Designing a Pattern of Participatory Management with the Approach of Economic Sustainability in Northern Iran (Case Study: Fereydoon Kenar Wetland)

Najmeh Daryaei, Mehdi Mirdamadi, Jamal F. Hosseini, Samad Rahimi Soureh and Reza Arjomandi

Abstract: Wetlands are under increasing pressure from population growth, poverty and economic inequality; social and economic conflicts between local communities; and unsustainable use of plant and animal resources. Agriculture is considered to be one of the important factors affecting wetlands. The overall purpose of this research is to design a participatory management pattern for rice farmers considering the sustainability of Fereydoon Kenar's wetland site in Mazandaran Province, Iran. The entire population are landowners on the wetland site (N = 3249), of which 345 rice farmers were selected as a sample using the Cochran formula. To analyze the data from the questionnaires, $SPSS_{Win19}$ and Amos Software were used. Based on the farmers' opinions, development of nursery, employment of rice farmers during the second six month of the year after the rice harvest, and tree planting in the main habitats of the birds (*Damgahs*) in order to exploit their benefits were considered to be the most important indicators of economic sustainability in the Fereydoon Kenar wetland. The results of the path analysis showed that the environmental, structural, educational and policy-making mechanisms had significant effects on the rice farmers' knowledge about participatory management of wetlands. Meanwhile, the structural, educational, and cultural mechanisms, and knowledge about participatory management had significant effects on rice farmers' attitudes towards participatory management in sustainability of the wetland. In addition, the structural mechanisms, knowledge of participatory management in economic sustainability, and attitudes of rice farmers towards participatory sustainable management had a significant and positive effect on the behavior of participatory management.

1. Introduction

Wetlands are among the most important ecosystems and life zones in the world, which absolutely have no replacement. The ecological value of wetlands is ten times more than forests and 200 times greater than agricultural lands. Wetlands are one of the most important basic environmental resources. As they are located in the lowest parts of the watersheds, they are usually affected by changes and evolutions of the

upstream. This can cause problems such as reduction in water entering the wetlands from surface water resources and groundwater watersheds and plains around the wetlands (failing to meet environmental water rights of wetlands), especially due to dam construction projects and inter-basin water transmission; destruction and sedimentation of wetland area; pollutions caused by urban, industrial and agricultural activities; unsustainable exploitation of plant and animal species in the wetland, particularly illegal and excessive hunting and fishing and harvesting of forage and other wetland products more than wetland's renewable ability; the development of unsustainable activities in wetlands; and the access of non-native and raider species into the wetlands, particularly *Azolla* [1].

The existence of wetland areas in northern Iran and the southern shores of the Caspian Sea receive a significant population of immigrant waterfowl every year and these aquatic habitats form the shelter of diverse plants and animal species. Among the northern Iranian wetlands, Fereydoon Kenar's wetland site in Mazandaran Province, with an area equivalent to 5427 hectares, consists of Fereydoon Kenar, Ezbaran, and Western and Eastern Sorkh Rud Ab-Bandans, which, annually, receive nearly one-third of overwintering bird species (150 species) in Iran and also have the most extensive methods for traditional hunting of birds. This wetland complex comprises different types of artificial or man-made wetlands and is mainly with private ownership, which, in fact, is the same agricultural lands revolving around rice production that are dedicated to the cultivation of this crop during spring and summer and are submerged in autumn and winter by the water of streams and rivers and, based on its breadth and depth, can store different amounts of water (Figure 1). According to the existence of the remains of rice, including seeds or stalks as well as benthic organisms, these lands are considered as a habitat and overwintering place for migratory aquatic birds and other creatures that live beside water. Fereydoon Kenar's wetland site is also considered an international wetland and has a vital importance by having the mentioned conditions, thus discussion of its management, through participation and involvement of stakeholders is essential.

