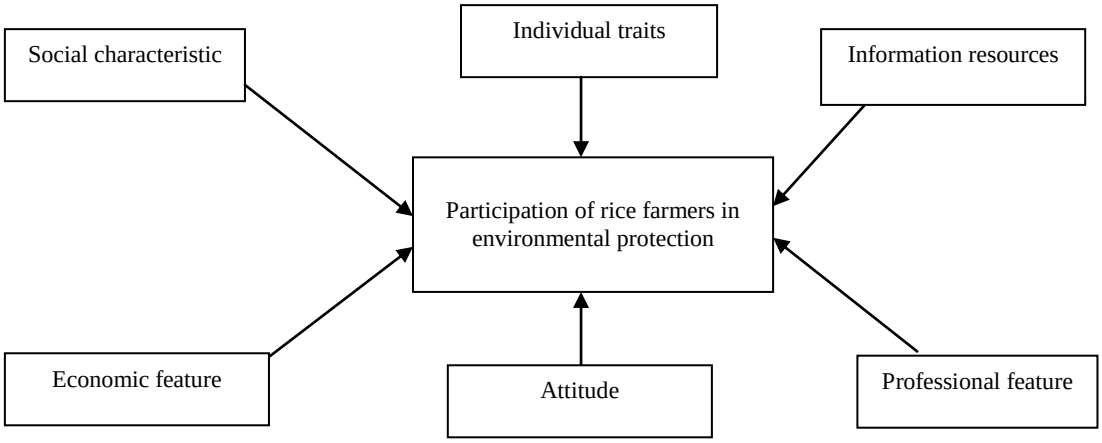

Figure 1. *Research theoretical model to investigate the effective factors on participation of rice farmers in environmental protection*

Methods

The present study is an applied research in terms of the purpose. A combination of quantitative and descriptive-inferential methods was adopted as the research methodology. The statistical population of the present research was made up of all 24502 rice farmers of the Iranian county of Sari (Agriculture Jihad Management of Sari, 2015). The sample size of the study was included 290 participants based on Cochran formula (Equation 1) via a stratified proportional sampling.

$$n = \frac{N(ts)^2}{Nd^2 + (ts)^2} \quad \text{(Eq.1)}$$

In Equation 1, N includes all rice farmers of Sari (N = 24502), t represents the t student with confidence 95 percent or error 5 percent (t = 1.96), S represents the highest standard deviation, which was obtained through a pilot test and pertains to the question of reference rate to the rice farmer regarding their rice farming difficulties in social feature with standard deviation 2.20 (S= 2.20) and d represents the half the approximate trust distance (d= 0.26). The rate of d is calculated by using Equation 2.

$$\boldsymbol{d = t\frac{s}{\sqrt{n}}} \quad \text{(Eq.2)}$$

In order to determine the validity of the research questionnaire, the face and content validity of the study were examined. In other words, following handing out the questionnaires to the related experts, their opinions on the validity of the questionnaire were obtained, and after making needed adjustments on the questions (their number or design), the detection validity was confirmed. To estimate the reliability coefficient of the research instrument, a pilot study was conducted, and 30 questionnaires were

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randomly distributed among rice farmers in Ghaemshar which were then completed. The Cronbach's Alpha coefficient of the whole questionnaire was obtained 0.937 using the $SPSS_{Win16}$ (Statistical Package for the Social Sciences) software. Cronbach's Alpha is obtained using software $SPSS_{Win16}$ through Equation 3.

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k} S_i^2}{\sigma^2}\right) \quad \text{(Eq.3)}$$

In this equation k is the number of questions, S_i^2 the variance of question i-th, σ^2 the variance of total questions (Cronbach and Shavelson, 2004).

The dependent variable in the current study refers to the participation of rice farmers in environmental protection which was examined with 10 items using a 6-level Likert scale. The independent variables in this research included individual, economic, social, professional features, the use of information resources in the field of environmental protection and attitude of Sari-based rice farmers. The data was analyzed through $SPSS_{Win16}$ and PLS (Partial least squares) Smart, and descriptive and inferential statistics were used for the research report.

