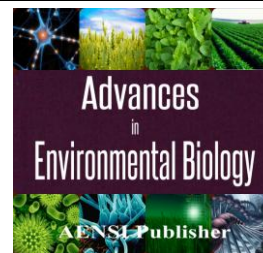




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### Comparative Analysis of Current and Favorable Extension System contents of Water Resources Management for Date Palm Growers in Khuzestan Province

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#### ABSTRACT

Iran is considered as one of the arid and semi-arid areas in the world, scarce in water, where irrigation problem is becoming a more and more limiting factor for intensive agriculture. Agriculture by using more than 70 percent of all water resources is the predominant consumer of water that has played a major role in feeding people. The date palm is considered as one of the most important horticultural crops in Khuzestan province. Due to limited water resources quality and quantity, it is necessary to reform strategies and technologies to increase water use efficiency. To obtain this goal, agricultural extension systems as a training and notification mechanism can play a key role to timely notification and enhance managerial ability of Date growers. Nowadays, it is certain that agricultural extension will be effective, when it be operating within a system. The main elements of extension system are goals, target groups, methods, organizations, professionals and the contents. The population of experts in this study are included all agricultural extension experts (N=150) of agricultural-Jihad Organization of Khuzestan Province. A survey study was applied as a methodology of research work. Data were collected using a structured questionnaire. For determining the validity of questionnaire, the face and content validity was used. Cronbach's alpha was used to measure reliability of the instrument which was showed the instrument reliability. The purpose of this research was identifying favorable contents of water resources management extension system for date palm growers in Khuzestan province of Iran. Based on the results, current content of extension system regarding all items of water resources management for date palm growers in Khuzestan province is not favorable. Wilcoxon signed ranks were used for analyzing causal comparative of water resources management, between current and favorable conditions which showed that there were significant differences between current and favorable conditions ( $P \leq 0.01$ ).

According to factor analysis, the contents of extension system for supporting of water resources management were categorized into three main components, which have been named Sustainability, Partnership and Specialized contents. The obtained results from the factor analysis revealed that the three mentioned factors explained 84.951% of the variation of extension content for supporting of water resources management extension system.

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## INTRODUCTION

In Iran, like other developing countries, agriculture is one of the most important economic sectors and comprises a considerably high percentage of production and employment [7]. The whole land under date cultivation in Iran is estimated about 240000 ha [4]. of which over 43000 ha are allotted to Khuzestan province [16].

Water is an essential component in agriculture. However, 70 percent of the total word water withdrawal is used for agriculture, and half of that is lost to seepage and evaporation [6]. Agricultural sustainable water resources management describes the set of approaches particular to transmittal, consumption and conservation of water resource in Agriculture [12].

Van den Ban & Hawkins [17] describe agricultural extension services (AES) as a means of enabling farmers to clarify their own goals and possibilities, to become better decision-makers, and to stimulate desirable agricultural development by transferring information from a global knowledge base that is filtered through local research to farmers. Change in agriculture has brought about new challenges for farmers in relation to production and technology. As a result more attention should be paid to agricultural extension.

Extension could play a key role in fostering sustainability through its educational programs but there has been a growing realization that traditional extension models have not been sufficiently effective in promoting adoption of sustainable agricultural practices [1].

Nowadays, it is certain that agricultural extension will be effective, when it be operating within a system. The main elements of extension system are goals, target groups, methods, organizations, professionals and the contents [10]. Components of extension system compose the internal parts of the model. These components are as similar as the traditional components of extension systems, but based on new paradigm of development, we have defined new function and objectives for them as they can support sustainability of agriculture [1]. One of the most important components of an extension is to choose the contents of the extension system of water resources management for Date palm growers in Khuzestan province.

Karshenas [8] claimed that the difficulties within Iranian agriculture were caused by the mismanagement of human resource by actors within the sector, and not because of shortages of natural resources in agriculture.

Ommami [12] contended that the contents of extension system for supporting of sustainable agriculture were categorized into three main components, which have been named Natural conservation, Human health and Economic contents.

Agricultural extension in Iran such as many developing countries is mainly focused on common extension approach. Studies indicated that Iran's sustainable agricultural extension contents are not favorable and the extension system does not pay enough attention to them. These conditions necessitate rethinking of extension contents to accomplish sustainable agriculture [1, 13]. Smith [15] pointed out, that through a participatory approach in extension, technical staff and other stakeholders put farmers in charge of water management at field and scheme level, promote the adoption of appropriate technologies and establish the necessary local capacity to put farmers in charge of water development and management. Participatory Training and Extension (PT&E) has proved to be an effective tool for this and to establish the appropriate support structure to assist and advise farmers in irrigation development and management. PT&E is in particular useful for small holder irrigation and in the case of irrigation management transfer programs.