The preservation of natural resources in this wetland, particularly the related plants and animal species including waterfowl, and the dependency of resident's livelihoods on sources of income obtained from hunting the birds of the area, by considering the social conditions and existed beliefs and values in the region, determines the undeniable role of the participation of local communities, especially rice farmers of the region as the owners of wetland areas, more than ever before. Therefore, to protect and preserve the stable survival of this collection depends on the participation and wise use of wetland resources by local people. Several cases are considered in participative management of wetlands that can be classified in form of economic, environmental, structural, educational, policy-making and cultural mechanisms. Careful and detailed examination of each of these mechanisms prepares

the ground work for designing an optimal model of participatory management for the rice farmers of this wetland site regarding the wise use of resources and the realization of sustainable development goals related to wetlands in all three—economic, social and environmental—dimensions. The aim of this study is thus the design of a participatory management model of rice farmers for the economic sustainability of Fereydoon Kenar's wetland site in the Mazandaran Province.

(**a**) (**b**)

Figure 1. Fereydoon Kenar wetland before (**a**) and after (**b**) water birds migration.

In his research on the wetlands of the Kisii area in Kenya, Mironga found that limiting public access to and non-normative use of wetland resources reduced wetland destruction to a minimum [2]. Robinson et al. believe that structural or institutional factors such as the lack of appropriate and enforceable property rights, conflicting interests of stakeholders and problems in clear definition of borders affect the development of the management plan in the wetland [3]. Maclean et al., in their research in Uganda, found that ill-defined property rights are often associated with wetland drainage and unsustainable levels of resource use. The property rights issues in Ugandan wetlands are afflicted by contradiction and tensions. For example, there is considerable ambiguity surrounding the concept of government or local government holding wetlands "in trust for the people", and confusion over rights and obligations of ownership on the one hand and management on the other. Substantial new legislation affecting land tenure and use has been set, but still needs to be absorbed by all levels of society [4]. Hannan Khan, in a study examining the participatory management of wetland resources in Bangladesh, found that the establishment of a state multi-stakeholder system as a structure and institutional process for stable wetland resource management is essential. The approach of natural resources management requires the integration of bottom-up and top-down approaches, which must include the interests of all stakeholders in decision-making processes relating to wetlands [5]. Legal arrangements for managing wetlands within

nation states are not intrinsically different. The legal structures in each state reflect the historical, cultural, political and constitutional background out of which they have developed. In response to these factors, wetlands are managed in accordance with a matrix of constitutional, strategic, regulatory and management rules. Each of these rules performs a different function within each system. Some are aspirational, while others are informative; some are facilitative, while others are directional; and few are mandatory, while others are cast as enforceable obligations, breach of which leads to a liability in one form or another. Importantly, these rules interact with and inform each other, and yet perform different functions in ways that point in the direction of a relatively coherent system [6]. Abila identifies the lack of clear policies in guiding the use of wetland resources as the main challenge in Kenyan wetlands protection program [7]. Mironga found that the strong and continuous monitoring in exploitation of wetlands by beneficiary groups can prevent imposing pressure on these resources [2]. In addition to coordination between policies implemented regarding wetlands and their management, executive sponsorship for a set of rules in this field are most important policy-making mechanisms [8]. Cultural values can encourage proper behavioral responses relative to the incidence of environmental changes [9]. The Ramsar Convention about the importance of knowledge, belief systems and social practices of local people in the management of wetlands held that local knowledge and skills are made available to assist in the ongoing identification of problems and solutions in the management of wetlands. Often, this information is difficult to access and special participatory processes are needed to bring it to the surface [10]. Table 1 shows a summary of the economic mechanisms extracted from various studies.

Table 1. Research background of economic mechanisms affecting participatory management of farmers in sustainability of wetland sites in the world.

