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Prioritizing the factors affecting the promotion of customers' attitude towards organic food products by employing the technique of fuzzy AHP

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Abstract

Considering the environmental problems and the increase in diseases resulting from consuming conventional and processed food, using organic food products is a suitable solution to get rid of problems and environmental damage and to increase the social responsibility of consumers, and it is a new thinking approach to food, health and nature. Organic products are produced without using chemicals, pesticides, additives and flavors. Therefore, it is very important and necessary to promote the attitude of consumers regarding organic products, so by using more organic products, organic agriculture expands more, too. The purpose of the current study is to define a method for prioritizing the factors affecting the promotion of the attitude of organic food products customers, under uncertain circumstances. The factors of the study include ten main criteria, namely, increasing the consumption of organic products, creating easy access, the support of the government, gaining the trust of consumers, increasing the health level of society, decreasing the price of organic products, supporting the environment, competent inspection, supervision and control systems, high agricultural potential in Iran and increasing the awareness of consumers. In order to prioritize the factors affecting the promotion of the attitude of organic food products customers under uncertain circumstances, the model of the Fuzzy Analytical Hierarchy Process (Fuzzy AHP) has been suggested. Accordingly, by using the descriptive-survey research method, a sample population of 50 relevant experts was examined and the factors were prioritized according to their importance by employing the method of Fuzzy AHP.

Keywords: Attitude, Consumer, Organic food products
2020 MSC: 53Z50, 62R07

1 Introduction

In recent centuries, due to the increasing growth of the population, the friendly attitude of human beings towards nature was replaced by a unilateral interaction against nature. The reason is that chemical fertilizers, pesticides for plants, hormonal products, etc., entered the agricultural section, and by taking benefit from modified cultivars, great steps were taken towards increasing the production of agricultural products to meet the increasing demands for

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food; however, this way of increasing the productions brought in environmental and health problems for producers and consumers, too, which is thought-provoking. Serious decreases in biodiversity and the danger of the extinction of many plant and animal species, accumulation of dangerous materials in the environment, and infection of individuals with different diseases are among examples of negative effects of using chemicals [25]. Considering the abundant benefits of such products, the importance of using healthy food has been revealed for scholars, statesmen and consumers, more than ever. Today, consumers pay attention to such issues as food quality and safety, which affects their buying behavior. Considering various economic, social and environmental benefits and the potential possibility of Iran to expand the production and consumption of green products, a new opportunity has been provided to help increase the recognition and awareness of people regarding the use of green food, on the one hand, and to promote the health indexes of society by increasing the quality level of manufactured food products, on the other hand, through identifying the attitude and perception of consumers. Furthermore, the success of the plans of expansion and reception of green products requires the recognition of the consumers' attitude regarding such products and the investigation of the factors affecting such attitudes, because, as stated earlier, the consumers' attitude affects their behavior. The results of studies indicate the importance of increasing the awareness of consumers regarding the nutritional value of products in order to change their consumption behavior and to expand the production and consumption of healthy food [19]. Considering that the behavior of the consumer includes a set of behaviors, before, during and after buying a product or service, a key factor for predicting and continuity of the consumers' behavior is the attitude of consumers about the products or services they want to buy or use, and attitude is the passive feeling or the empathy or antipathy to a stimulus [27]. It is worthy of note that the investors of companies regard digital communication with customers as important for the business success of organic products; this point is also stated obviously in the literature on innovation management of such products. Moreover, most of the experts believe that by using the Reaction Theory, those investing in social media communication and online advertisement are able to increase the sales volume and the profits of new organic products [11]. The results of investigations in Iran show that the problems of the organic agricultural system arise in two aspects of supply and demand. As for the supply aspect, it is possible to point to the problems of different stages of production, transportation and distribution network, and regarding the demand aspect, is possible to point to the needs and motivations of consumers, so as to expand such products, such aspects should be investigated by national and comprehensive strategies [7]. The production of such products started in 2006 in Iran, and for the time being, Iran is ranked fifth in Asia and fiftieth in the world, in this regard. The area under cultivation of such products in Iran is 82.000 hectares, and Iran Organic Association has made attempts to increase the area under cultivation, from 0.1% to 1%. Although organic products have assigned a small part of the food market to themselves, but their rapid growth has been noticed by consumers, traders and scholars [21]. Many obstacles caused, in practice, the lack of a market to buy or sell agricultural organic products in Iran. That's why the demand to buy such products in Iran is low, and the producers have no motivation to do marketing for these products due to the increase in marketing costs and consequently the increase in the final price of the product, while the tendency to and interest in marketing and studying this type of products is increasing all over the world [9]. However, it is generally sensed that individuals or groups are facing problems regarding the settlement of complex discussions about the attitudes toward organic food products. The complexity of issues or systems is related to the presence of many elements and the mutual interactions among these elements of attitudes. The direct or indirect presence of relevant elements might complicate, by a clear style, the structure of a system, which might be vague or not. It is difficult to solve the problems of such a system if the structure is not defined clearly. Therefore, one of the best possible strategies to increase the consumption of organic food products in Iran is improving the attitude of customers toward such products, and that's why the current study seeks to present a model for improving the attitude toward organic food product customers in Iran.

