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Identifying and Prioritizing the Challenges of Organic Farming Development Among Farmers in Lorestan Province

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Abstract

The purpose of this research is qualitative analysis and prioritize the challenges of organic farming development in Lorestan province, Iran. This research was conducted from February to December 2022 to provide a comprehensive and practical model to understand the challenges through grounded theory and Analytic Hierarchy Process (AHP) in Lorestan province. The data were collected by performing in-depth semi-structured interviews with 32 agricultural experts in this field. To measure the validity of this qualitative study, a strategy of triangulation was used, and to measure the reliability, constant testing and comparison methods of data and use of tables to record data were used. Data analysis was done by using MAXQDA12 in three steps: open coding, axial coding, and selective coding. The results of this study by grounded theory identified 29 initial codes and seven main following challenges were categorized and prioritized by AHP: lack of technical knowledge, skills and motivation in the field of organic production, weakness in the information and advertising network in the field of organic consumption, weakness in management and human resources of organic training courses, lack of financial resources and credits for organic training courses, structural and content weakness of organic training courses, weakness of modern research regarding organic agriculture and lack of awareness of the relative advantage of organic agriculture. It is recommended to provide the necessary mechanisms to deal with identified challenges.

Keywords: Organic Farming, Grounded theory, Analytic Hierarchy Process, Lorestan

1. Introduction

Based on the study conducted by FAO in 2022, it was found that in 44 countries surveyed worldwide, only some countries recognized the need to monitor the effects of agricultural pesticides on wildlife as a necessity. According to the survey, the global situation of pesticide management in agriculture was unfavorable. Only 30% of 44 countries have data on the effects of agricultural pesticides on aquatic ecosystems, 23 have data on the effects of agricultural pesticides on terrestrial ecosystems, and 16% have data on the effects of agricultural pesticides. On endangered species. 14% were about wildlife, and 25% was about damage to the environment (FAO, 2022). Conventional agriculture has caused environmental pollution due to the excessive use of pesticides. Since the concept of integrated pest management emerged in the 1960s, it aimed to rationalize and reduce the use of chemicals to control crop pests. However, 60 years later, the amount of pesticides used globally is still increasing. Pollution of soil, water and air, reduction of pollination, health effects on ecosystems and human populations, development of resistance in

agricultural crops, etc. are the consequences of this increase in the use of chemical inputs (Deguine et al., 2021). In 2020, worldwide herbicide consumption reached about 2.2 million tons, while fungicides and bactericides were nearly one million tons. The global consumption of agricultural pesticides reached 4.19 million tons this year (Fernández, 2021). The global consumption of pesticides during the period from 2000 to 2019 increased by 36% to 2.4 million tons in 2019 (Figure 1). The largest share was from Asia (52 percent), followed by America (33 percent), Europe (11 percent), Africa (3 percent) and Oceania (1 percent). Oceania had the highest growth in pesticide use (85% increase in use). China was the largest consumer of pesticides in 2019 with 1.8 million tons or 42% of the world's total, which was much higher than the United States of America and Brazil (0.4 million tons each). The global consumption of pesticides per unit of arable land (hectare) has been increasing from 2000 to 2019 (Figure 2). The growth rate was 29% and increased from 2.1 kg/ha to 2.7 kg/ha (FAO, 2021).

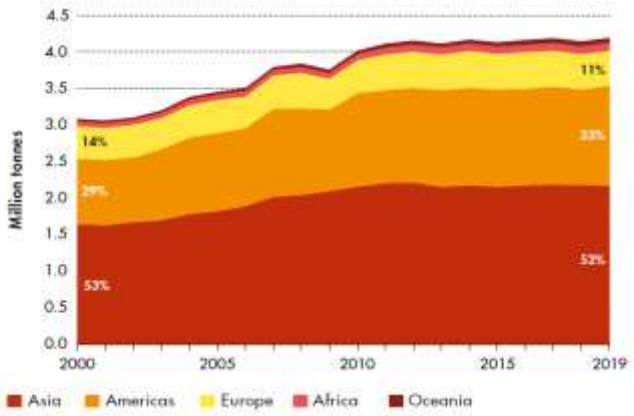

Figure 1. Pesticide consumption according to the share of each region and year (FAO, 2021)