Mechanism	Extracted Item	Researcher(s)
Economic	• Penalties imposed by the government for those who degrade the environment of wetlands	Macharia et al. [11]; Shrestha [12]
	• Provide public funds to develop the site wetland management plans	Lim and McAleer [13]
	• Give financial incentives to universities, academic institutions and research centers based studies in the field of wetland ecology, biodiversity and ecological functions of wetlands, wetland restoration and sustainable utilization of wetlands	Hailun and Dong [14]
	• Economic valuation of the wetland sources	Gawler [15]

Table 1. *Cont.*

Mechanism	Extracted Item	Researcher(s)
Environmental	• Divide the wetland into three functional areas: core (given the sensitive and vulnerable habitat), buffer and development areas	Hailun and Dong [14]
	• Provide sufficient information for farmers about the rules of the wetlands, especially hunting and fishing rules	Darradi et al. [16]
	• Increase awareness of farmers about the methods of improving the management of wetland resources and introduce alternative revenue options to reduce dependence on wetlands	Diouf [17]; Amaniga Ruhanga and Iyango [18]
	• Create awareness of all managers and decision-makers about pollution control, waste management and environmental management in order to prevent unnecessary damage to the wetlands	Kyarisiima et al. [8]
Structural	• Restrict non-normative access and use and prevent illegal use of wetlands resources by individuals and institutions	Turner et al. [19]; Mironga [2]
	• Create adequate management structures with harmonized goals and preferences with the environment in order to manage the wetland site	Robinson et al. [3]; Hannan Khan [5]
	• Clearly define the rights and obligations of land ownership and management of wetland sites	Maclean et al. [4]
	• Work in accordance with local institutions and their role in wetland management	Dixon [20]; Wood et al. [21]; Rahman and Begum [22]
Educational	• Train locals in guiding the tourists to visit the region and aquatic migratory birds	Macharia et al. [11]
	• Learn the skills of the locals in order to expand self-employment	Wood et al. [21]
	• Integrate existing knowledge with the use of various methods of science	Murdiyarso et al. [23]
	• Introduce and include topics related to wetlands and protect them in environmental education topics provided in elementary and high school grades	Maclean et al. [4]

Table 1. *Cont.*

Mechanism	Extracted Item	Researcher(s)
Policy-making	• Periodically monitor and evaluate management plans to be carried out at the level of the wetland	Stanic [24]
	• Define exactly the method of implementing the laws as executive devices, especially strict rules regarding the prohibition of illegal hunting	Abila [7]; Kyarisiima et al. [8]; Fisher [6]; Mapedza et al. [25]
	• Deal with violators of hunting rules with the support of all relevant institutions	Hailun and Dong [14]; Moses [26]
	• Formulate a comprehensive policy for wetlands conservation	Katerere [27]; Dekens et al. [28]
	• Implement a strong and continuous supervision over the operation of the wetland, especially waterfowl hunting and fishing methods	Mironga [2]
	• Equip the local environmental community with information and tools for monitoring the wetland environment	Alberta government [29]
Cultural	• Hold different ceremonies and celebrations in the area	Schuyt and Brander [30]
	• Strengthen the culture of prevention of hunting birds with illegal methods	Casagrande [9]; Shrestha [12]
	• Employ people's religious beliefs about preserving the environment	Schuyt and Brander [30]
	• Review and introduce the history of the wetland sites	

2. Materials and Methods

The present study is considered as applied research in terms of the results, as combinatory research in terms of implementation process, as deductive research in terms of implementation logics, as prospective study in terms of time, and also in terms of the purpose as analytical non-experiential research. Statistical population of this study is composed of all paddy farmers and landowners of Fereydoon Kenar wetland site in Mazandaran Province (N = 3249). According to the Cochran formula [31], the sample size calculated for this study equals 345 farmers with whom interviews were conducted. In addition, stratified sampling proportionate to the size of sampling was used to select the samples and the samples were selected using simple random sampling method in each class. Data were collected with a questionnaire, the validity of which was approved by a panel of experts and its

reliability was confirmed by carrying out a pilot study and calculating its Cronbach alpha coefficient. The Cronbach alpha values for different parts of the questionnaire exceed 0.7. $SPSS_{Win19}$ (*IBM SPSS Statistics for Windows*, Version 19.0.; IBM Corp.: Armonk, NY, 2010) and Amos software (Amos, Version 23.0; IBM SPSS; Chicago, IL, USA, 2014) have been used for data analysis.