2 Theoretical foundations

2.1 Customer's attitude

Attitude is defined as the long-term organization of motivational, emotional, perceptual and cognition processes according to some environmental aspects surrounding the individual. Accordingly, the attitude of an individual represents the way of thinking, feelings and reactions of an individual regarding his/her surrounding environment (for example, his/her favorite car) [24]. The degree to which an individual evaluates a behavior as pleasant or unpleasant is the attitude [18]. The value that influences the customers and determines their function actually indicates the customers' attitude and judgment [22]. The attitude of the customer to the product affects his/her intention to buy it. Accordingly, the more the customer's attitude towards a product is pleasant, the more the possibility of buying it. The customer's attitude means a base which is learnt to respond pleasantly or unpleasantly to an object or goal. Markets, attitudes, ways of thinking and the criteria of individuals to evaluate options are constantly changing. The customer's attitude and understanding it is so important that in the 21st century, many organizations give importance

to recognizing the attitude of customers to identify their weaknesses and strengths. Attitude is the evaluation and pleasant or unpleasant feeling and tendency of the individual to an idea or object. The Reasoned Action Theory claims that the functions of individuals result from their behavioral intentions which are determined by their attitudes and subjective norms.

Since attitude is an important factor for predicting the future behavior of customers, it is very important among the workers in the market [17]. An important point about the customers' attitude is that the initial approaches have focused on customer loyalty to repeat buying the product or the possibility of buying it again. However, gradually some criticisms were made by such scholars as Dey et al. regarding the fact that the repetition of purchases might be due to the lack of alternatives for the customer. In response to such criticisms, some scholars suggested that loyalty is examined and measured not only through behavioral aspects, but also attitudinal aspects [3].

2.2 Organic food products

Today, the unsteady increase in environmental destruction, groundwater pollution and the increase of different diseases and cancers are due to producing and consuming non-organic products prevailing in the market. If producing and consuming organic products are deemed as a solution to the mentioned problems, by the increase in public awareness regarding the use of healthy products in the family food chain, general concerns of people regarding the health of food products increase [14]. The word organic literally means a material derived from living creatures, but in agriculture and the food industry, organic refers to a method of production, which includes the first steps of the food production chain, i.e., preparing the agricultural land through the time when the food is delivered to people in raw for processed forms, in packages. The basis of designing the organic production systems is producing an acceptable amount of required food for humans, with high quality and the minimum amount of damage to the environment and wildlife. This system is highly reliable in terms of renewable resources operated from nature, and a kind of sustainability is latent inside of it. Sustainability, which is taken into consideration while designing the principles of this system, not only means protecting renewable resources such as soil, energy and minerals, but also environmental sustainability and even social sustainability. The organic mark on food packages indicates that some rules and standards in this system have defined the properties of this food, all production steps have been inspected and the conformity of its characteristics with the rules and standards is certified by valid and independent companies [16]. Organic food refers to that category of agricultural food products that during their production, processing and storage, chemical fertilizers, pesticides, herbicides and other artificial chemicals are not used. In the past fifteen years, the market of organic products has quadrupled, in such a way that the sales value of organic food products reached to 81.6 billion dollars (10% growth) at the world level by 2015. Of course, the greatest growth of the organic final products market has occurred in North America, which includes more than half of the value of the international sales of such food. In 2012, the sale of organic food in Europe has been 22.8 billion euros and in North America 24.1 billion euros. Organic food products are produced by 2.4 million producers in 179 countries of the world [10]. Among the most important reasons that buyers buy organic food products are paying attention to general health while receiving the maximum essential nutrients and the minimum artificial additives, food safety against animal diseases, possible dangers resulting from consuming genetically modified materials and the remaining chemical toxins, ethical issues and paying attention to the environment. Since the production industry of healthy food products is yet in the infancy and puberty stage in Iran, and considering the importance of this issue for increasing the trend of expanding the demand and supply and market of healthy food products, the first step in this regard is promoting the attitude of customers by the strategies of expanding their reception and consumption [4].