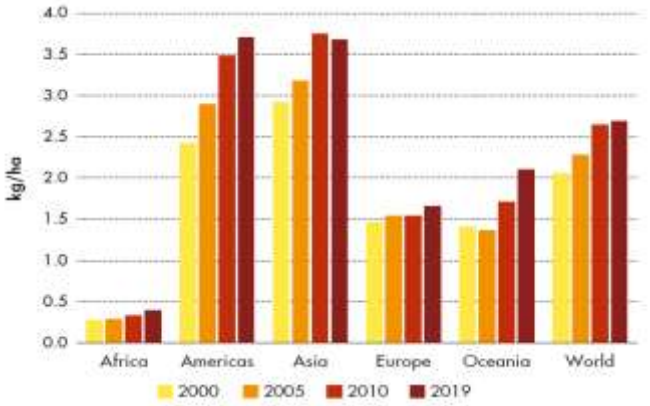

Figure 2. Global consumption of pesticides per unit of arable land (hectare (FAO, 2021)

According to the FAO report (FAO, 2021), the total consumption of inorganic fertilizers in the agricultural sector, which is a total of three substances nitrogen (N), phosphorus (P2O5) and potassium(K2O), was 189 million tons in 2019. As shown in Figure 3, it was 108 million tons of nitrogen (57% of the total), 43 million tons of phosphorus (23%), and 37 million tons of potassium (20%). The total consumption of fertilizers in 2019 was 54 million tons or 40% more than in 2000 (33% for nitrogen, 34% for phosphorus and 73% more for potassium).

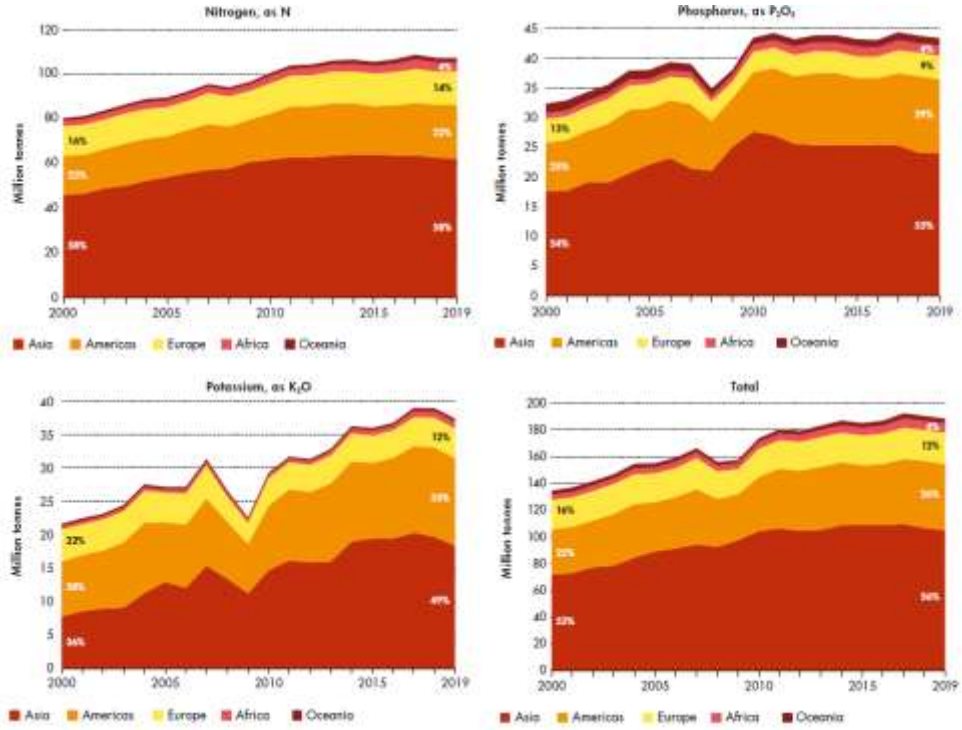

Figure 3. Global consumption of inorganic fertilizers by region and type of fertilizer (FAO, 2021)