3. Results

The results of the farmers' analysis by age showed that their average age was over 52 years. Maximum age was 75 years and minimum age was 31 years. In addition, the majority of farmers had certificate of junior high school or lower levels of education. On average, their families consisted of four members (Table 2).

Table 2. Personal and professional characteristics of rice farmers.

Variable	Group	Frequency	Percent	Mean	SD	Min	Max
Age (year)	<40	59	17.1	52.130	10.606	31	75
	41–50	122	35.4				
	51–60	84	24.3				
	61–70	63	18.3				
	>70	17	4.9				
Education Level	Illiterate	50	14.5	—	—	—	—
	Primary school	106	30.7				
	Junior high school	87	25.2				
	High school	81	23.5				
	High school diploma and upper	21	6.1				
Number of Household Members	2–3	107	31	—	—	2	8
	4–5	172	49.9				
	6–7	63	18.3				
	8	3	0.9				
Experience of Rice Farming (year)	<20	102	29.6	29.229	13.251	7	62
	20–30	117	33.9				
	30–40	51	14.8				
	40–50	60	17.4				
	50–60	9	2.6				
	>60	6	1.7				
Total Area of Rice Lands (ha)	<1	119	34.5	1.488	0.899	0.4	5
	1–2	147	42.6				
	2–3	61	17.7				
	3–4	10	2.9				
	4–5	8	2.3				

In addition, findings on the evaluation of participatory management of paddy farmers in the economic sustainability of the wetlands using ISDM (Interval of Standard Deviation from the Mean) method showed that 14.2% of respondents had a low level of participatory management behavior, 40.6% had moderately low level of participatory management behavior, 30.7% had moderately high level of participatory management behavior and 14.5% had a high level of participatory management behavior (Table 3).

Table 3. Distribution of the respondents according to the level of participatory management behavior in the economic sustainability of wetlands.

Levels of Behavior	Frequency	Percentage	Cumulative Percentage
Low	49	14.2	14.2
Moderately low	140	40.6	54.8
Moderately high	106	30.7	85.5
High	50	14.5	100
Total	345	100	—

Mean: 31.63; Standard Deviation: 5.43.

In addition, as can be seen in Table 4, the item of nursery development to increase income was specified as the highest priority and the item of mushroom production was specified as the lowest priority in the collection of items related to participatory management behavior of paddy farmers in the economic sustainability of wetlands.

Table 4. Prioritization of items of participatory management behavior of paddy farmers in the economic sustainability of wetland.

Item	Average* (of 5)	Standard Deviation	Coefficient of Variations	Priority
Development of nursery	2.568	0.752	0.292	1
Employment of rice farmers in the second six month of the year after the rice harvest	3.031	0.941	0.310	2
Tree planting in the main habitats of birds (*Damgahs*) in order to exploit its benefits	2.660	0.871	0.327	3
Insurance of land income for all owners of the wetland as agriculture land supplying household income	2.756	0.904	0.328	4
Reconstruction of irrigation projects in the region	2.846	0.965	0.339	5
Development and prosperity of the local markets, especially fish markets	2.863	0.986	0.344	6
Introduction of rice produced in *Damgahs* (trapping site) of Fereydoon Kenar wetland site as organic product with affordable price	2.631	0.931	0.353	7
Local poultry breeding	2.484	0.895	0.360	8
The production of Compost from *Azolla* ferns	2.188	0.870	0.397	9

Table 4. *Cont.*

Item	Average* (of 5)	Standard Deviation	Coefficient of Variations	Priority
Preparing household food by local residents, local and traditional cuisine tour and the establishment of a family hotel in order to increase income	1.944	0.799	0.411	10
Development of natural tourism activities (ecotourism) in the region (bird watching, hiking, fishing and boating, etc.)	1.634	0.686	0.419	11
Constructing tourist huts	2.005	0.889	0.443	12
Mushroom production	2.014	0.965	0.479	13

* Likert range: 1, Very Low; 2, Low; 3, Medium; 4, High; 5, Very High.