2.3 Fuzzy logic

Fuzzy Logic was introduced by Professor Lotfizadeh, in 1965, in an article entitled, "Fuzzy Sets" [31]. Being fuzzy refers to different types of ambiguity and uncertainty, particularly the ambiguities related to the linguistic expression and the attitude of humans, and it is different from the uncertainty stated in the Probability Theory. By using the science of fuzzy management, the methods of classical management science are employed in the fuzzy environment, and it might be used in various management tasks including decision-making, policy making and planning. Fuzzy management science is able to create models which can process qualitative information intelligently like a human. In addition to creating flexibility in the model, this science inserts such data as knowledge, experience and human judgment in the model and presents completely applicable responses. Dvbois and Prade proposed a specific type of fuzzy numbers (fuzzy numbers are a special type of fuzzy sets) called LR fuzzy numbers. Using these numbers increases the computational efficiency. Algebraic operations are done very easy by using these numbers, and they have a determined pattern. Triangular and trapezoidal fuzzy numbers are a specific form of LR fuzzy numbers. Among the LR fuzzy numbers, triangular fuzzy numbers are more important, because they are good patters for explaining many

of the identified imprecise quantities, and they make calculations easier. The current study has used triangular fuzzy numbers to make fuzzy the indexes of evaluating organic products.

Consider two positive triangular fuzzy numbers (meaning all their components are positive):

$A = (a_1, a_2, a_3)$ and $B = (b_1, b_2, b_3)$

Arithmetic operations are performed on these numbers, as follows:

Sum $A + B = (a_1 + b_1, a_2 + b_2, a_3 + b_3)$.

Difference $A - B = (a_1 - b_1, a_2 - b_2, a_3 - b_3)$.

Symmetry $-A = (-a_3, -a_2, -a_1)$.

Reciprocal $\frac{1}{A} = (\frac{1}{a_3}, \frac{1}{a_2}, \frac{1}{a_1})$.

Division $\frac{A}{B} = (\frac{a_1}{b_3}, \frac{a_2}{b_2}, \frac{a_3}{b_1})$.

Multiplication $A.B = (a_1.b_1, a_2.b_2, a_3.b_3)$.

Multiplication of a fuzzy number by a positive constant like λ, $\lambda.A = (\lambda.a_1, \lambda.a_2, \lambda.a_3)$.

2.4 Fuzzy analytic hierarchy process (FAHP)

In the process of decision making, the one who decides might face different criteria. Under such circumstances, one should use the methods common in this regard. One of these methods is the analytical hierarchy process (AHP). The method of AHP is one of the most famous techniques of multi-attribute decision making, which was introduced by Tomas Saaty, in 1980. This method might be used when the practice of decision making is facing several competing options and criteria for decision making. The analytical hierarchy process makes it possible to simultaneously combine both qualitative and quantitative criteria. The method of AHP is based on the pairwise comparison of decision making options and criteria, and it makes it possible for managers to consider different scenarios. When the priorities show the uncertainty and imprecision, crisp and precise numbers are not very suitable for showing time judgment. In order to avoid ambiguity, the triangular fuzzy number and AHP are merged in the fuzzy method to solve the problem of deciding over issues. Therefore, Fuzzy Analytical Hierarchy Process (FAHP) refers to the fuzzification of classic AHP method by using fuzzy numbers and calculations. The key idea of AHP is extracting the knowledge of experts regarding the phenomenon under study. Fuzzy methodology allows the decider to merge the quantitative and qualitative data in the decision model. However, it should be noted that the traditional AHP is not able to accurately reflect the processes, particularly when the problems are not defined or solving them requires the uncertainty of data [20]. To compensate for this defect, two Dutch scholars, namely, Larhon and Pedrick, proposed a method for FAHP which was based on the Logarithmic Least Squares method. The number of calculations and the complexity of stages made this method not to be used frequently. In 1996, another method, called Extent Analysis method (EA) was presented by a Chinese scholar, named Yong Chang, who used fuzzy numbers in the method [6]. In the current study, the method presented by Yong Chang has been used, and for more explanation, the method of calculations is presented in the following, briefly.

