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Analysis of the Requirements of Sustainable Agriculture Development from Perspective of Professionals of Agricultural Jihad Organization and Research Center of South Khorasan Province

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ABSTRACT: This study has been aimed to analyze the requirements of sustainable agriculture development from perspective of Agricultural Jihad Organization and Research Center of South Khorasan Province. Experts of Agricultural Jihad Organization and Research Center constitute statistical society of this research. Using Cochran formula, 55 experts were selected as sample and data was collected through questionnaires and random sampling. Interviews and questionnaires were used to collect the field data. The information obtained was analyzed using SPSS 18 and descriptive statistical methods and factor analysis. The factor analysis showed that the requirements of sustainable development of agriculture include six factors that explain 72.222% of shared variance between variables and the desired factors. Also based on the research findings we conclude that the first factor among the extracted factors i.e. training-promotional-research factor has obtained the highest percentage of explained variance with special amount of 2.677.

Keywords: Requirements, Sustainable Development, Experts, South Khorasan Province

INTRODUCTION

In the early twentieth century, the global population was increasing. As a result, the problem of food shortages in many countries was raised as a serious crisis. To counter this deficit, many countries widely started to practice in various fields such as increase in production, prevention of damage, pests, and diseases and spread of mechanized farming. The result was discovery and invention of a variety of pesticides, chemical fertilizers, new varieties and agricultural machinery (Rawson, 1995) and farmers could produce more foods using the minimum amount of land. However, this could bring increasing and improving agricultural production in the short term in most parts of the world, it led to many economic, social and environmental problems due to inattention to moral and social issues such as the rights of other entities and future generations and due to severe use of chemicals (Martin *et al.,* 2001). In this regard, the major concerns in the global reports are in relation to rapid and significant decrease of basic agricultural resources (water and soil) via soil erosion, land salinization, desertification, extinction of species and environmental pollution. The main cause of these concerns is indiscriminate use of pesticides, chemical fertilizers, agricultural equipment and expansion of mechanized cultivation (Zoghi, 1997), (Chaharsoghi Amin *et al*., 2007). Recognizing the negative results of conventional farming on the land, social systems, human health, quality of products, etc., experts and scholars decided to find solutions to overcome these problems or at least reduce them. Research of the agricultural researchers emphasized on this point that the best solution to deal with these problems is sustainable development and especially sustainable agricultural development (Zoghi, 1997).

Sustainable development is a process towards rational and optimized use of resources and guidance of investments and technology towards supply compatible with present and future human needs that covers all aspects of social, economic, cultural and other human needs based on a holistic view (Ebrahimi and Kalantari, 2003) and economic, financial, trade, energy, agricultural, industrial, and other policies are designed so that it leads to the development that is economically, socially and ecologically sustainable (Khajeh Shahkoohi and Ahangari, 2003). In this regard, sustainable agriculture is an important aspect of sustainable development that not only meets future needs to increase the production but also maintains the quality of environment, soil and water (Rezaei Moghadam, 1997).

Earles (2002) introduces sustainable agriculture as a kind of agriculture aimed at high-quality food production, increasing soil preservation, water and other natural resources and creating a good life with economic progress for farms and rural communities.

Principles of such an approach based on the principles of environmental protection are understanding of complex biological relationships and the use of appropriate technologies consistent with the characteristics of the community. Therefore, such thinking covers all social, economic and ecological aspects (Omani and Chizari, 2006) (Omani, 2000).

Experts believe that sustainable agriculture requires a long-term plan based on holistic and comprehensive approach that protects the environment against adverse consequences and produces healthy food products (Sedighi and Rousta, 2003). However, sustainable agricultural system is realized when requirements and challenges of sustainable agricultural development are identified and approaches, structures and appropriate rules are predicted for implementation of this type of agriculture (Najafi, 1996). In a general view of management of commercial agriculture in Iran it has been suggested that a traditional system of agriculture can meet expectations of the society from agriculture sector. Therefore management structure of agricultural system of Iran should necessarily find a fundamental change.