In addition, in order to gain a suitable model of the participatory management of paddy farmers in the economic sustainability of Fereydoon Kenar wetland site, and in accordance with the literature and theoretical framework of the research, we tried to select effective variables. Nine variables,

1. participatory management behavior of paddy farmers regarding economic wetland sustainability,
2. paddy farmers' knowledge of participatory management of economic wetland sustainability,
3. paddy farmers' attitudes toward participatory management of wetland sustainability,
4. economic mechanisms,
5. environmental mechanisms,
6. structural mechanisms,
7. educational mechanisms,
8. cultural mechanisms, and
9. policy-making mechanisms

were entered in the model.

Figure 2 shows an analysis diagram of the research path. The indices of model fit and results of the path analysis are presented in Tables 5 and 6.

Table 5. Fit Indices of the Fitted Model.

Index	Optimal Value	Reported Value
X^2/df	<3	1.448
RMSEA	<0.07	0.038
CFI	>0.95	0.999
NNFI or TLI	>0.96	0.993
IFI	0.95	0.999

RMSEA = Root Mean Square Error of Approximation; CFI = Corrected Comparative Fit Index; NNFI or TLI = Non-Normed Fit Index or Tucker Lewis Index; IFI = Incremental Fit Index.

As can be seen in Table 5, proportionate amounts of fit indices include chi-square on the degrees of freedom, RMSEA (Root Mean Square Error of Approximation), CFI (Corrected Comparative Fit Index), NNFI or TLI (Non-Normed Fit Index or Tucker Lewis Index) and IFI (Incremental Fit Index) represent a reasonable adjustment of data-model.

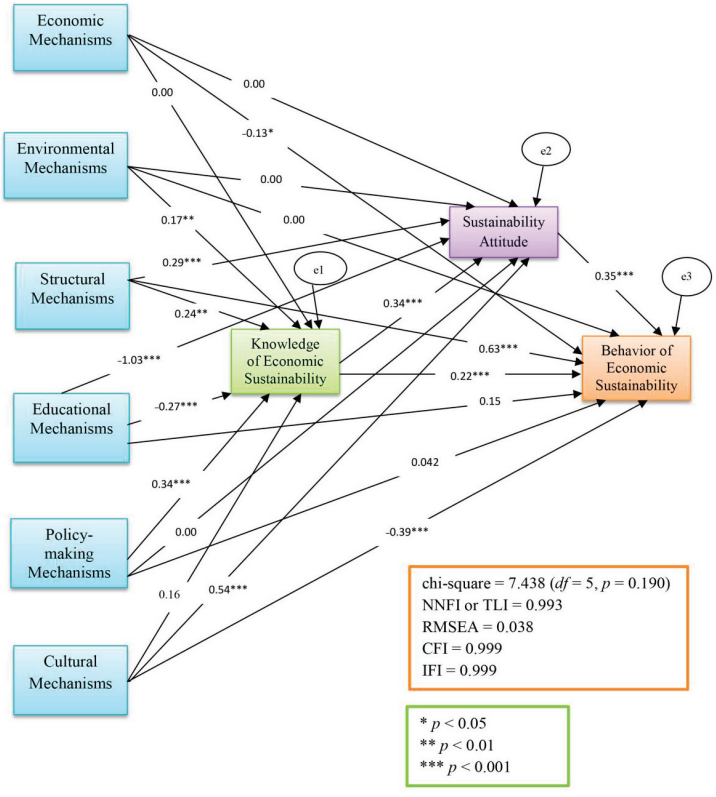

Figure 2. The model of mechanisms affecting participatory management behavior of paddy farmers regarding economic sustainability of wetland. RMSEA = Root Mean Square Error of Approximation; CFI = Corrected Comparative Fit Index; NNFI or TLI = Non-Normed Fit Index or Tucker Lewis Index; IFI = Incremental Fit Index.

Table 6. Analysis of the direct, indirect and total effects in the model of mechanisms affecting participatory management behavior of paddy farmers regarding economic sustainability of wetland.