Consider these two triangular fuzzy numbers:

$$
\begin{aligned}
&M_1 = (L_1, m_1, u_1) \; And \; M_2 = (L_2, m_2, u_2) \\
&Then, \;\; M_1 + M_2 = (L_1 + L_2, m_1 + m_2, u_1 + u_2), \\
&M_1.M_2 = (L_1.L_2, m_1.m_2, u_1.u_2), \\
&M_1^{-1} = (\frac{1}{u_1}, \frac{1}{m_1}, \frac{1}{L_1}), \\
&M_2^{-1} = (\frac{1}{u_2}, \frac{1}{m_2}, \frac{1}{L_2}),
\end{aligned}
$$

In EA method, for each row of pairwise comparison matrix, the value of S_k which is itself a triangular fuzzy number, is calculated as below:

$$S_k = \sum_{j=1}^{n} M_{kj} \times \left[\sum_{i=1}^{m} \sum_{j=1}^{n} M_{ij} \right]^{-1}$$

where k represents the row number and i and j represent options and indexes, respectively.

In this method, after calculating the $S_k s$, their degree of magnitude in relation to each other should be calculated. Generally, if M_1 and M_2 are two triangular fuzzy numbers, the degree of magnitude of M_1 and M_2 is defined as below:

$$\begin{cases} V(m_1 \geq M_2) = 1 & m_1 \geq m_2 \\ V(m_1 \geq M_2) = hgt(m_1 \cap m_2) \end{cases}$$
$$hgt(m_1 \cap m_2) = \frac{u_1 - L_2}{(u_1 - L_2) + (m_2 - m_1)}.$$

By calculating the magnitude of a triangular fuzzy number of k, another triangular fuzzy number also is obtained from the following relation:

$$V(M_1 \geq M_2, \ldots, M_k) = V(M_1 \geq M_2), \ldots, V(M_1 \geq M_k).$$

Moreover, the weight of indexes in the pairwise comparison matrix is calculated as follows:

$$w^{'}(x_1) = minV(S_i \geq S_k) \qquad k = 1, 2, \ldots, n, k \neq i.$$

Therefore, the vector of indexes weight shall be as follows, which is the same as the vector of abnormal multipliers of fuzzy AHP:

$$w^{'} = [w^{'}(x_1), w^{'}(x_2), \ldots, w^{'}(x_n)]^t.$$

By normalizing the mentioned vector, the normalized weight vector is obtained.

$$w = [w^{'}(x_1), w^{'}(x_2), \ldots, w^{'}(x_n]^t$$

where w is not a fuzzy number.

3 Literature review

With regards to the customers' attitude and organic food products, various studies have been conducted in Iran, some of the most important of which are presented in the following. Mansori et al. [15] conducted a research to investigate the factors affecting the tendency to consume organic products in Mashhad. They collected data through questionnaires distributed among 200 consumers in Mashhad, and by employing a distinction analysis pattern, the most important factors affecting the distinction between two groups were identified (one group had a tendency to consume organic products and the other not). The results showed that the nutritional value is the most important factor regarding the tendency of consumers to buy and consume such products. And increasing the awareness of consumers about the nutritional value of organic products was proved to be important for changing their consumption behavior and expanding the production and consumption of healthy food. Ranjbar and Omidi [23] studied the factors influencing the attitudes to consume organic agricultural products in Tehran. The statistical population of their study included those people who would buy and consume at least one group of organic horticultural crops, summer crops, animal products and dairy products, from Jalal-e Ale-Ahmad Fruit and Vegetable Market in Tehran. The findings of regression analysis showed that the variable of hygiene awareness, knowledge on organic products, and the motivation and age of consumers explained 32 percent of changes in the variable of attitude towards organic products. Zarei and Siahsarani Kojouri [32] conducted a study, entitled, "Discovery and Analysis of Shopping Behavior of Older Customers Deciding to Buy Organic Products", by the mixed method of clustering and decision tree. A mixed approach was employed for the analysis and modeling of the buying behavior of elderly customers while deciding to buy organic products, in two relevant steps. The results showed that in both clusters of enthusiastic and unenthusiastic customers, the index of education was a determinant factor for predicting the decision to buy organic products. Moreover, it seemed that the consumption of organic products was not prevailing among the elderly. Pezeshki Najafabadi and Al-hosseini Al-modarresi [21] conducted a research, entitled, "Investigating the Intension to Consume Organic Food Products Using the Theory of Planned Behavior", and studied the women residing at Shiraz City and analyzed data by using the method of structural equation modeling. They came to the conclusion that three constructs of attitude, social norm and controlling the perceived behavior affect positively the intension to consume organic food products. A study, entitled, "The Effect of Consumers' Perceptions on Their Attitude to Organic Food in Yazd City", was carried out by Al-hosseini Al-modarresi et al. [1]. The statistical population of their study included 206 consumers