PLS Smart software was used to provide the research model. Structural equation modeling (SEM) is made up of development of a number of multivariate techniques such as multivariate regression and factor analysis. SEM deals simultaneously with a set of dependency relationships (Kline, 2011). PLS approach, as the second generation of SEM methods, opened new horizons to the scholars of behavioral science. Unlike LISREL (Linear Structural Relationships) as a first generation software, PLS is known a more suitable approach for the scholars on account of less dependency to sample size, level measurement of variables, normal distribution (Chin, 1998), and using frequently used tools, because the above said issues are considered as the problems against the scholars (Amani et al., 2012).

Results

According to the findings of the research, the participants were 256 men and 34 women who comprised 88.3 percent and 11.7 percent of the research sample size, respectively. The average age of the rice farmers under study was 48.53 with a minimum and maximum ages of 20 and 75. The findings of the study revealed that from among the total 290 farmers under this study in Sari, 254 (87.6 percent) participants were married while 36 (12.4 percent) persons were single. Also, 34.5 percent of the rice farmers had a diploma in terms of education. The average family members of the participants were 4.27.

Based on the obtained results, 42.8 percent of the participants involved in rice farming as their main profession while 57.2 percent did not do it as the primary and main occupation. Based on the collected data, the highest frequency (34.4 percent) belonged to those farmers with 11 to 20 years of experience in rice farming; this is whilst the average experience in this occupation was 23.82 years. Also, according to the gathered data, 45.9 percent of the participants used only their family members for rice farming. 67.2 percent of ownerships were personal properties. The average area under

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rice cultivation for the farmers in this study was 1.24 hectares. Also, the average rice yield was 4.30 tons per hectare, while the minimum and maximum rice yield per hectare were 2 tons and 6.5 tons, respectively.

The participation rate of the rice farmers in environmental protection, social feature features and information resources were measured with 10, 7, and 6 items respectively in a 6-level Likert scale (none, very low, low, average, high and very high). Based on the *Table 1,* the average participation rate of the rice farmers in environmental protection was found high and the participation rate of about 88 (30 percent) persons of rice farmers in environmental protection was very high. The average social feature and sources of information of the rice farmers were identified average and high, respectively. The social feature rate of about 80 (28 percent) persons of rice farmers was low and the use of information resources in the field of environmental protection was about 103 (36 percent) persons of the rice farmers was high.

Table 1. *Distribution of participation level, social feature and information resources of rice farmers*

Variable	Level	Frequency	Valid percent	Cumulative percent
Participation of rice farmers in environmental protection	none	1	0.4	0.4
	very low	25	8.6	9
	low	36	12.4	21.4
	average	71	24.5	45.9
	high	69	23.8	69.7
	very high	88	30.3	100
	total	290	100	
	Mean: 3.54 Median: 4 Standard Deviation: 1.29			
Social feature	none	5	1.8	1.8
	very low	42	14.5	16.3
	low	80	27.6	43.9
	average	72	24.8	68.7
	high	59	20.3	89
	very high	32	11	100
	total	290	100	
	Mean: 2.81 Median: 3 Standard Deviation: 1.27			
Information resources	none	1	0.4	0.4
	very low	10	3.4	3.8
	low	46	15.9	19.7
	average	64	22.1	41.7
	high	103	35.5	77.2
	very high	66	22.8	100
	total	290	100	
	Mean: 3.57 Median: 4 Standard Deviation: 1.13			

Likert scale: None (0), very low (1), low (2), average (3), high (4), very high (5).

The attitude of rice farmers in the field of environmental protection was measured with 8 items with the 5-level Likert scale. Attitude levels included totally disagree, disagree, no idea, agree and totally agree. According to *Table 2*, the average attitude of the rice farmers to environmental protection was positive and about 102 (35 percent) persons of rice farmers with the most frequency had a positive attitude in the field of environmental protection.