Variables	Economic Mechanisms	Environmental Mechanisms	Structural Mechanisms	Educational Mechanisms	Policy-making Mechanisms	Cultural Mechanisms	Participatory Management Knowledge	Attitudes towards Participatory Management	Participatory Management Behavior
Direct effects									
Participatory Management Knowledge	0.000	0.174	0.241	−0.271	0.345	0.160	—	—	—
Attitudes towards Participatory Management	0.000	0.000	0.296	−1.034	0.000	0.543	0.349	—	—
Participatory Management Behavior	−0.130	0.000	0.638	0.149	0.042	−0.392	0.221	0.355	-
Indirect effects									
Participatory Management Knowledge	—	—	—	—	—	—	—	—	—
Attitudes towards Participatory Management	0.000	0.060	0.084	−0.094	0.120	0.055	—	—	—
Participatory Management Behavior	0.000	0.059	0.187	−0.459	0.003	0.246	0.123	—	—
Total effects									
Participatory Management Knowledge	0.000	0.174	0.241	−0.271	0.345	0.160	—	—	—
Attitudes towards Participatory Management	0.000	0.060	0.380	−1.128	0.120	0.598	0.349	—	—
Participatory Management Behavior	−0.130	0.059	0.825	−0.310	0.045	−0.146	0.344	0.355	—

In addition, as can be seen in Table 6 and Figure 2, the variable of economic mechanisms had a direct, negative and significant impact on the variable of participatory management behavior of paddy farmers regarding economic wetland sustainability ($\beta = -0.130$, $p < 0.05$) and had no effect on the two variables of paddy farmers' knowledge of participatory management of economic wetland sustainability and paddy farmers' attitudes toward participatory management of wetland sustainability. The variable of environmental mechanisms had a direct, positive and significant impact on the variable paddy farmers' knowledge of participatory management of economic wetland sustainability ($\beta = 0.174$, $p < 0.01$) and had no effect on the variables paddy farmers' attitudes toward participatory management of wetland sustainability and participatory management behavior of paddy farmers regarding economic wetland sustainability. In addition, structural mechanisms had a direct, positive and significant effect on three variables of paddy farmers' knowledge of participatory management of economic wetland sustainability ($\beta = 0.241$, $p < 0.01$), paddy farmers' attitudes toward participatory management of wetland sustainability ($\beta = 0.296$, $p < 0.001$), and participatory management behavior of paddy farmers regarding economic wetland sustainability ($\beta = 0.638$, $p < 0.001$). In other words, this variable can be a good predictor of three variables of paddy farmers' knowledge of participatory management of economic wetland sustainability, paddy farmers' attitudes toward participatory management of wetland sustainability and their participatory management behavior of paddy farmers regarding economic wetland sustainability. Educational mechanisms also had a direct, negative and significant effect on the variables of paddy farmers' knowledge of participatory management of economic wetland sustainability ($\beta = -0.271$, $p < 0.001$) and a direct, negative and significant effect on the paddy farmers' attitudes toward participatory management of wetland sustainability ($\beta = -1.034$, $p < 0.001$). In addition, this variable had no effect on the variable of participatory management behavior of paddy farmers regarding economic wetland sustainability. Policy-making mechanisms also had a direct, positive and significant effect on the variable of paddy farmers' knowledge of participatory management of economic wetland sustainability ($\beta = 0.345$, $p < 0.001$) and no significant effect on the variable of participatory management behavior of paddy farmers regarding economic wetland sustainability. In addition, the variable of policy-making mechanisms had no effect on the variable of paddy farmers' attitudes toward participatory management of wetland sustainability. Cultural mechanisms had a direct, positive and significant effect on the variable of paddy farmers' attitudes toward participatory management of wetland sustainability ($\beta = 0.543$, $p < 0.001$); a direct, negative and significant effect on the variable of participatory management behavior of paddy farmers regarding economic wetland sustainability ($\beta = -0.392$, $p < 0.001$); and no effect on paddy farmers' knowledge of participatory management of economic wetland sustainability.