With this introduction, the main purpose of this study was to identify the requirements of sustainable agriculture development of wheat from the perspective of agriculture experts of South Khorasan Province. In this regard, the following specific objectives were predicted for this study:

1- To identify general features of experts

2- To identify requirements of sustainable agriculture development of wheat from the perspective of agricultural experts of South Khorasan Province

MATERIALS AND METHODS

The research has been done as a survey. General information on the subject was obtained by library studies and environmental data was collected using questionnaires and field study. Experts of Agricultural Jihad Organization of South Khorasan Province made up the study population. Among them, 55 experts were selected using Cochran formula as statistical sample of this research and the required data were collected from them. Content Validity of the questionnaire was provided for 5 specialists of agricultural training and promotion and agricultural development and the questionnaire was reviewed and revised.

Cronbach's alpha was used to confirm the reliability of questionnaire and the coefficient obtained was 0.78 which demonstrated the questionnaire's reliability and ability to answer the research questions and goals.

At the end the data obtained were analyzed using SPSS software and statistical methods such as descriptive statistics, factor analysis and the following steps.

A. Identification of the data suitability for factor analysis

KMO index (Kaiser Meyer Olkin) and Bartlet test were used for identification of the data suitability for factor analysis that shows to what extent the variables under study have internal correlation and are suitable for factor analysis. In the factor analysis, when the KMO is less than 0.5, data are not suitable for factor analysis and if the amount is between 0.5 to 0.7, the data will be suitable for factor analysis and if it is greater than 0.7, the variables will be very suitable for factor analysis.

The results showed that the amount of KMO was 0.7 that is a very good value for factor analysis. Also Bartlet test was significant at 1% with the value of the 269.655 that confirmed results of KMO test.

B. Determination of the number of factors

One of the most important things in factor analysis is determining the number of extractable factors. Although there is no detailed quantitative basis for deciding on the number of extracted factors, there are codes that are used in decision making on the number of extracted factors. These criteria include: 1. The criterion of special measure, 2. The previous criterion, 3. Variance percentage criterion, 4. The cut test criterion (Kalantari, 2003). In this research the criteria of special measures was used to determine the number of factors. Based on this criterion, only factors special measure of which is more than 1 are accepted (Mansourfar, 2001).

C. Rotation of Factors

The rotation of factors in factor analysis means turning the factor axis around the center of coordinates. The rotation is performed when the interpretation is not simply performed. Therefore, the rotation of factor is used to simplify the factors structure and their interpretation (Mansourfar, 2001). There are several ways for rotation of factors that Varimax method was used in this study.

RESULTS AND DISCUSSION

According to research findings contained in Table 1, the mean age of the respondents was 43.2 years. The youngest person was 31 years old and the oldest one was 59 years old. The most frequency was related to age group of 36 to 45 years with an amount of 49.1% and the lowest frequency was related to age group of 56 to 65 years with an amount of 7.3%.

The gender distribution of the participants of this study showed that 36.4% of the respondents were female and 63.6% of them were male.

Table 1: The experts studied age.

Variable	Frequency	Percent	Cumulative Percent
25-35	8	14.5	14.5
36-45	27	49.1	63.6
46-55	16	29.1	92.7
56-65	4	7.3	100
Total	55	100	-

Average: 2/43 SD: 84/6 Max: 31 Min: 59

Table 2: The frequency of demographic characteristics of respondents.

Variable	Groups	Frequency	Percent
Sex	Woman	20	36.4
	Man	35	63.6
Education Level	License	23	41.8
	MA	25	45.5
	Ph.D.	7	12.7
Field of Study	cultivation	13	23.6
	Gardening	20	36.4
	Economy	11	20
	Promotion	11	20

The results of the analysis of data on the education level of respondents indicated that 48.10% of them had Bachelor's Degree, 45.50% of them had Master's Degree and 12.80% of them had Ph.D. The results of the respondents discipline revealed that 23.6 percent of them studied in the field of agriculture, 36.40 of them studied in the field of horticulture, 20% of them studied in the field of promotion and economics.

A. The Factor Analysis

In this study, factor analysis was used to summarize the data. The aim of this method is to describe a large number of variables according to a basic structure with fewer elements. As Table 3 shows after the studied variables were summarized in six factors after rotation. In other words, the number of factors that was statistically significant and their specific measure was more than one, were six factors. These factors totally explain 72.222% of the common variance between variables and desired factors.