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Table 2. *Distribution of attitude level of the rice farmers to environmental protection*

Level	Frequency	Valid percent	Cumulative percent
totally disagree	14	4.8	4.8
disagree	52	18	22.8
no idea	62	21.3	44.1
agree	102	35.2	79.3
totally agree	60	20.7	100
total	290	100	

Average: 3.49 Median: 4 Standard Deviation: 1.16
Likert scale: Totally disagree (1), disagree (2), no idea (3), agree (4), totally agree (5).

Spearman correlation coefficient was used to investigate the relationship between participation rate of the rice farmers in environmental protection and social feature, information resources, attitude, rice farming experience, area under rice cultivation, average yield per hectare, total annual rice farming income, annual non-rice farming income, age, and number of family members.

The results from *Table 3* showed a significant relationship between rice farmers' participation in environmental protection and social feature, information resources, and attitude; whilst no significant relationship was observed between the participation and the other variables.

Table 3. *The Correlation between variables and rice farmers' participation in environmental protection*

Variable	r_s	p-value
Social feature	0.363^{**}	0.000
Information resources	0.353^{**}	0.000
Attitude	0.307^{**}	0.000
Rice farming experience	-0.063	0.283
Area under rice cultivation	-0.021	0.726
Average yield per hectare	0.011	0.851
Total annual rice farming income	-0.026	0.657
Annual non-rice farming income	-0.048	0.470
Age	0.035	0.547
Number of family members	-0.036	0.546

$^{*}P<0.05$ $^{**}p< 0.01$

Findings of Mann–Whitney U test demonstrated that the factors of main profession, gender, marital status, and domicile had no impact upon the participation rate of the rice farmers in environmental protection. Also, the results of Kruskal–Wallis test indicated that labor force, land ownership and education had no impact on the participation rate of the rice farmers in environmental protection.

Smart PLS software was used to develop the research model. In order to examine the validity, Fornell and Larcker (1981) suggest three criteria including validity of each item, composite reliability (CR) of each structure, and average variance extracted (AVE). On validity of each item, the factor loading of over 0.7 for each item in factor analysis is an indicative of a well-defined structure, and also, the factor loading of items is expected to be significant at least at 0.01 (Gefen and Straub, 2005). *Figure 2* shows

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the experimental model of effective components on rice farmers' participation in environmental protection. It is worth noting that due to low effect on Spearman correlation coefficient in spite of its significance, the factor of attitude was excluded from the model. *Table 4* demonstrates path coefficients of the latent features, indicators of rice farmers' participation in environmental protection, and the factors affecting it.

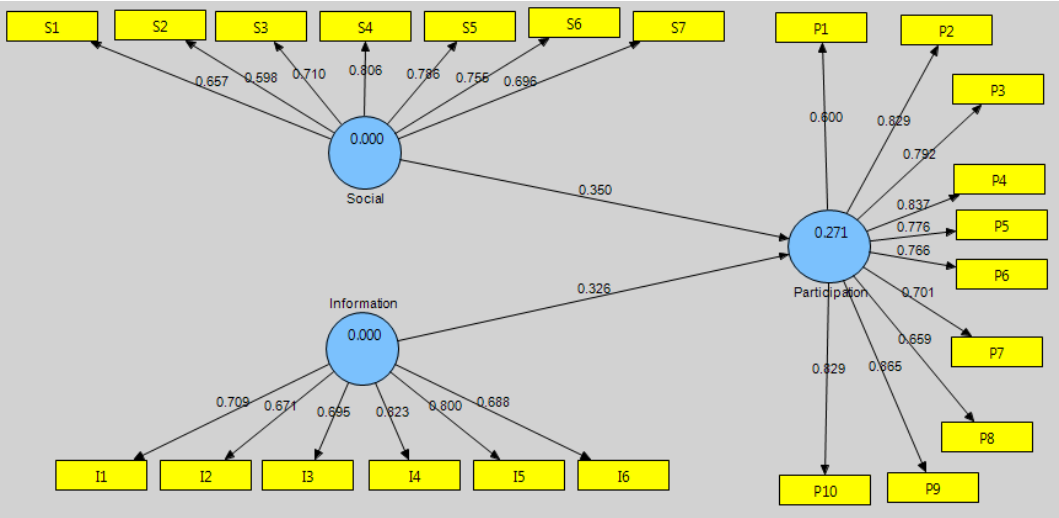

Figure 2. *Experimental model of components affecting the rice farmers' participation in environmental protection*

