

**Identifying and ranking effective factors in tendency toward vandalism
in irrigation and drainage networks in Iran
(A case study of the irrigation and drainage network of Kinevars Dam)**

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Abstract

The present study was conducted to identify and rank the effective factors in the tendency of villagers to vandalize and steal the components of Iran irrigation and drainage networks. A mixed qualitative-quantitative method was employed, and exploratory participatory rural appraisal (Exploratory PRA) evaluation and exploratory factor analysis were carried out. The sample of the quantitative section consisted of 300 participants who were randomly selected from among 823 beneficiary farmers residing 4 villages around the domain of Kinevars Dam. Techniques utilized to collect data in qualitative section included group discussion, semi-structured interview, observation, focus groups, and sketch maps of destruction density of the network, and factor analysis using the orthogonal Varimax Rotation Method was employed in the quantitative section. Afterwards, ranking method was employed to rank the identified factor in each village. The results of the scree plot indicated that in total the collected data were loaded in 5 main factors that were respectively structural factors with 0.17 variance, social factors with 0.16 variance, economic factors with 0.14 variance, legal factors with 0.13 variance, and cultural factors with 0.7 variance. Among the identified factors; therefore, structural factors had the highest role in explanation of tendency toward vandalism.

Keywords: Vandalism, Irrigation and Drainage Networks, Iran.

INTRODUCTION AND OBJECTIVE

Increasing growth of population, human need for food, and limited water and soil resources to produce food have concerned most politicians all over the world especially countries located in dry and semidry regions. Due to its unique geographical location and climate with a rainfall of one third of the global average, Iran is counted as one of these countries [10]. Therefore, appropriate management of water in these regions can have a remarkable effect on sustainable development and progress. Consumption management of agricultural water resources has been proposed in response to the issues of inappropriate use of water resources and adverse environmental and economic effects of traditional methods of water consumption [16]. Nowadays, all planners and policymakers of the national water resources agree that these resources are at stake of crisis and this trend continues using the current exploitation practices [5]. Compared to traditional irrigation systems, pressurized irrigation systems due to their better irrigation efficiency have a remarkable role in agricultural policies especially in areas with scarce water resources [13]. Low efficiency of irrigation, shortage of precipitation, lack of appropriate spatial and temporal distribution of precipitation, and various droughts in recent years necessitate utilization of pressurized irrigation systems more than ever [7]. Establishment of pressurized irrigation systems in costal lands around dams is one of the main methods of managing water resources and realizing social justice in the exploitation of water resources[8].

Given the expansion of physical and public facilities in villages, we are always witnessing intentional vandalism and asocial irresponsible behavior by individuals who intentionally destroy public properties. As a social problem, intentional destruction of public properties has concerned many scholars and experts of social studies in different countries and Iran because such an action can be considered as a social predicament and a type of aberration [2]. Sociologically, these individuals are called vandals. When the mutual affinity between the individual and the society fades away and the individual cannot reach his goals using the means and mechanisms provided

by the society, he tries to achieve them via anomalous ways, as a result the individual becomes abnormal, and when this situation is generally prevalent, the society will experience anomie and abnormality, in other words, when values and norms are diminished or weakened, there will be no common values or goals among the society members. Vandalism can include damage to properties, green spaces, streets, walls, etc. Therefore, since destruction of public properties like phone booths, buses, toilets, tables and chairs, walls, windows of passageways, shops, and schools, water valves, cooling water systems, shrubs and grasses planted in the green spaces, and facilities and irrigation networks happens frequently, it causes extremely high amendment and restoration expenses. It also causes mental annoyance of people and authorities. Therefore, it is considered as a threat to social order. As a result, it is necessary to identify the causes and reasons that influence such behaviors and propose practical methods to guide them toward developing the vandals' talents and encourage them to make optimal use of public properties [12].