Some of Iran's agricultural areas have been exposed to unsustainability due to the changes in their agricultural structure. The need for food for the growing population and excessive use of external inputs, which has increased agricultural production, has put excessive pressure on the environment (Nazarian et al., 2020). The lack of water resources and the spread of drought, the excessive use of inorganic fertilizers and chemical poisons are among the most important challenges that the agricultural development of Iran is facing now and in the future. According to the report of the Water and Soil Research Institute of Iran, the consumption of chemical fertilizers in 2020 in Iran was about 3 million tons. The consumption of chemical fertilizers in 2012 was one million and 525 thousand tons and in 2020 this amount has increased to 3 million tons. This year, the consumption of urea fertilizer reached about two million tons. The amount of potash fertilizer consumption has also increased fivefold from 2012 to 2020 and has reached one million tons (Rasouli, 2019). Currently, pesticides are used in 15 million hectares of agricultural and horticultural fields throughout Iran. The annual consumption of pesticides in Iran is on average 25,000 to 30,000 tons (AgNews, 2020). Based on the studies that have been conducted in the context of the consumption of chemical fertilizers and pesticides in Lorestan province, it was found that the excessive use of chemical fertilizers and pesticides has caused more unsustainability in agriculture in some areas of this province (Nazarian et al., 2020).

Based on the results of various researches, several factors play a role in the excessive use of agricultural fertilizers and pesticides in Iran. The most important of these cases can be cognitive-informational weakness (Salahi-Moghadam et al., 2020; Razavi et al., 2015; Razavi, 2015; Malek-Mohammadi et al., 2021), low awareness of the side effects of using pesticides (Razavi, 2016). , limited information about the principles of pest control and the advantages of organic farming, weak educational-promotional services (Salahi Moghadam et al., 2020; Malek Mohammadi et al., 2021), poor information and difficulty in accessing information (Malek Mohammadi et al. , 2021), the absence of relevant training courses and limited access to the number of experts, the characteristics of chemical pest control methods, the low cost of pesticides, the rapid effectiveness of pesticides compared to other pest control methods, the ease of access and use of pesticides, and protective weakness (Razavi et al., 2015). Also, financial components are one of the factors influencing the development of organic agriculture (Karpisheh, 2020, Fatemi and Rezaei Moghadam, 2020). Kazimieh and Eidi (2022) concluded that the most important challenges and factors hindering the development of organic farming included the following, respectively: agricultural information and knowledge barriers, motivational and attitudinal barriers, economic barriers, technical-management and support barriers and extensional barriers.

In most of the researches that can be seen in the field of challenges and obstacles to the development of organic farming in Iran, there is a weakness of extensional programs, networking and a lack of detailed and practical planning in the field of improving the cognitive field (Kazemieh and Eidi, 2022; Mirlo et al., 2022; Salahi Moghadam et al., 2020; Maqsoudi et al., 2018; Razavi, 2016; Razavi et al., 2015; Yaqoubi and Javadi, 2013). Assadollahpour et al.,

(2019) concluded that rice farmers are facing many challenges to transition to organic farming. Lack of knowledge and awareness in the field of producing organic products was expressed as the most important challenge of transitioning to organic agriculture.

In recent years, due to the importance of food security and the irreparable damage caused by the excessive use of agricultural chemicals on the environment and human health, and the need to pay attention to ethics and non-compliance damage to other parts of nature, the void of an identification and prioritization of regional challenges for the development of organic farming is very felt. This issue is very important for Lorestan province, which is one of the important hubs of agricultural production (Shahrokhi, 2022).

Lorestan province is located in the west of Iran, between 32 degrees and 37 minutes to 34 degrees and 22 minutes north of the equator, and its area is about twenty-eight thousand five hundred and fifty-nine square kilometers. This province is connected to Hamadan province from the north, Khuzestan province from the south, Isfahan province from the east, and Kermanshah and Ilam provinces from the west (Figure 1). Lorestan province has between 2.9 and 3 million tons of agricultural and horticultural production, 0.8 million hectares of arable land and 42,600 hectares of fruitful gardens with a production of 300,000 tons is considered a great capacity for this province. The annual production of various products are: 360 thousand tons of wheat, 150 thousand tons of barley, 70 thousand tons of apples, 21 thousand tons of walnuts, 65 thousand tons of pomegranates, 30 thousand tons of figs, 300 thousand tons of sugar beets, 120 thousand tons of beans, 78 thousand tons of chicken, 29 thousand tons of red meat, 25 thousand tons of fish, 250 thousand tons of milk, 2700 tons of honey and 10 thousand tons of eggs are produced in Lorestan (Shahrokhi, 2022., Hasanimoghadam, 2020., Moomvandi, 2020).