According to *Table 4*, among the indicators of the rice farmers' participation in environmental protection, the components of adaptability of the used devices of the farmer to environment, contribute to the protection of groundwater, take part in educational classes on environmental protection, and providing other rice farmers with information on environmental protection by each farmer played the most significant role in environmental protection. Also, among the indicators of social feature, rate of contact of the rice farmer with agricultural service centers, rate of refering to a rice farmer for rice farming difficulties, and the rate of refering people to a rice farmer for their private and personal issues were salient components more than othes. From among the indicators of information resources, the most important roles went to the rate of communication of rice farmers with experts on environmental protection, the awareness rate of rice farmers about aftermaths of destroying the environment, and the rate of using radio and television programs by the rice farmers on environmental protection. *Table 4* implies also that social features and information resources with the path coefficients of 0.350 and 0.326, respectively, left the most effects on the participation of the rice farmers in environmental protection.

In order to investigate the validity of the structures, Chin (1988) maintains that AVE square root of a structure should be higher than its correlation value with other structures. This implies that correlation of a structure with its indicators is higher than its correlation with other structures. *Table 5* shows the results of validity investigation which represents an appropriate validity of the structures.

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Table 4. *Path coefficients of the latent features, indicators of rice farmers' participation in environmental protection, and the factors affecting it*

Latent feature	Sign	Path coefficient	Indicator	Symbol	Factor loading	t
Rice farmers' participation in environmental protection	Participation	-	Participation in farm waste collection	P1	0.600	6.490
			Participation in educational classes on environmental protection	P2	0.829	17.005
			Participation in protection of arable lands	P3	0.792	15.971
			Participation in protection of groundwater	P4	0.837	21.655
			Participation in protection of farm water	P5	0.776	13.124
			Participation in implementation of environmental protection projects	P6	0.766	13.710
			Use non-chemical methods to combat rice-associated pests and diseases	P7	0.701	9.771
			Use green manure and organic fertilizers, etc. in rice farming	P8	0.659	7.551
			Adaptability of the used devices by the rice farmer to environment	P9	0.865	21.222
			Provide other rice farmers with information on environmental protection	P10	0.829	18.285
Social feature	Social	0.350	Participation of rice farmer in group activities like harvesting rice paddy	S1	0.657	6.052
			Interest of rice farmer in group activities related to environmental protection	S2	0.598	5.197
			Communication with other rice farmers	S3	0.710	8.529
			Communication with agricultural service centers	S4	0.806	15.734
			Refer to rice farmer for rice farming difficulties	S5	0.786	14.545
			Refer of people to rice farmer on their privacy and personal issues	S6	0.755	8.095
			Communication of rice farmer with Environmental Protection Agency (EPA)	S7	0.696	8.199
Information resources	Information	0.326	Use radio and television programs by rice farmers on environmental protection	I1	0.709	5.676
			Surfing the net on environmental protection	I2	0.671	6.442
			Watch educational movies on environmental protection	I3	0.695	7.564
			Communication with experts on environmental protection	I4	0.823	7.765
			Awareness on aftermaths of destroying the environment	I5	0.800	8.197
			Use newspaper, magazine, and other publications on environmental protection	I6	0.688	5.686

Table 5. *Matrix of correlation and validity of research factors and variables*

	Participation of rice farmers in environmental protection	Social feature	Information resources
Participation of rice farmers in environmental protection	0.77*		
Social feature	0.41	0.72*	
Information resources	0.391	0.186	0.73*

* AVE square root of each structure

The results presented in *Table 6* indicated that two variables of social feature and Information resources explain totally 27.1 percent of the variance of rice farmers' participation in environmental protection. The acceptable values of composite reliability (CR) for each structure should be 0.7 or more. Fornell and Larcker (1981) suggest values of 0.5 and more for AVE which shows that the structure explains approximately 50 percent or more of the variance of its indicators (Chin, 1988). As *Table 6* represents, CR of each structure is more than 0.7 and AVE is obtained over 0.5.