THEORETICAL FRAMEWORK AND BACKGROUND

Vandalism is defined as the uncontrolled and intentional destruction cultural objects and artifacts or public properties, which is to some extent considered as social anomaly. Different causes can be evaluated for it. Sociologically, this phenomenon is classified as one of the aberrance and delinquency of modern societies and is analyzed as a hostile behavior and vindictive reaction toward some pressures, imposition, adversity, extortion, and failures [6]. Sociologically, vandalism means to have a sick mood that is inclined toward destruction of public properties and facilities. As an irreparable phenomenon in today's societies, vandalism on public properties causes damages to national and public properties every year [11]. In sociological perspective, structures, organizations, and social and cultural entities as social realities are the cause of human's behavior, and delinquent behaviors are caused by social and cultural structures. According to social control theory, delinquency and deviation are caused the weakness and separation of the individual from the society, which is the result of lack of control and supervision. Social control is the continuation of socialization process, and socialization process results in conformity, i.e. socialization is a volunteer and optional conformity. However, when conformity is not adopted voluntarily and optionally, mechanisms of social control are employed in order to transfer and realize social norms and expectations [3]. In his outcome theory, R Clark classifies independent variables effective in creation of vandalistic behavior into 8 groups: childhood experiences, heredity, formation of delinquent personality, personal, social, and economic factors, individual's current conditions and status, crises and events, and cognitive procedures [9]. Based on Moser model, vandalistic behavior and destruction in social facilities have deeper and more complex intentions. According to him, three factors of oppression feeling, failure to succeed, and rebellion and protest are considered as the main causes of vandalistic behaviors [11]. According to social learning theory, no one is born delinquent and criminal, rather such behavior are caused by environmental and social factors; therefore, the individual learns some responses through his experience or others encourage or prevent such responses, which are certainly effective in formation of delinquent behaviors [12].

The issue of developing the cooperation of the entities and agricultural beneficiaries throughout all phases of studies, design, and implementation of projects of developing and managing water resources plays an outstanding role in optimally maintaining the facilities of irrigation and drainage systems. Cooperative and social challenges are among the most important challenges involved with implementation, maintenance, and exploitation phases in irrigation and drainage projects. Neglecting the social aspects and cooperation of local communities can bring about negative consequences like prolonged time of establishing the networks, damages due to the path ownership, wear and destruction of irrigation networks, and problems of exploitation and maintenance. Not only does participation of people in projects resolve their resistance and protest against the projects but it also equips the projects with administrative and economic capacity. Moreover, responsibility taking for and optimal maintenance of the facilities will increase if

the beneficiaries feel they have ownership over the projects. The farmers' participation should not be limited only to financial aids, rather they should have a say in all phases of planning, implementing, and exploiting the networks. Therefore, an effective step can be taken forward to sustainably develop agriculture by seeking the farmers' participation in irrigation management and utilizing the local knowledge. On the other hand, people should not be forced to participate in developing plans because it may frustrate them with the projects, which can finally cause to withdraw from the programs and fail to cooperate [4]. Withdrawal from and dissatisfaction with the projects can lead to lose their interest in maintenance of the irrigation networks and also cause them to complainingly destroy the facilities. In analyzing the farmers' satisfaction with pressurized irrigation systems, Lahannama concluded that the beneficiaries' dissatisfaction with implementing the pressurized irrigation systems is mostly related to limitations and issues like lack of compatibility of the systems with the climate, lack of sufficient funds, inefficiency of designing companies, and low quality equipment [14]. Minh concluded that factors such as the farms size, the farmers' educational level, and benefit from developing services affect the farmers' satisfaction with maintenance of and exploitation from pressurized irrigation technology [15]. The results of the study conducted by Taghvaei et al indicated that segmenting and scattering the farming lands are among the most important constraint on development of pressurized irrigation systems, and structural, economic, socioeconomic, and natural factors account for 66% of the variances [1].

Abharis located in Zanjan Province, Iran. It is an important center of agriculture. Shortage of water resources is one of the most essential constraints on agriculture in this town. Construction of Kinevars Dam was aimed at supplying agricultural water and other types of consumption. Studies and implementation of irrigation and drainage network in this town began in 2001, and the zone 2 executive operations of irrigation and drainage network infrastructure was finished in 2015. During the implementation of the irrigation and drainage network, the villagers residing the areas around Kinevars Dam caused a lot of damages to the facilities and imposed enormous expenses on Zanjan's regional water company. Damages included destroying and breaking the sprinklers and riser in plow seasons by agricultural machinery and stealing them, breaking the concrete pipes protecting the risers, stealing the irrigation valves and fittings, stealing the locks and the doors of pumping stations, and avulsing and stealing drip irrigation pipes. Since the main beneficiaries of Kinevars irrigation and drainage network are residents of Abhar and villages of Espas, Rahmatabad, and Funushabad, investigating the causes of destroying the irrigation and drainage network by the beneficiaries before exploitation is highly significant in the phase of implementation and exploitation. Therefore, the present study deals with identifying the effective factors in tendency toward vandalism in Kinevars Dam irrigation and drainage network.