The variable of paddy farmers' knowledge of participatory management of economic wetland sustainability had a direct, positive and significant effect on the variables of paddy farmers' attitudes toward participatory management of wetland sustainability ($\beta = 0.349$, $p < 0.001$) and participatory management behavior of paddy farmers regarding economic wetland sustainability ($\beta = 0.221$, $p < 0.001$). The variable paddy farmers' attitudes toward participatory management of wetland sustainability had a direct, positive and significant effect on the variable participatory management behavior of paddy farmers regarding economic wetland sustainability ($\beta = 0.355$, $p < 0.001$). In addition, as can be seen in Table 6, policy-making mechanisms had the greatest total effect on the variable of paddy farmers' knowledge of participatory management of economic wetland sustainability. Cultural mechanisms had the greatest total effect (positive) on the variable of paddy farmers' attitudes toward participatory management of wetland sustainability, and the variable of structural mechanisms had the greatest total effect on the variable of participatory management behavior of paddy farmers regarding economic wetland sustainability.

The stepwise method of multivariate regression test was used to determine the ability of the independent variables to predict the variable of participatory management behavior of paddy farmers regarding economic wetland sustainability. As Table 7 shows, the four variables of structural mechanisms, paddy farmers' attitudes toward participatory management of wetland sustainability, and paddy farmers' knowledge of participatory management of economic wetland sustainability were entered into the regression equation. According to the adjusted value of R^2, these variables are able to explain approximately 50% of changes of the variable of participatory management behavior of paddy farmers regarding economic wetland sustainability.

Table 7. The results of the stepwise multiple regression analysis with the dependent variable of participatory management behavior of paddy farmers regarding economic sustainability of wetland.

Independent Variables	B	SE B	Beta	T	Tsig	R	R^2	R^2Adj
Structural Mechanisms (X_1)	0.763	0.078	0.658	9.810	0.002	0.554	0.307	0.305
Attitude towards Participatory Management in Sustainability of Wetland (X_2)	0.266	0.038	0.292	6.941	0.000	0.659	0.434	0.431
Cultural Mechanisms (X_3)	−0.404	0.076	−0.349	−5.303	0.000	0.682	0.465	0.460
Participatory Management Knowledge in the Economic Sustainability of Wetland (X_4)	0.195	0.042	0.234	4.613	0.000	0.705	0.497	0.491
Constant	−7.822	2.542	—	−3.077	0.000	—	—	—

F Value = 83.877, Significance = 0.000.

According to the regression coefficients (B) and calculated constant coefficients, the regression equation is as follows:

$$Y = -7.822 + 0.763X_1 + 0.266X_2 - 0.404X_3 + 0.195X_4 + error$$

4. Discussion and Conclusions

Iran is a country that located at the center of many bird migration paths. In fact, this country is the main corridor of annual birds migration from northern China, Kazakhstan, Turkmenistan, Azerbaijan, Armenia, East and West Siberia to northern Europe, Scandinavian countries located in North-West Europe and Africa. Accordingly, many wetlands of Iran are a safe haven for many migratory birds. Fereydoon Kenar, Ezbaran and Sorkh Ruds Ab-Bandans have become as one of the most important overwintering habitats for migratory birds due to favorable conditions and abundant food resources. Whooper swan, mute swan, Bewick's swan, red-breasted goose, lesser white fronted goose, bean goose, marbled duck, ferruginous duck, white-headed duck, Eurasian bittern, ruddy shelduck and dalmatian pelican are among most important bird species in this region. This wetland is overwintering habitat for the sole survivor of the West Siberian cranes in the world. Conservation of natural resources of this wetland, particularly its plants and animals species including aquatic birds, and its residents' dependence on bird hunting as an income source, considering the social conditions, beliefs and values in the region, further indicate the undeniable role of local communities, especially farmers of the region.. Therefore, protection and sustainable conservation of this wetland site depend on the participation and wise use of the wetland resources by locals.