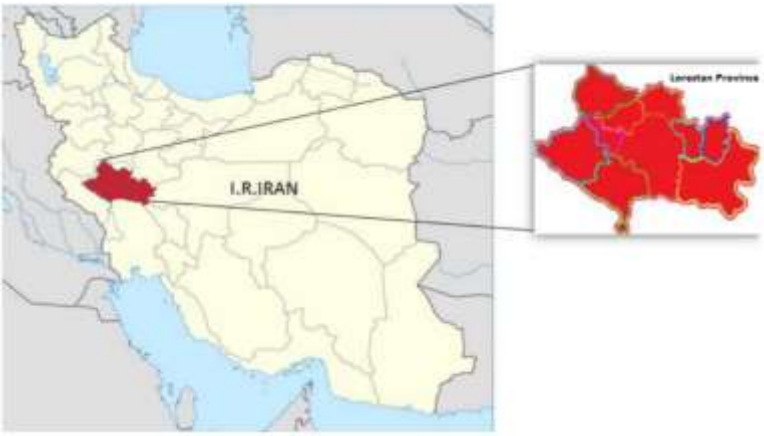

Figure 1. Map of Lorestan Province in Iran.

2. Materials and Methods

In this research, a qualitative method to identify and prioritize the challenges of organic farming in Lorestan province, Iran was used. Qualitative research involves in-depth evaluation, collection, and analysis of non-numerical data to identify and understand phenomena, concepts, ideas, or experiences. It can be used to gather in-depth insights into a challenge, problem or come up with new ideas for research. This research was conducted from February to December 2022 to provide a comprehensive, and applied model to understand the challenges of organic farming through grounded theory and Analytic Hierarchy Process (AHP). Grounded Theory is a qualitative research method. The main method of data collection in this method is to use a variety of interviews. By analyzing and coding the text of the interviews, a paradigm model is presented (Vogel et al., 2021). In this study, purposive sampling method and theoretical sampling strategy were used. The statistical sample included 32 agricultural experts of Lorestan province who were selected by snowball sampling method. These experts had at least 10 years of work experience.

To measure the validity of this qualitative study, a strategy of triangulation was used. This basically involves that the research will be conducted from different or multiple perspectives. To measure the reliability of this qualitative study, constant testing and comparison methods of data and use of tables to record data were used. After identifying the challenges, it was time to prioritize the challenges. The Analytic Hierarchy Process (AHP) technique was used to prioritize the challenges. AHP is a technique that is widely used in group decision making, it is used when we want to prioritize alternatives based on criteria (Mujumdar et al., 2021). AHP helps decision makers find a decision that fits their purpose and their understanding of the problem. It provides a comprehensive and rational framework for structuring a decision, for representing and determining its elements, for linking those elements to overall goals, and for evaluating alternative solutions (Fang & Partovi, 2021). The steps to implement the AHP are:

Step 1: Define Alternatives.
Step 2: Define the Problem and Criteria.
Step 3: Establish Priority among Criteria Using Pairwise Comparison.
Step 4: Check Consistency.
Step 5: Get the Relative Weights.

3. Results and Discussion

3.1 Individual characteristics

The statistical population in this study was 32 agricultural experts from the Lorestan Agricultural Jihade Organization. Their average age was 43.54 years, and the lowest frequency with 3 people and 9.37% had a diploma upper degree and the highest frequency with 15 people with 46.87% had a master degree.

3.2 Coding/categorization stage

After conducting numerous in-depth interviews and holding brainstorming sessions that lasted for about 4 months, the challenges of developing organic farming were identified through 3 stages of open coding, axial coding and selective coding using MAXqda12 software. First, the concepts obtained from brainstorming methods and face-to-face interviews were entered into the software after writing and editing, and then three types of coding were implemented in order.

Open coding:

In this stage of coding, by performing content analysis on the obtained concepts and detailed study and line by line of the resulting information, the topics were set. First, the data obtained from the interview was analyzed and the answers during the interview were converted into semi-structured questions. Key themes were extracted in separate sentences. Thus, the results of semi-structured interviews and brainstorming with experts identified and extracted a total of 29 concepts. First, the main sentences under the title of concepts were extracted from direct quotes that had at least 5 repetitions and each one was given a code with OR-CHA symbol. The results of open coding are presented in Table 1.