MATERIALS AND METHODS

Since the study was empirical and identifying the hidden aspects of the issue was significant, a mixed method (qualitative and quantitative) was employed. In the first phase and in the qualitative section, participatory rural appraisal (PRA) method was utilized. PRA is used for evaluation studies and is based on field operations. Since the present study deals with a specific issue, i.e. effective factors in tendency toward vandalism in irrigation and drainage network, exploratory PRA was employed. The study population consisted of the beneficiaries of the irrigation and drainage network of Kinevars Dam, including the four villages of Kinevars, Espas, Rahmatabad, Funushabad, and Abhar. The area of Kinevars Dam irrigation and drainage network was 1750 hectares, which was exploited by 823 farmers. Data collection was conducted during a period of three months through techniques such as group discussion, semi-structured interview, observation, focus groups, and sketch maps of destruction density of the network in the four villages. These activities were carried out along with other related measures by holding meetings and transferring responsibility of the network to the cooperative water users

associations. During the study, causes and factors involved with vandalism on the irrigation and drainage network were examined and explained in different ways. The selected participants were chosen based on different criteria such as social status, age, income, ownership level, and education so that the ideas of all classes of the villagers could be included.

Afterwards, in the quantitative section, the qualitative data were operationally conceptualized, and a questionnaire was designed in order to evaluate the concepts extracted from the field interviews. Validity of the questionnaire was confirmed by the experts and its reliability was calculated to be 0.85 by Cronbach's Alpha method by administering it on 60 participants.

Afterwards, the questionnaire was administered on the 300-participant sample that was randomly selected from among the individuals who were willing to cooperate with the study. The orthogonal Varimax Rotation Method was employed to analyze the results of exploratory factor analysis.

RESULTS AND DISCUSSION

Results of the qualitative section (PRA)

After qualitative data collection techniques (PRA) was carried out, various cases that were effective in vandalism of the irrigation and drainage network of the region were identified. Afterwards, the mentioned issues were classified according to general socioeconomic, cultural, legal, and structural issues. Twenty-three factors were identified; 7 social cases, 3 economic cases, 2 cultural cases, 3 legal cases, and 8 structural cases. Then, the identified factors for each factor of tendency toward vandalism were classified separately for each village in the form of some questionnaires. In so doing, individuals who had previously cooperated with qualitative techniques in the four villages and in an urban location were asked to rank each topic using numbers 1 to 23. The results are presented in Table 1, below.

Table 1. A summary of the results extracted from qualitative analysis in the villages located around the dam

Identified Factors	Ranking the Importance by the Beneficiaries: 23						
	Funushabad	Espas	Rahmatabad	Abhar	Kinevars	Mean	Rank
Rural subcultures	17	8	11	12	8	11.2	11
Ethnic disputes and conflicts	18	22	17	22	23	20.4	21
Easy access to the components of the network to be stolen	8	15	12	15	5	11	10
Allocation of the dam water to industrial uses and reduction in agriculture share	22	19	22	17	16	19.2	19
Low level of educational and developmental activities	3	13	10	10	2	7.6	6
Failure to attract people's comprehensive participation in designing and implementing phases	2	14	9	1	10	7.2	5
Immigration of some owners and renting their lands	11	1	1	9	11	6.6	4
Dissatisfaction with the performance and behavior of the contractor company	16	20	8	20	12	15.2	15
Lack of economic motivation	15	10	15	11	9	12	13
Unemployment	10	11	7	2	3	6.6	4
Lack of ownership feeling toward the network	14	21	16	19	22	18.4	18
Addiction	4	12	2	8	1	5.4	2
Retaliation against the regional water company	21	18	21	23	17	20	20
Unclear legal status of irrigation network ownership	12	3	6	13	13	9.4	7
Lack of judicial review of the violators	6	2	3	4	6	4.2	1
Clogginess of the network components during plow seasons	14	16	19	16	14	15.8	17

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The prolonged procedure of implementing the plan	9	5	18	7	18	11.4	12
Failure to exploit the irrigation networks	5	7	4	5	7	5.6	3
Lack of compatibility between the network and the real needs of the beneficiaries	1	6	13	21	20	12.2	14
Lack of government's physical protection of the irrigation network during implementation	7	4	5	14	21	10.2	9
Extreme drop of water volume of Kinevars Dam	23	23	23	18	19	21.2	22
Implementing the network in a part of a farming land	19	17	20	6	15	15.4	16
Low income (poverty)	20	9	14	3	4	10	8

According to the qualitative results and the results of the ranking by the respondents, each of the 23 factors were given a score from 1 to 23 in order of importance. Therefore, in each village and the town, 5 factors were identified as the most important ones in tendency toward vandalism on irrigation and drainage networks, which are presented in Table 2.