Also based on the findings contained in Table 3, it can be concluded that the first factor, among other extracted factors, with the specific measure of 2.677 obtained the highest percentage of explained variance that means 16.744% of total explained variance had been clarified by this factor and the sixth factor with specific measure of 4.970 obtained the lowest share in total variance.

Placement of a set of variables according to the extracted factors, after varimax rotation of factors and nomenclature of factors is given in Tables 4 to 9.

Table 3: Extracted factors with eigenvalues, percent variance and the cumulative percent of variance.

Agents	Eigenvalues	Percent of the variance	Percent of total variance
First	2.677	10.923	16.744
Second	2.228	15.234	32.068
Third	2.092	14.277	46.345
Fourth	1.956	11.015	59.340
Fifth	1.575	8.892	68.252
Sixth	1.191	4.970	73.222

After the rotation of factors, six factors of training-promotion-research, policy making, economic, social, management, and technical were identified. Considering variables explaining the first factor, their nature and function that suggests research-training issues, this factor can be called a "training-promotional-research" factor. This factor is composed of nine variables of "teaching courses related to sustainable agriculture in the agricultural schools", "training courses and teaching experts of sustainable agriculture"

"Setting research priority for sustainable production in research centers", "Information and scientific relationship between the experts and specialists", "Training courses for farmers in order to introduce the importance of sustainable agriculture", "Training courses for farmers to apply good management techniques in farms", "Training courses for private counseling centers and suppliers of agricultural inputs", "Introduction of sustainable agriculture through the media", and "Publication of the results obtained in sustainable agriculture research via books, professional journals of sustainable agriculture" and these variables obtained 16.744% of total explained variation. As the results of Table Five show, the second factor, namely policy making includes requirements such as "The definition of standards for identification of products using sustainable method", "Ratification of protecting and encouraging laws for sustainable production", "Establishment of an encouraging and supporting center in the Agricultural Jihad Organization", "Guaranteed purchase of products which are produced sustainably" and "Provision of inputs required for sustainable agriculture" that the requirements explained about 15.234% of total variance.

The third factor is related to economic and financial requirements of sustainable agricultural development. Hence, this factor was named as "economic factor".

As Table 6 shows this factor includes these variables: "Allocation of sufficient funds and providing financial incentives for the provision of the infrastructure necessary for inputs supply"

Table 4: Variables related to the cause of training - extension - research, the coefficients obtained from the matrix of results.

Operating Name	Variables	Load factor	The percentage of variance explained
Training - extension - research	Teaching units related to sustainable agriculture in agricultural colleges	0.771	16.744
	Training courses and training experts sustainable agriculture	0.734	
	Research priorities for the sustainable production of research centers	0.802	
	Information and scientific communication between experts and professionals	0.887	
	Training courses for farmers in order to introduce the importance of sustainable agriculture	0.766	
	Training courses for farmers to apply appropriate management methods farms	0.569	
	Training courses for private counseling centers and supply of agricultural inputs	0.781	
	Introducing sustainable agriculture through the media	0.834	
	Dissemination of research results sustainable agriculture through books, journals - sustainable agricultural professional ...	0.855	

Table 5: Variables related to the policy, the coefficients obtained from the matrix of results.

Operating Name	Variables	Load factor	The percentage of variance explained
Policies	The standard defines a method for identifying sustainable products	0.744	15.234
	Legislation supporting and encouraging sustainable production	0.756	
	Encourage and support the creation of a Center of Agricultural Jihad Organization	0.731	
	Order guarantee products with sustainable	0.535	
	Provide inputs for sustainable agriculture	0.641	

Table 6: Variables related to economic factors, the coefficients obtained from the matrix of results.

Operating Name	Variables	Load factor	The percentage of variance explained
Economic	The allocation of sufficient funds and provide financial incentives for meeting	0/628	14/277
	Credit allocation and provide financial incentives to provide adequate infrastructure for the marketing of products	0/749	
	Providing appropriate financial incentives and loans to farmers	0/716	
	Providing defined and provided subsidies for inputs and tools for sustainable farming	0/765	
	Funding for advertising and marketing products Sustainable methods	0/540	
	Define credit and funds for research, education and Promoting sustainable production methods	0/812	

"Allocation of sufficient funds and providing financial incentives for provision of the infrastructure for products marketing ", "Providing financial incentives and appropriate loans for farmers", "Providing appropriate subsidy to supply inputs and appropriate tools for sustainable cultivation", "Funding for advertising and marketing products produced by sustainable methods" and "Prediction of appropriate credit and funds for research, education and promotion of sustainable production methods" that explained 14.277% of total variance.