Table 1. Concepts extracted from the interviews (in open coding)

Concepts (Initial codes)	code
The educational content in the courses does not fit the needs.	OR-CHA1
The content of educational programs is not at the audience level.	OR-CHA2
The time and place of the courses are not determined with the participation of the audience.	OR-CHA3
The number of organic courses is limited.	OR-CHA4
Educational facilities and infrastructure are not suitable.	OR-CHA5
Planning without audience participation	OR-CHA6
Low organic management among farmers	OR-CHA7
Lack of organic organization among farmers	OR-CHA8
Lack of proper organization of educational programs	OR-CHA9
Lack of control and supervision in educational programs	OR-CHA10
Lack of follow-up evaluation	OR-CHA11
Lack of appropriate budget allocation in the field of organic education	OR-CHA12
Lack of financial resources for education and promotion	OR-CHA13
No spending for training courses	OR-CHA14
Old educational facilities and equipment and no new purchase	OR-CHA15
Lack of attention to invest in education	OR-CHA16
Inadequacy of research with the needs of farmers	OR-CHA17
Failure to transfer research findings to users	OR-CHA18
Lack of communication between the extension department and research centers	OR-CHA19
Lack of communication between research centers and farmers	OR-CHA20
Failure to implement educational and research farms in rural areas	OR-CHA21
Low organic technical knowledge among farmers	OR-CHA22
Low organic technical knowledge among experts	OR-CHA23
Low organic technical skills among farmers	OR-CHA24
Low motivation of farmers for organic farming	OR-CHA25
Lack of information programs	OR-CHA26
Absence of advertising programs	OR-CHA27
Lack of networking	OR-CHA28
Failure to use proper communication channels	OR-CHA29

Axial coding

In this step, the number of repetitions of the concepts was calculated and the categories were determined. Based on the results of axial coding, the most important challenges of organic farming development in the study area are stated in Table 2. In the axial coding phase, the main goal is for the researcher to systematically think about and organize the data.

Table 2. Axial coding related to the challenges of organic farming development

Axial Code	Categories	Concepts (Initial codes)	Repetitions
Challenges of Organic Farming Development	Structural and content weakness of organic training courses	The educational materials in the courses are not appropriate to the needs.	8
		The content of educational programs is not at the audience level.	12
		The time and place of the courses are not determined with the participation of the audience.	15
		The number of organic courses is limited.	17
		Educational facilities and infrastructure are not suitable.	16
	Weakness of management and human resources of organic training courses	Shortage of sufficient credit for agricultural insurance	12
		Planning without audience participation	15
		Low organic management among farmers	16
		Lack of organic organization among farmers	13
		Lack of proper organization of educational programs	11
		Lack of control and supervision in educational programs	17
	Lack of financial resources and credits for organic training courses	Lack of appropriate budget allocation in the field of organic education	16
		Lack of financial resources for education and promotion	18
		No spending for training courses	12
		Old educational facilities and equipment and no new purchase	15
		Lack of attention to invest in education	14
	Weakness of new research on organic farming	Inadequacy of research with the needs of farmers	18
		Failure to transfer research findings to users	16
		Lack of communication between the extension department and research centers	19
		Lack of communication between research centers and farmers	13
		Failure to implement educational and research farms in rural areas	15
	Lack of technical knowledge, skills and motivation in the field of organic production	Low organic technical knowledge among farmers	16
		Low organic technical knowledge among experts	12
		Low organic technical skills among farmers	18
		Low motivation of farmers for organic farming	19
	Weakness in the information and advertising network in the field of organic consumption	Lack of information programs	12
		Absence of advertising programs	17
		Lack of networking	16
		Failure to use proper communication channels	11
	Farmers' lack of awareness of the relative advantage of organic farming	Lack of awareness of the economic advantage	10
		Lack of announcement of environmental benefits	12
		Lack of advertisement of social and cultural advantage	8
		Lack of advertisement of the benefit of food security	9

Selective coding:

At this stage of the research, the relationship obtained in open coding and the subcategories resulting from axial coding with the main category were determined in the form of a graph based on the index of repetition. Figure 3 shows that the weakness of management and human resources of organic training courses, weakness of new research on organic farming, lack of financial resources and credits for organic training courses, structural and content weakness of organic training courses, lack of technical knowledge, skills and motivation in the field of organic production, weakness in the information and advertising network in the field of organic consumption and farmers' lack of awareness of the relative advantages of organic farming were the most important challenges of the development of organic agriculture in the Lorestan.