of organic products in Yazd, who were selected by Cochran Sampling method. To collect data, a questionnaire based on Likert scale was used. To analyze data, structural equation modeling was used based on PLS software. The findings of the study showed that uniqueness, convenience shopping and the knowledge of the customer affect the attitude of consumers to organic food products and this attitude affects positively and significantly the purchasing intention. However, risk taking, quality and price did not have a significant effect on the attitude of consumers to organic food products. In other countries, too, various studies have been carried out in this regard. For example, Khan et al. [12] studied the consumption of green food in Malaysia by reviewing the purchase motivations of consumers. The study showed that the majority of Malaysian people consider safety and hygiene of food products as the main factors when buying vegetable and food. To ensure long-term stability, green food products and also expansive food industries in Malaysia, it is necessary to seriously perceive the motivations and attitudes of consumers for buying food products. Sulaiman and Janai [26] investigated the patterns of green food consumption among university students in Malaysia. The consumers of food products have changed their tendency to the selection of healthier food products, and they have chosen the nutritional-based life style. In order to understand the purchase power and consumption of organic food products of customers, it is required to accurately understand their concerns about the safety of food products and hygiene awareness. The findings show that there is a relationship between the environmental awareness, perceived consumption effectiveness and health awareness and the patterns of organic food consumption. Khoiriyah and Toro [13] investigated the attention paid to green products, the tendency to pay for them and the customers' goal of buying them. The results showed that hygiene awareness, environmental attitude and the value orientation affect positively and significantly the attitudes to green products, and the attitude to green products affects the tendency to pay for them, and the tendency to pay influences the determination of the customer to buy the product. Woo and Kim [29] studied the consumer's attitude and purchasing behavior regarding the green food products, in terms of green perceived value. The study investigated four green perceived values, namely, functional, conditional, social and emotional values, and evaluated the relationships among the green perceived value, the attitude and determination to buy the products. Overall, 300 questionnaires were distributed, out of which 253 questionnaires were capable to be used. The relationships between six constructs and 20 indexes were evaluated by using a structure. The results showed that all key aspects had a significant effect on the consumers' attitude and they significantly affect the determination of consumers to buy them.

With regards to the models of customers' attitude towards organic food products, also, some studies are conducted, the most important of which are mentioned in Table 1.

4 Research method

The research methods employed in this study are descriptive and survey methods. Using the AHP method, a questionnaire was designed and distributed among the relevant experts.

4.1 Statistical population

In the current study, to prioritize the factors affecting the customers to use organic products, the comments of experts form the statistical population.

4.2 Sample size

In order to determine the number of intended samples, the computational formula of sample size in AHP method, which is $[n\frac{(n-1)}{2}]$, has been used. In this formula, n represents the number of criteria employed in the study. Considering that in this study, 10 main criteria have been employed, the sample size is 45.

4.3 Research instrument

The current study uses a questionnaire including 22 questions.

4.4 Validity and reliability of the questionnaire

In order to evaluate the validity of the designed questionnaire, the method of content validity measurement has been used. To do so, the comments of specialized people relevant to the subject of the study and also university professors and experts were collected and considered as the criteria to modify and complete the questionnaire. In order to measure the reliability of questionnaire, the Cronbach's Alpha method has been used, and the reliability coefficient for the current study was 0.882.