Extension activities based on the survey information were effective in creating awareness, but did not result in widespread change [3]. Also, development options that have the potential to increase whole farm profit will invariably consider the potential to increase water use efficiency (WUE). At this regard, extension approaches are very important [3].

Lacking the suitable linkage between extension and research organizations has been a barrier for transfer of appropriate new technology to farmers [14]. Identifying favorable contents of sustainable agricultural extension system in Khuzestan province have important role to developing extension system. The purpose of the present study was to identify the most appropriate contents for water resources management extension system for date palm growers in Khuzestan province of Iran.

## MATERIALS AND METHODS

This study carried out in the cities of Khuzestan province that date palm is cultivated such as Ahvaz, Behbahan, Shadegan, Abadan; Khoramshahr during 2013 to 2014. The research method was quantitative, correlative descriptive and causal relation research. In quantitative research, the researcher identifies variables and may look for relationships among them, but does not manipulate the variables [5].

The total population of agricultural extension experts (N=150) of Agricultural-Jihad of Khuzestan Province, Iran, considered as population of study and were selected for participation in the study. One hundred and thirty

agricultural extension experts returned questionnaires yielding an overall response rate of 86.7%. A questionnaire was developed to gather information regarding water resources management for Date Palm Growers in Khuzestan Province. Questions were generated from the literature review. The survey was divided into two sections to gather data on personal characteristics of extension experts and the degree of current and favorable regarding water resources management. Responses for 2nd section were categorized using a Likert-type scale from point 1 to 5 representing very low important to very high important respectively. Content and face validity were established by a panel of experts from faculty members. Questionnaire reliability was estimated by calculating Cronbach's alpha. Reliability was Cronbach's alpha=0.85, which can be regarded as sufficient. Data collected were analyzed using the Statistical Package for the Social Sciences (SPSS, 17). Appropriate statistical procedures for description (frequencies, percent, means, and standard deviations) were used. Inferential statistics such as Wilcoxon, canonical Correlation were used to analysis data.

#### *Population and sample:*

The total population of agricultural extension experts (N=150) of Agricultural-Jihad Organization and the agricultural-Jihad management of Khuzestan Province, Iran, considered as population of study. One hundred and thirty agricultural extension experts returned questionnaires yielding an overall response rate of 86.7%.

#### *Instrument:*

A questionnaire was used to collect the data. Researchers developed this questionnaire. Questions were generated from the literature review. Responses for these sections were categorized using a five point Likert - type scale: 1 =very low, 2 = low, 3 = medium, 4 = much and 5 = very much. The mean scores were used for later analysis (Canonical Analysis). Questionnaire reliability was estimated by calculating Cronbach's alpha. Reliability of the overall instrument was estimated at 0.85, which can be regarded as sufficient.

#### *Data collection and analyses:*

The data were collected between October 2013 and March 2014 through a questionnaire that were available to 150 agricultural extension professionals. One hundred and thirty agricultural extension professionals returned questionnaires yielding an overall response rate of 86.7%. Data collected were analyzed using the Statistical Package for the Social Sciences (SPSS, 17). Appropriate descriptive statistics such as mean scores and standard deviations were used to analysis the data generated. Inferential statistics such as Wilcoxon signed ranks were used to analysis data. The factor analysis used to identify the factors and to categorize content of extension systems toward supporting water resources management.

## **RESULTS AND DISCUSSION**

The first section was to describe agricultural extension experts' demographic profile in Khuzestan province of Iran. The ages of the respondents ranged from 23-68. The mean age was 38 (SD = 8.50, n = 130). The majority (37.7%, n = 49) of respondent were 34-44 years old. In reference to the frequency of respondents' gender, 55.4% of experts were male and 44.6 % were female. The years of respondents' experience ranged from 1-30. The mean years served in extension were 12.7(SD = 8.40) and about 69% of experts had a Master of Science degree level of education.