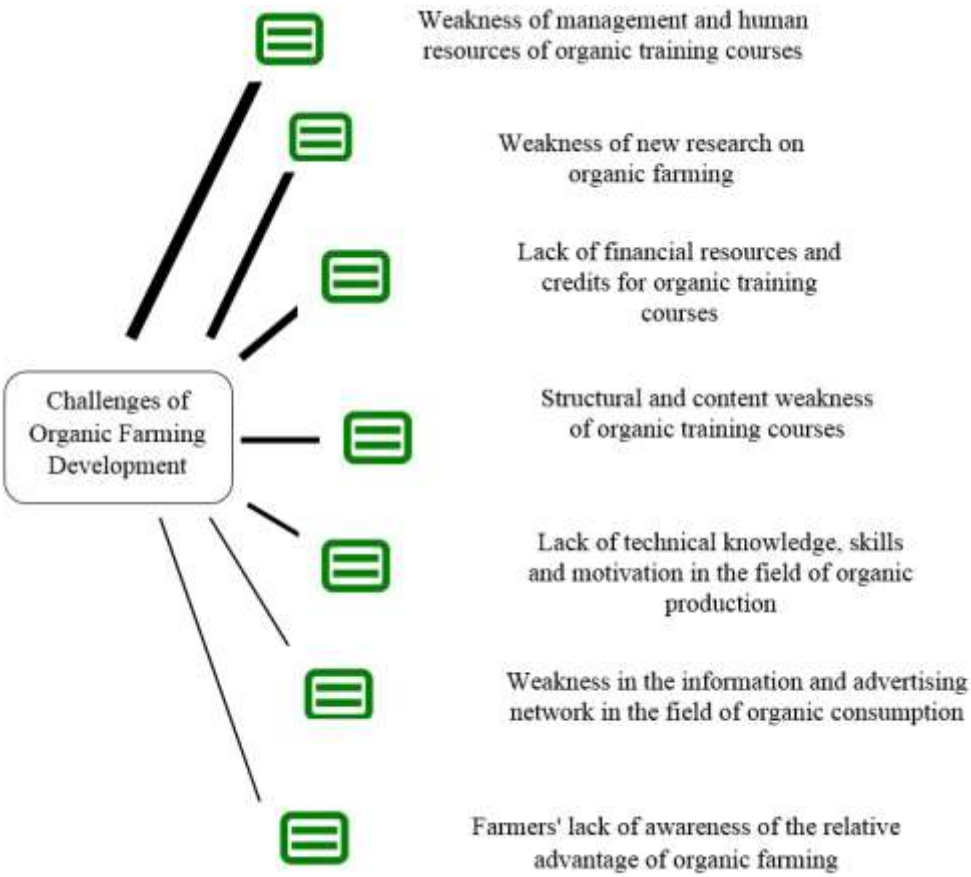

Figure 3. Selective coding related to the challenges of organic farming

3.3 Prioritize Organic Farming Development Challenges through Hierarchical Analysis (AHP)

After identifying the decision-making alternatives (challenges of organic farming development) mentioned in the previous section and identifying the criteria and sub-criteria of organic farming development, for this purpose, qualitative methods of content analysis, interviews with experts and the brainstorming method were used. In the first step, 12 indicators and 68 sub-indicators were identified using the content analysis method, and then by interviewing experts and using the brainstorming method, and by agreeing among respondents, 7 indicators and 33 sub-indicators on which experts with 75% and above agreed, were extracted. To compare the alternatives, the decision tree was designed by Expert Choice software (Figure 4). After that, the challenges were prioritized according to the criteria and sub-criteria. In order to perform pairwise comparisons of the challenges of organic farming development according to the criteria and sub-criteria, a questionnaire for pairwise comparisons was completed by 32 experts.

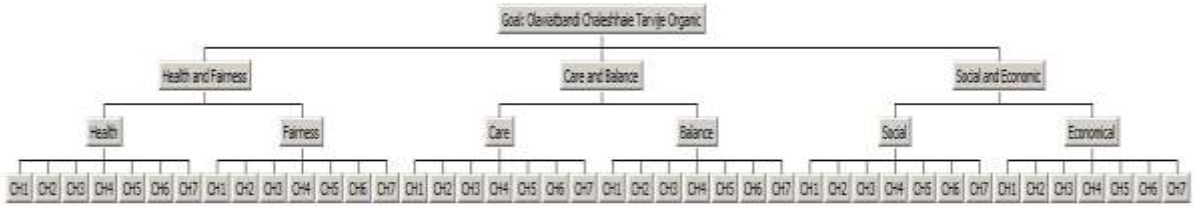

Figure 4. The decision tree that was designed by Expert Choice software

After the pairwise comparison of all the challenges based on each of the sub-criteria, the pairwise comparisons were combined and the result and final weight and priority of each of the challenges was announced based on the set of criteria using the Expert Choice software. Figure 5 shows the weight and priority of each of the items investigated in the research based on the determined criteria. This prioritization is as follows:

1- Lack of technical knowledge, skills and motivation in the field of organic production, with a weight of 0.191 (CH6).