Table 2. The most important factors in tendency toward vandalism on irrigation and drainage network divided by villages (town)

Village/Town	The most important factors in order of rank from 1 to 5				
	1	2	3	4	5
Funushabad	Lack of compatibility between the network and the real needs of the beneficiaries	Failure to attract people's comprehensive participation in designing and implementing phases	Low level of educational and developmental activities	Addiction	Failure to exploit the irrigation networks
Espas	Immigration of some owners and renting their lands	Lack of judicial review of the violators	Unclear legal status of irrigation network ownership	Lack of government's physical protection of the irrigation network during implementation	The prolonged procedure of implementing the plan
Rahmatabad	Immigration of some owners and renting their lands	Addiction	Lack of judicial review of the violators	Failure to exploit the irrigation networks	Lack of government's physical protection of the irrigation network during implementation
Abhar	Failure to attract people's comprehensive participation in designing and implementing phases	Unemployment	Low income (poverty)	Lack of judicial review of the violators	Failure to exploit the irrigation networks
Kinevars	Addiction	Low level of educational and developmental activities	Unemployment	Low income (poverty)	Easy access to the components of the network to be stolen
The total rank of the factor	Lack of judicial review of the violators	Addiction	Failure to exploit the irrigation networks	Unemployment	Failure to attract people's comprehensive participation in designing and implementing phases

The final ranking was carried out based on the mean of the ranks, and the lowest rank was calculated to be 1 and the highest rank was calculated to be the last rank in the order of importance of the factors. Based on this, the 5 factors of lack of judicial review of the violators, addiction, failure to exploit the irrigation networks, unemployment, and failure to attract people's comprehensive participation in designing and implementing phases were identified as the most important causes affecting vandalism (intentional destruction or stealing the properties) in Kinevars Dam irrigation and drainage network.

Results of the quantitative section: Exploratory Factor Analysis (EFA)

After the qualitative data were analyzed, 23 effective factors in tendency toward vandalism were identified, which were then analyzed using the prepared measuring tool and EFA.

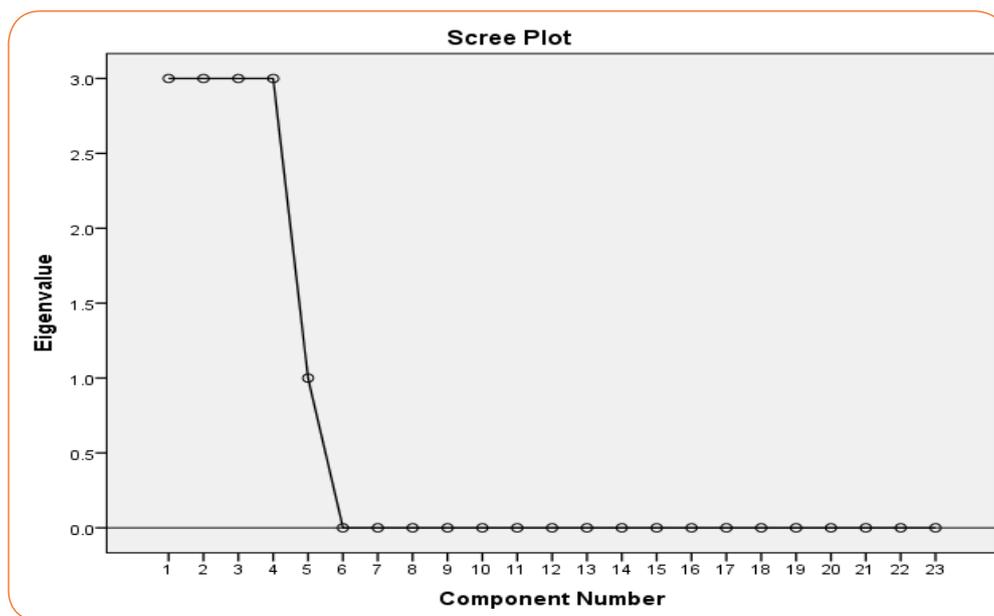


Fig. 1. EFA Scree Plot

Scree plot presented in Figure 1 indicates the factor analysis. A total of 5 factors indicate Eigen values of above 1. The total of the explained variances was 0.67, which indicates that the 5 identified factors explain the total of 0.67 variances of tendency toward vandalism. KMO index is equal to 0.75 and the results of Bartlett test also indicate that the chi-square of 3220 with the degree of freedom of 253 was obtained which shows the adequacy of the factor analysis.