The fourth factor is related to the condition of participation in sustainable agricultural development programs. For this reason this factor was called as a "social factor". This factor is consisted of four variables: "Farmers' organization in rural associations", "Facilitating partnerships between researchers, experts and farmers in planning", "Facilitating the farmers' participation in the program for the use of indigenous knowledge", and "Implementation of appropriate research projects with the participation of researchers, promoters and farmers" that explained 7.43% of total variance.

Table 7: Variables related to social factors, the coefficients obtained from the matrix of results.

Operating Name	Variables	Load factor	The percentage of variance explained
Social	Of the farmers in rural organizations	0/564	11.015
	Facilitating partnerships between researchers, experts and farmers in planning	0/732	
	Facilitating the participation of farmers in the program for the use of indigenous knowledge	0/652	
	Relevant research projects with the participation of researchers, extension agents and farmers	0/561	

The fifth factor is related to the management of sustainable agricultural development programs. For this reason, this factor was called as "management factor" that includes four variables: "Helping farmers to improve farm management and increase sustainability", "Helping farmers to improve farm management to use domestic inputs and reduce the use of external inputs ", "Management of relationships between research, promotional and training centers", and "management of the communication between administrative departments, research centers, policy makers and producers" that explained 8.892% of total variance.

Table 8: Variables related to the management, the coefficients obtained from the matrix of results.

Operating Name	Variables	Load factor	The percentage of variance explained
Management	Help farmers to improve farm management in order to increase stability, reduce costs and increase revenue	0.798	8.892
	Help farmers to improve farm management in order to reduce consumption of inputs, internal and external inputs	0.651	
	Managing communication between investigative services, advocacy and education	0.589	
	Executive management and communication between organizations, research centers, organizations and manufacturers policy		

The sixth factor is related to technical status of sustainable agricultural development and was called as "technical factor". This factor includes 3 variables of "Introduction of appropriate inputs of sustainable agriculture", "Introduction of appropriate methods of sustainable agriculture" and "Establishment of multidisciplinary teams of researchers, experts and producers" that explained 4.970% of the total variance.

Table 9: Variables related to technical factors, the coefficients obtained from the matrix of results.

Operating Name	Variables	Load factor	The percentage of variance explained
Technical	Introduce appropriate input sustainable agriculture	0.548	4.970
	The introduction of appropriate methods of sustainable agriculture	0.623	
	The creation of multidisciplinary teams of researchers, experts and producers	0.745	

CONCLUSIONS AND RECOMMENDATIONS

-In the general classification, requirements of sustainable agriculture development in Iran are divided into 4 groups of promotional-training-research, policy making, economic, social, management and technical factors. On the other hand, the promotional-training-research factor has explained total variance more than other factors extracted in this research and technical factor has explained the lowest amount of total variance. Therefore, the authorities and planners are recommended to consider these criteria for any changes and implementation of development programs in the field of sustainable agriculture.

-The training - promotional factor that obtained the highest percentage of variance includes the variables of "teaching courses related to sustainable agriculture in the agricultural schools", "training courses and teaching experts of sustainable agriculture", " Setting research priority for sustainable production in research centers", "Information and scientific relationship between the experts and specialists", "Training courses for farmers in order to introduce the importance of sustainable agriculture", "Training courses for farmers to apply good management techniques in farms", "Training courses for private counseling centers and suppliers of agricultural inputs", "Introduction of sustainable agriculture through the media", and "Publication of the results obtained in sustainable agriculture research via books, professional journals of sustainable agriculture". Therefore, the agricultural promotion system is recommended to identify barriers to promote sustainable agricultural development and facilitate the implementation of sustainable agriculture by implementation of comprehensive programs in the fields of research, promotion and training and implement appropriate programs to improve the capacity of farmers for adoption of sustainable agriculture.

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