2- Weakness in the information and advertising network in the field of organic consumption with a weight of 0.169 (CH7).

3- Weakness in management and human resources of organic training courses, with a weight of 0.160 (CH3).

4- Lack of financial resources and credits for organic training courses, with a weight of 0.134 (CH4).

5- Structural and content weakness of organic training courses, with a weight of 0.130 (CH2).

6- Weakness of modern research regarding organic agriculture, with a weight of 0.115 (CH5).

7- Lack of awareness of the relative advantage of organic agriculture, with a weight of 0.101 (CH1).

The inconsistency rate of pairwise comparisons is equal to 0.060

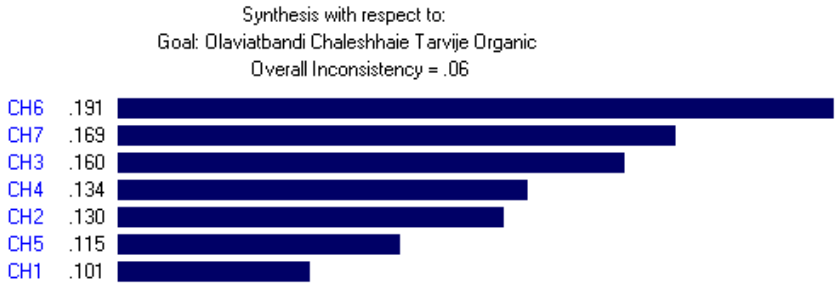

Figure 5. The final weight of the challenges is based on the synthesized criteria of the research

3.4 Sensitivity analysis

Sensitivity analysis is one of the tools in pairwise comparisons used to compare options to changes in criteria. In the sensitivity analysis, the sensitivity of the alternatives to the changes in the criteria in the target subset is shown. In fact, in this stage of sensitivity analysis, the ranking of the alternatives is determined according to the changes in the weight of the criteria. Sensitivity analysis is performed based on methods such as dynamic, performance, gradient, head-to-head and two-dimensional methods. In the following, the dynamic method has been used, and its effect on the insects has been expressed with changes in the criteria.

In dynamic sensitivity analysis, horizontal axis diagrams are drawn, based on which the researcher can determine the effect on the ranking of alternatives by increasing or decreasing the weight of the criteria (Figure 6). With the 20% changes made in the criteria of health and fairness, it was determined that due to the lack of technical knowledge, skill and motivation in the field of organic production, insignificant changes occurred and always remained as the first priority.