In the present study the experts were questioned about the importance rate of extension contents for supporting water resources management for Date Palm Growers in Khuzestan Province in current and favorable conditions, by 5- point scale (1=very low, 2=low, 3=moderate, 4=high, 5=very high). As Table 1 indicates, the four most important extension contents according to the experts in current conditions, were: (1) Water crisis and optimum use of water resources(M= 3.10, Sd= 0.90), (2) New connection technologies(M=2.47, Sd= 0.77), (3) The interrelationships between production, food security and water resources management(M= 2.61, Sd=0.848), (4) Ways to conserve natural base resources(M=2.59, Sd= 0.841), while in reference to the frequency of respondents about extension contents, in current conditions 79% of respondents stated that the considering extension contents had low and average importance for supporting water resources management(Table 2).

**Table 1:** Present importance of extension system contents for supporting water resources management for Date Palm Growers in Khuzestan Province.

Content of Extension System	Very Low		Low		Average		High		Very High		M	SD	CV	R
	f	%	f	%	f	%	f	%	f	%				
Water crisis and optimum use of water resources	4	3.1	27	20.8	57	43.8	35	26.9	7	5.4	3.10	0.90	0.289	1
New connection technologies	12	9.2	55	42.3	52	40.0	11	8.5	-	-	2.47	0.77	0.314	2
The interrelationships between production, food security and water resources management	13	10.0	42	32.3	57	43.8	18	13.8	-	-	2.61	0.848	0.3242	3
Ways to conserve natural base resources	11	8.5	47	36.2	59	45.4	10	7.7	3	2.3	2.59	0.841	0.3246	4
New irrigation methods and modern methods of production	12	9.2	37	28.5	61	46.9	16	12.3	4	3.1	2.71	0.908	0.334	5
Participation, dynamic groups, self reliant and leadership	18	13.8	56	43.1	45	34.6	10	7.7	1	0.8	2.38	0.848	0.355	6
Integrating indigenous knowledge and modern science	19	14.6	37	28.5	52	40.0	20	15.4	2	1.5	2.60	0.96	0.371	7
Networking with other organizations in rural and farming communities	25	19.2	38	29.2	50	38.5	17	13.1	-	-	2.45	0.94	0.386	8
M=Mean, SD=Standard Deviation, CV= Coefficient of Variation, R=Rank														

**Table 2:** Current importance of extension system contents.

Importance	Frequency	Percentage	Cumulative Percentage
Very Low	15	11.5	11.5
Low	50	38.5	50.0
Average	46	35.4	85.14
High	16	12.3	97.7
Very High	3	2.3	100
Total	130	100	

Table 3 indicates, the four most important extension contents according to the experts in favorable conditions, were: (1) New irrigation methods and modern methods of production (M= 4.30, Sd= 0.63), (2) Ways to conserve natural base resources (M=4.26, Sd= 0.69), (3) The interrelationships between production, food security and water resources management (M= 4.20, Sd=0.73), (4) Networking with other organizations in rural and farming communities (M=4.04, Sd= 0.70).

**Table 3:** Favorable importance of extension system contents for supporting water resources management for Date Palm Growers in Khuzestan Province.

Content of Extension System	Very Low		Low		Average		High		Very High		M	SD	CV	R
	f	%	f	%	f	%	f	%	f	%				
New irrigation methods and modern methods of production	-	-	1	0.8	9	6.9	69	53.1	51	39.2	4.30	0.63	0.146	1
Ways to conserve natural base resources	-	-	4	3.1	7	5.4	70	53.8	49	37.7	4.26	0.69	0.164	2
The interrelationships between production, food security and water resources management	-	-	1	0.8	21	16.2	59	45.4	49	37.7	4.20	0.73	0.1735	3
Networking with other organizations in rural and farming communities	-	-	2	1.5	23	17.7	72	55.4	33	25.4	4.04	0.70	0.1737	4
New connection technologies	-	-	4	3.1	19	14.6	55	42.3	52	40.0	4.19	0.79	0.190	5
Integrating indigenous knowledge and modern science	-	-	5	3.8	16	12.3	52	40.0	57	43.8	4.23	0.81	0.192	6
Participation, dynamic groups, self reliant and leadership	-	-	5	3.8	22	16.9	63	48.5	40	30.8	4.06	0.79	0.195	7
Water crisis and optimum use of water	1	0.8	7	5.4	16	12.3	57	43.8	49	37.7	4.12	0.88	0.213	8

resources														
M=Mean, SD=Standard Deviation, CV= Coefficient of Variation, R=Rank														

In inferential analysis, Wilcoxon signed ranks were used for analyzing causal comparative of water resources management, between current and favorable conditions. Based on the results in each (Table 4) and overall (Table 5) items ( $Z=9.604$ ,  $P=0.000$ ), there were significant differences between current and favorable conditions. Multiple researchers such as Allahyari [1], Ommani [11], Khabazzade [9] also have found similar results.