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Table 6. *Average variance extracted (AVE), composite reliability (CR), and* R^2

Latent feature	AVE	CR	R^2
Rice farmers' participation in environmental protection	0.592	0.935	0.271
Social feature	0.516	0.881	-
Information resources	0.538	0.874	-

Discussion and Conclusion

The present era witnesses a rise in impact of human behavior on natural resources in a way that participation of people, especially farmers, in reduction of destructive consequences of human behavior on environment seems essential. Environmental protection is a collaborative process which is in need of constant measures and interactions between government, farmers, and infrastructure sectors. This study aimed at providing a structural equation modeling of rice farmers' participation in environmental protection. The achieved results demonstrated that the average age of the rice farmers under study was 48.53 which represents the participants were middle-aged farmers. Based on the results, 42.8 percent of the participants involved in farming as their main profession while 57.2 percent did not see it as their main occupation. Accordingly, more than a half of the rice farmers involved in activities other than farming. According to the collected data, the highest frequency (34.4 percent) belonged to those rice farmers who had 11-20 years of experience in this profession. Based on the aforesaid data, the average years of experience in rice farming was 23.82 which indicates the participant rice farmers had a rich experience in this connection.

The obtained results showed that there was a significant relationship between attitude and rice farmers' participation in environmental protection. This is consistent with findings of a study by Allahyari (2009). Meanwhile, no significant relationship was found between rice farmers' participation in environmental protection and rice farming experience, area under rice cultivation, average yield per hectare, total annual rice farming income, annual non-rice farming income, age, and number of family members. Rafiei and Amirnezhad (2009) found in a research that income, number of family members, and age affect the protection of Caspian Sea environment. Husseini et al. (2007) found in their study that there is a negative and significant relationship between participation of villagers and amount of income from a second job.

The findings revealed that the variables of main profession, gender, marital status, and domicile had no impact on the rice farmers' participation in environmental protection. The results demonstrated that labor force, land ownership and education had no effect upon the rice farmers' participation in environmental protection. Rahmani and Majidi (2009) believed that participation of women has a direct correlation with education.

The results obtained from Smart PLS unveiled that two variables of social feature and information resources explain totally 27.1 percent of the variance of rice farmers' participation in environmental protection. Najafian and Namdari (2012) found out that social factors affect the performance of women in environmental protection. Koushki et al. (2011) and Mendoza (2006) maintained that educational and socio-psychological factors affect the participation of women in rural areas. Zare et al. (2009) found out that the most frequent discussed issue by the audience in order to win public involvement is to inform and educate people on the concept of participation.

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Given the above discussed issues, it is advised that environmental protection is considered in group activities and within public communication with the organizations. Agricultural service centers are included in those which are able to play a contributive role in environmental protection. Also, with more memberships in associations and groups, it is expected to see more accountability in public behavior to environment.

Information is one of the most effective components on sustainable development in every country. Therefore, it sounds necessary to have all-inclusive, various, and constant measurements in increase of awareness of agriculture society on environment. It is stressed also that rice farmers establish a constant communication with the relevant experts on environmental protection. It is suggested that more advisory services are provided to improve appropriate behaviors of rice farmers to environment. Awareness of rice farmers about the aftermaths of destroying environment as well as use of radio and television programs on environment may affect considerably their participation in environmental protection.

Given the items of rice farmers' participation in environmental protection, the aforesaid farmers are expected to use devices adaptable to environment, and conserve groundwater as a public responsibility. Also, different educational classes are expected to use opinions of rice farmers to increase knowledge of others on environmental protection. Training of pioneers and participation of the beneficiaries would improve awareness of rice farmers. It goes without saying that participation realizes based on the human needs, and what is important in this connection is organize of participation in order to access objectives of the programs. As a result, an increased social participation would hopefully entail more accountability to environment leading to a less environmental degradation.