Table 1: Studies Conducted on the Attitude of Customers towards Organic Food Products

No	Name of Scholar and Year	Title and Results
1	Andervazh et al. [2]	The factors affecting the organic food consumers' attitude and purchase determination were investigated by the structural equation modeling. This qualitative study, which was conducted by Amos software and distributing questionnaires, showed that considering the direct effect of organic food knowledge on the attitude and purchase determination and behavior of consumers, it is recommended to the companies producing such products to put extensive advertisement for the awareness of people of society regarding such products and explaining the benefits of consuming them.
2	Dadashi et al. [7]	They conducted a research, entitled, "Native Pattern of Market Orientation Expansion of Organic Products in Iran". They used a mixed method, which was actually a combination of qualitative and quantitative methods. The study first considers viewpoints, different models of market orientation, factors of market orientation and the effect of market orientation on business performance. Then they investigated the causal relationship between internal and external factors affecting the market orientation, with two cultural and behavioral approaches, and the business performance. Then by conducting exploratory interviews among the managers of the companies producing organic products and by structural equation molding, they proposed and tested a conceptual decision making model to explain the causal links affecting the business performance. The results showed that market orientation affects positively and significantly the performance of producing firms of organic productions.
3	Cachero-Martínez [5]	In this study, the model of consumer's behavior regarding the organic products was investigated, with the moderating role of environmental concerns. The study points out that the Covid-19 pandemic has changed the attitude of many consumers. The purpose of the study was analyzing the relationships among the attitude, satisfaction, trusting, purchasing, determination of shopping and word of mouth regarding the organic products. The customers' trusting organic products is influenced by their satisfaction and attitude.
4	Vijith H. [28]	In this study, the attitude, priorities and behavior of customers regarding the organic food were investigated by using Fishbein's multi-attribute model. The purpose of the study was to understand the attitude of people towards organic food and also identifying the factors affecting the purchasing tendency and behavior of people regarding organic food, by using Fishbein's multi-attribute model. Based on the results, the priority and attitude of customers and the factors provoking the customers to buy organic food products are getting better.
5	Yazar and Burucuoglu [30]	They investigated the attitude of consumers regarding the organic food, by conducting multi-group analysis between genders. The purpose of the study was investigating the relationship among being aware of the consumers health, concerns about the food safety, attitudes towards the organic products and the determination to purchase organic food products. The results indicated that in gender-based pairwise comparison, the attitudes and goals of male and female consumers are different regarding the organic food.

5 Research model

In this section, the criteria and sub-criteria affecting the promotion of customers' attitude to organic food products are presented briefly.

6 Data analysis

In the current study, to measure the criteria, triangular fuzzy numbers have been used in such a way that for each question, five states have been considered, as shown in Table 3.

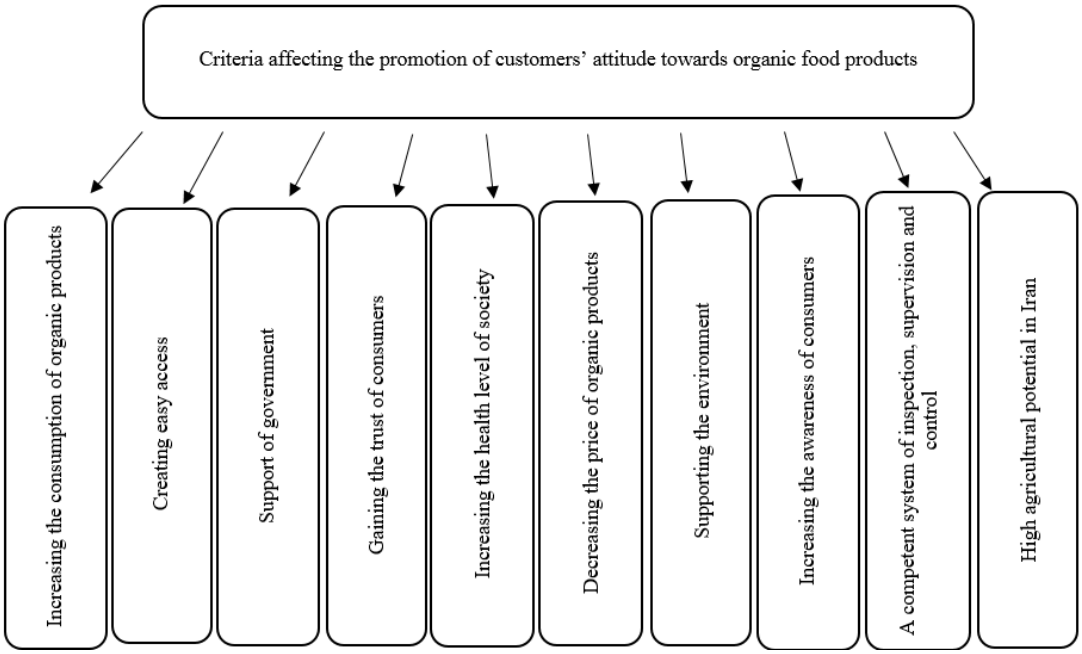

Figure 1: Hierarchical structure of prioritizing the criteria of organic food products