**Table 4:** Causal comparative between current and favorable conditions in extension system of water resources management for date palm growers in Khuzestan province by Wilcoxon signed ranks

Item	Z	Sig
Water crisis and optimum use of water resources	7.002	0.000**
New connection technologies	9.356	0.000**
The interrelationships between production, food security and water resources management	9.094	0.000**
Ways to conserve natural base resources	9.436	0.000**
New irrigation methods and modern methods of production	9.246	0.000**
Participation, dynamic groups, self reliant and leadership	9.289	0.000**
Integrating indigenous knowledge and modern science	8.943	0.000**
Networking with other organizations in rural and farming communities	8.791	0.000**

\*\* $P \leq 0.01$ .

**Table 5:** Causal comparative between overall items of extension system contents of water resources management for date palm growers in Khuzestan province by Wilcoxon signed ranks.

Item	Z	Sig
Overall items of extension system contents	9.604	0.000**

\*\* $P \leq 0.01$ .

To categorize content of extension systems toward supporting water resources management, an exploratory factor analysis was conducted for the data presented in Table 6. The factor analysis used was a principal components analysis with factor extraction and VARIMAX rotation. The four commonly used decision rules were applied to identify the factors [5]:

1) Minimum eigenvalue of 1; 2) Minimum factor loading of 0.5 for each indicator item; 3) Simplicity of factor structure; and 4) Exclusion of single item factors.

Based on the results of Bartlett and KMO (Kaiser-Mayer-Olkin) tests was realized whether the data are appropriate for factor analysis ( $KMO=0.898$ ; Bartlett=720.2, Sig= 0.000). It revealed that the internal coherence of the data is appropriate.

The contents of extension system for supporting of water resources management for date palm growers were categorized into three main components, which have been named Sustainability, Partnership and Specialized (Table 6). The obtained results from the factor analysis revealed that the three mentioned factors explained 84.951% of the variation of extension content for supporting of water resource management (Table 6, 7). The first group, which is labeled sustainability content, consists of four items and Cronbach's alpha for this group is 0.86, which is more than sufficient. This factor had the most Eigen value (5.152). Also, this factor explained 64.398% of the total variances of the variables. The second group, labeled partnership content, is comprised of two items. This component has a Cronbach's alpha of 0.79, which can be regarded as sufficient. In addition, this component that its Eigen value was 2.312 explained 12.322% of the total variances of the variables and the third group, labeled specialized content, is comprised of two items that its Eigen value was 1.121 explained 8.231% of the total variances of the variables (Table 6, 7).

**Table 6:** Percent of explained variance by factors underling extension system contents.

Factors	Percentage	Cumulative Percentage
Sustainability	64.398	64.398
Partnership	12.322	76.720
Specialized	8.231	84.951

**Table 7:** Rotated component matrix for the extension contents for supporting of water resource management extension system for date palm growers in Khuzestan province of Iran.

Content of Extension	Factor Loadings for Components		
	Sustainability content	Partnership content	Specialized content
Integrating indigenous knowledge and modern science	0.895		
New connection technologies	0.875		
Ways to conserve natural base resources	0.851		
The interrelationships between production, food security and water resources management	0.835		
Participation, dynamic groups, self reliant and leadership		0.814	
Networking with other organizations in rural and farming communities		0.764	
New irrigation methods and modern methods of production			0.767
Water crisis and optimum use of water resources			0.574

**Conclusions:**

For receiving favorability in content of water resource management, extension programs in Khuzestan province of Iran, there is a need for reorientation in content of agricultural extension system and extension has a key role to improve it, but current extension system in Iran does not has a sufficient competency for the achievement of water resource management and it needs to shift toward new approaches with new objectives [1, 13]. According to the results of research, contents of extension system for supporting of water resources management for date palm growers were categorized into three main components, which have been named Sustainability, Partnership and Specialized contents.

Also, four most important extension contents for supporting of water resource management in favorable conditions according to the experts were: (1) New irrigation methods and modern methods of, (2) Ways to conserve natural base resources, (3) The interrelationships between production, food security and water resources management, (4) Networking with other organizations in rural and farming communities.

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