Given the positive attitude of the rice farmers on environmental protection, it is advised to boost their knowledge during the relevant educational classes on the adverse consequences of environmental degradation as well as the influence a rice farmer may leave upon the environment. Finally, it could be concluded that reduced individualism and increased participation and training together with fostering a public sense of social responsibility could encourage people to feel belonged to environment and conduct a better environmental behavior.

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APPENDIX

Appendix 1. *Original questionnaire*

"Dear rice farmer

The present questionnaire aims to collect data required to complete a thesis entitled "Structural equation modeling of rice farmers' participation in environmental protection". We hope that your kind comments contribute us in conducting this study. The information provided will remain completely confidential. Thank you in advance for your consideration.

Social feature

Dear rice farmer, please read each statement and mark the correct answer with an asterisk *.

Item	None	Very low	Low	Average	High	Very high
Participation of rice farmer in group activities like harvesting rice paddy						
Interest of rice farmer in group activities related to environmental protection						
Communication with other rice farmers						
Communication with agricultural service centers						
Refer to rice farmer for rice farming difficulties						
Refer of people to rice farmer on their privacy and personal issues						
Communication of rice farmer with Environmental Protection Agency (EPA)						

Information resources

Please read each statement, and mark the correct answer with an asterisk *.

Item	None	Very low	Low	Average	High	Very high
Use radio and television programs by rice farmers on environmental protection						
Surfing the net on environmental protection						
Watch educational movies on environmental protection						
Communication with experts on environmental protection						
Awareness on aftermaths of destroying the environment						
Use newspaper, magazine, and other publications on environmental protection						

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Attitude of rice farmers in environmental protection

Item	Totally disagree	Disagree	No idea	Agree	Totally agree
I believe that only the village governor is responsible for keeping the village clean					
In my opinion the indiscriminate use of chemical fertilizers and pesticides pollute the soil and water.					
Keeping the water clean is of no use when others do not pay attention to this issue.					
I think the farmers are responsible for environmental pollution.					
I believe that earning higher incomes by using more pesticides is the right of every rice farmer.					
I believe that the exploitation of natural resources and agricultural land should be done with respect to the rights of future generations.					
I believe one of the most significant points about the recycling of waste, is incurring less damage to the environment.					
The use of chemical fertilizers and pesticides in rice farming has no harmful effects, but increases the amount and quality of the product.					

Participation of rice farmers in environmental protection

What is the rate of participation in each of the following? Please read each statement and mark the correct answer with an asterisk *.

Item	None	Very low	Low	Average	High	Very high
Participation in farm waste collection						
Participation in educational classes on environmental protection						
Participation in protection of arable lands						
Participation in protection of groundwater						
Participation in protection of farm water						
Participation in implementation of environmental protection projects						
Use non-chemical methods to combat rice-associated pests and diseases						
Use green manure and organic fertilizers, etc. in rice farming						
Adaptability of the used devices by the rice farmer to environment						
Provide other rice farmers with information on environmental protection						

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Professional feature

- Your main job: Rice farming ☐ Other ☐
- Rice farming experience:……..year(s)
- Which of the following workforce do you use?
- The family ☐ Full-time worker ☐ Part-time worker ☐ Others, please name.....
- What is the type of property you own?
- Personal ☐ Rental ☐ Share Cropping ☐ Endowment ☐ Mixed ☐
- Area under rice cultivation:……hectare(s)

Economic feature

Average yield per hectare:…….ton(s)
Total annual rice farming income:……..rials
Annual non-rice farming income:…… rials

Individual traits

-Gender: Woman ☐ Man ☐
- Age:…… years
- Marital status: Married ☐ Single ☐
- Level of education:
Illiterate ☐ Under Diploma ☐ Diploma ☐ Bachelors ☐ Masters' or higher ☐
- Number of family members:…….person(s)"

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