To achieve the farmers' participatory management pattern in the economical sustainability of Fereydoon Kenar wetland site, path analysis was used. The variables used include the paddy farmers' knowledge of participatory management of economic wetland sustainability; paddy farmers' attitudes toward participatory management of wetland sustainability; economic, environmental, structural, educational, and cultural mechanisms; policy-making; and, the main variable, participatory management behavior of paddy farmers regarding economic wetland sustainability. The results showed that there is a direct negative and significant relationship between the variable of economic mechanisms and the participatory management behavior of paddy farmers regarding economic wetland sustainability. Perhaps one of the main reasons for this relationship is that the farmers focus on their livelihoods too much and they have a great attention and desire to earn short-term gains instead of long-term benefits by the exploitation of wetland resources, and this is practically in conflict with the principles of wetland's economic sustainability. These results are consistent with the findings of Mironga [2] and Kyarisiima et al. [8].

There is a direct positive and significant relationship between the variable of structural mechanisms and the participatory management behavior of paddy farmers regarding economic wetland sustainability. These results are consistent with the findings of Mironga [2] in Western Kenya, Dixon [20] and Wood [21] in Ethiopia, Robinson et al. [3], Shrestha [12] and Hannan Khan [5] in Bangladesh. In other words, structural mechanisms such as restricting public and unprincipled access to wetland resources, paying attention to local institutions in the process of wetland management as a missing link in the development of the relationship between people and the environment, clarity in defining the rights and obligations of land ownership and management of wetland site, and paying attention to the discussion of the use of wetland lands and correcting it, are necessary. Also, establishing a state system as an institutional structure and process in order to stabilize the decisions in the management of wetland resources has positive effect on the farmers' participatory management in the economic sustainability of wetland.

Moreover, there is a direct positive and significant relationship between the variables of paddy farmers' knowledge of participatory management of economic wetland sustainability and their attitudes toward participatory management of wetland sustainability, and participatory management behavior of paddy farmers regarding economic wetland sustainability. In other words, enhancing the paddy farmers' knowledge of participatory management of economic wetland sustainability and their attitudes toward participatory management of wetland sustainability has a positive effect on theoir behavior regarding participatory management in economic wetland sustainabilit. These results are consistent with the findings of Gawler [13], Wood et al. [21], Mironga [2], Shtestha [12] and Murdiyarso et al. [23].

Furthermore, the stepwise multivariate regression test was used to determine the ability of independent variables to predict the dependent variable of participatory management behavior of paddy farmers regarding economic wetland sustainability. The result of this test showed that, according to the adjusted R^2, in total, four variables, structural mechanisms paddy farmers' attitudes toward participatory management of wetland sustainability, cultural mechanisms and paddy farmers' knowledge of participatory management of economic wetland sustainability, can predict approximately 50% of the changes in participatory management behavior of paddy farmers regarding economic wetland sustainability.

5. Recommendations

- Given the direct, positive and significant effect of structural mechanisms of paddy farmers' knowledge, attitudes and behavior regarding participatory management of Fereydoon Kenar's economic wetland sustainability, we suggest the integration of collaborative activities related to wetland management (such as technical and civil projects, holding training courses, etc.), public participation

in this field by establishing a distinct and separate governmental structures for wetland management, and creating local and participatory associations. This could be a very good incentive for farmers to participate more in the sustainable management of wetland sites.

- According to the positive and significant effect of the variables paddy farmers' knowledge of participatory management of economic wetland sustainability and the paddy farmers' attitudes toward participatory management of wetland sustainability on participatory management behavior of paddy farmers regarding economic wetland sustainability, we suggest different courses and workshops on new and alternative options for the livelihood of local communities with a focus on the exchange of views among experts, farmers and local menagerie-owners to improve living conditions and increase the income level of residents. This will aid in the preservation and wise use of wetland resources and the promotion of sustainable development of Fereydoon Kenar.
- Considering the lack of studies on the economic and environmental value of Fereydoon Kenar wetland site, we propose separate evaluation of the wetland resources from economic and conservational aspects as the basis for any management action taken in this site.

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