Table 3. Factor loadings of the identified factors

Items	Factor Loadings				
	Structural	Social	Economic	Legal	Cultural
Easy access to the components of the network to be stolen	.22	.26	.25	.29	.56
The prolonged procedure of implementing the plan	.14	.11	.23	.13	.53
Failure to exploit the irrigation networks	.29	.14	.11	.11	.57
Extreme drop of water volume of Kinevars Dam	.19	.15	.17	.21	.47
Allocation of the dam water to industrial uses and reduction in agriculture share	.29	.14	.15	.18	.49
Lack of compatibility between the network and the real needs of the beneficiaries	.13	.18	.27	.11	.52
Implementing the network in a part of a farming land	.21	.26	.16	.13	.54
Clogginess of the network components during plow seasons	.14	.16	.13	.16	.48
Low level of educational and developmental activities	.19	.11	.21	.66	.12
Ethnic disputes and conflicts	.28	.17	.19	.54	.14
Addiction	.17	.17	.18	.59	.29

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Failure to attract people's comprehensive participation in designing and implementing phases	.21	.29	.21	.47	.12
Lack of ownership feeling toward the network	.11	.19	.15	.65	.26
Immigration of some owners and renting their lands	.13	.24	.15	.53	.12
Dissatisfaction with the performance and behavior of the contractor company	.18	.13	.11	.64	.13
Lack of economic motivation	.13	.15	.59	.21	.13
Unemployment	.17	.16	.65	.11	.17
Low income (poverty)	.28	.12	.54	.25	.28
Unclear legal status of irrigation network ownership	.17	.58	.18	.25	.17
Lack of government's physical protection of the irrigation network during implementation	.28	.51	.13	.12	.28
Lack of judicial review of the violators	.29	.67	.21	.11	.29
Rural subcultures	.64	.21	.17	.29	.21
Retaliation against the regional water company	.69	.14	.12	.27	.14

Table 3 indicates the factor loading of the identified items. The value of 0.3 is considered as the cut-off point of the factor loading. In total, the data were loaded in 5 main factors that are respectively structural factors with 0.17 variance, social factors with 0.16 variance, economic factors with 0.14 variance, legal factors with 0.13 variance, and cultural factors with 0.7 variance. Therefore, among the extracted factors, structural ones have the highest factor loading in exploring the tendency toward vandalism.

SUGGESTIONS

Factors causing vandalism in irrigation and drainage networks are so interrelated and related that mere quantitative and survey methods can hardly explore the causes and the main intentions. Therefore, employing the qualitative and quantitative methods that are appropriate with the target study sample can decrease a part of the inefficiency of the methodology of the studies. On the one hand, applicability of the results of such studies necessitates utilizing qualitative methods and obtaining concrete results. According to the results of the present study, a set of legal, social, structural, and economic are involved with the villagers' tendency toward intentional destruction and theft in irrigation and drainage networks. Judicial review of the violators by the regional water company and legal inhibitors remove the ease of the task for the vandals. Therefore, presence of a protective group to physically monitor the network and record the violations in order to legally deal with these individuals can reduce a large portion of the violations. Unemployment and addiction are also two economic and social factors that are intermingled and are highly effective in stealing the components of the network. Developing employment programs in agriculture sector and rural artifacts can both reduce delinquency and crimes and control a part of immigration. Immigration of landlord villagers has also been identified as one of the factors of destroying irrigation network developed in their lands. Neglecting the attraction of people's comprehensive participation in study and implementation phases has caused people to feel alien and feel a lack of ownership. Therefore, this infrastructural factor should be prioritized from the very first step. Moreover, if the beneficiaries have benefited from the network, they feel the responsibility to protect it. Due to the prolonged implementation procedure and lack of the network readiness to be exploited within the studied region, the beneficiaries had no willing to maintain it and are indifferent to protecting it.

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