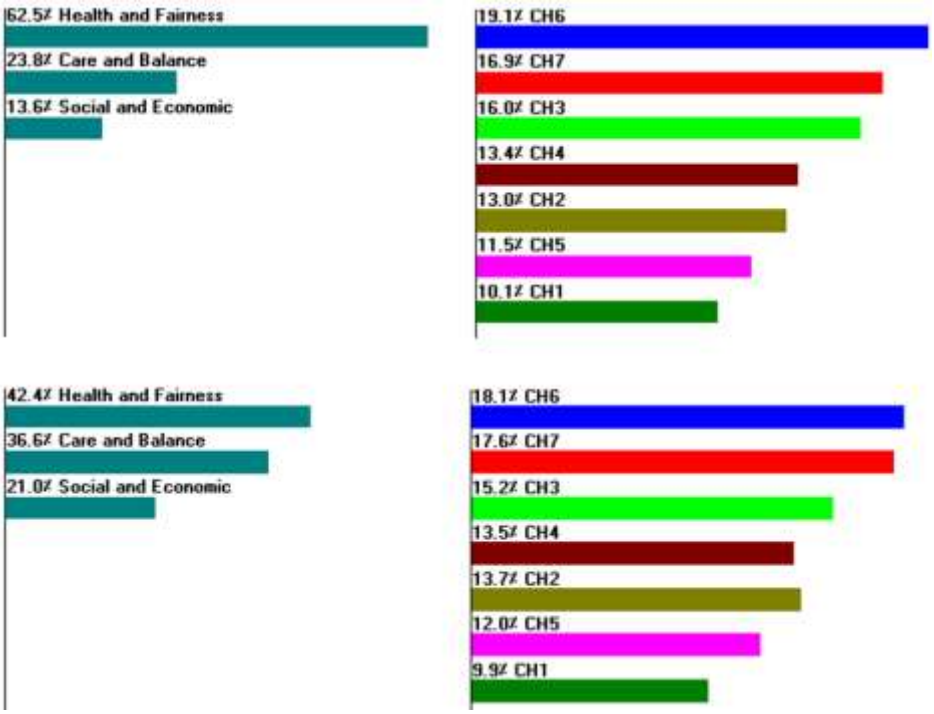

Figure 6. Sensitivity analysis by dynamic method

3.5 Discussion

The results of the research of Assadollahpour et al., (2019) are in line with the results of this research. They concluded that rice farmers are facing many challenges to transition to organic farming. Lack of knowledge and awareness in the field of producing organic products were expressed as the most important challenges of transitioning to organic agriculture. The research results (Malek Mohammadi et al., 2021; Kazemieh and Eidi, 2022; Mirlo et al., 2022) which stated the weakness in networking as one of the most important challenges of information in organic agriculture, confirm the results of our research. The obtained results about weakness in management and human resources of organic training coursesare consistent with the research results of Salahi Moghadam et al., (2019); Maqsoudi et al., (2018); Razavi, (2016); Razavi et al., (2015). The obtained results are consistent with the research results of Karpisheh, (2020); Fatemi and Rezaei Moghadam, (2020) that believed, financial components were one of the factors influencing the development of organic agriculture. The obtained results about structural and content weakness of organic training coursesare consistent with the research results of Salahi-Moghadam et al., (2019); Malek-Mohammadi et al., (2021).

4. Conclusion and Recommendation

Based on the qualitative study, the challenges of organic farming development were identified in three stages of open coding, axial coding and selective coding using MAXqda12 software. Then the challenges were prioritized according to organic farming criteria through AHP. The first category as the most important challenge was lack of technical knowledge, skills and motivation in the field of organic production. The primary codes that make up this challenge were: Low organic technical knowledge among farmers, low organic technical knowledge among experts, low organic technical skills among farmers, low motivation of farmers for organic farming. Based on the results, it is recommended to organize required training courses in organic farming for experts and farmers to increase their knowledge level, improve their skills, create motivation and change their attitude in order to eliminate the weaknesses of cognitive, skill and emotional domains. The second category was weakness in the information and advertising network in the field of organic consumption. The primary codes that make up this challenge were: Lack of information programs, absence of advertising programs, lack of networking and failure to use proper communication channels. Based on the results, it is recommended that necessary action be taken for networking for information and advertising through virtual and real space. The third category was weakness in management and human resources of organic training courses, which was identified as third challenge. The initial codes that make up this challenge were: Shortage of sufficient credit for agricultural insurance, planning without audience participation, low organic management

among farmers, lack of organic organization among farmers, lack of proper organization of educational programs and lack of control and supervision in educational programs. In order to overcome the mentioned challenge, it is recommended that the necessary measures be taken to attract the participation of the beneficiaries in the field of organic agriculture development, and that training programs be properly organized and their strict implementation monitored. The fourth category was lack of financial resources and credits for organic training courses, which was identified as fourth challenge. The initial codes that make up this challenge were: Lack of appropriate budget allocation in the field of organic education, lack of financial resources for education and promotion, no spending for training courses, old educational facilities and equipment and no new purchase and lack of attention to invest in education. Therefore, it is recommended that policymakers and planners allocate appropriate budgets in the field of organic education, consider financial resources for the cost of training courses, and provide new educational facilities and equipment. The fifth category was structural and content weakness of organic training courses, which was identified as fifth challenge. The initial codes that make up this challenge were: the educational materials in the courses are not appropriate to the needs, the content of educational programs is not at the audience level, the time and place of the courses are not determined with the participation of the audience, the number of organic courses is limited and educational facilities and infrastructure are not suitable. In order to overcome the stated challenges, the following are recommended: educational needs assessment, taking advantage of farmers' participation in designing and compiling content, timing and location, and providing appropriate infrastructure and educational facilities. Therefore, considering the mentioned challenges and the recommendations, the policy makers and planners of organic agriculture can take the necessary measures for the development of organic agriculture in the study area.

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