The mean of fifty questionnaires for each question has determined the final value of that question. The numbers obtained have been put in pairwise comparison matrix and they have been compared two by two. Then, by using EA method, the criteria and sub-criteria have been weighed and finally prioritized. The mentioned steps have been explained briefly, in the following:

Step 1: First, all criteria in each layer are measured proportional to their upper layer, and such proportions are put in a matrix, called pairwise comparison matrix. To form such matrixes, the mean of fuzzy numbers obtained from the questionnaires has been used. In this matrix, the elements on the main diagonal are one. The top and down elements of the main diagonal are reciprocal. Pairwise comparison matrixes have been compared as to the criteria of decreasing the price of organic products, supporting the environment, increasing the health level of society, increasing the consumption of organic products, support of government, gaining the trust of consumers, creating easy access, increasing the awareness of consumers, competent inspection, supervision and control systems and high agricultural potential in Iran.

The pairwise comparison matrix of increasing the consumption of organic products is presented below. The elements on the row and column of this matrix are in the following order:

The pairwise comparison matrix of the Creating easy access is presented below. The elements on the row and column of this matrix are in the following order:

The pairwise comparison matrix of the support of government is presented below. The elements on the row and column of this matrix are in the following order:

The pairwise comparison matrix of gaining the trust of consumers is presented below. The elements on the row and column of this matrix are in the following order:

The pairwise comparison matrix of increasing the health level of society is presented below. The elements on the row and column of this matrix are in the following order:

The pairwise comparison matrix of decreasing the price of organic products is presented below. The elements on the row and column of this matrix are in the following order:

The pairwise comparison matrix of supporting the environment is presented below. The elements on the row and column of this matrix are in the following order:

The pairwise comparison matrix of increasing the awareness of consumers is presented below. The elements on the row and column of this matrix are in the following order:

The pairwise comparison matrix of competent inspection, supervision and control systems is presented below. The

Table 2: Criteria and sub-criteria

Criteria	Sub-criteria
C1: Increasing the consumption of organic products	C11: Increasing the supply of organic products and achieving the economies of scale
	C12: Expanding the area under cultivation of organic products in Iran
	C13:The high level of customers' general satisfaction with consuming organic products compared to other products
C2: Creating easy access	C21: Strengthening the system of supplying and selling organic products
	C22: Difficult access to the sales market of organic products
	C23: Lack of determining a suitable and fixed place for distributing and selling organic products for the public access
C3: The support of government	C31: Assigning supportive subsidies in many developed countries to the section of organic agriculture
	C32: The cooperation of government and other relevant institutes to decrease the price of organic products
C4: Gaining the trust of consumers	C41: The necessity of labeling system for organic products
	C42: Using the capacity of media to prevail and increase the consumption of organic products
	C43: The high level of customers' general satisfaction with consuming organic products compared to other products
	C44: Increasing people's tendency to pay more for organic products due to their benefits
C5: Increasing the health level of society	C51: Preserving the health of society by expanding the consumption of organic products
	C52: Healthy and safe nutrition by consuming organic products
C6: Decreasing the price of organic products	C61: High price of organic products compared to other products
	C62: High intermediation costs while selling organic products and consequently low profit of producers
	C63: High costs of transporting such products
C7: Supporting the environment	C71: Increasing the interest of consumers in improving the health of environment and conserving it
	C72: Having healthy and non-polluted water for underground resources, aquatics, plants and human beings.

Table 3: Converting the linguistic variable to the triangular fuzzy number

Linguistic variable	Triangular fuzzy number
Very high	0.67, 0.84, 1
High	0.50, 0.67, 0.84
Medium	0.34, 0.50, 0.67
Low	0.17, 0.34, 0.50
Very low	0, 0.17, 0.34

	C11	C12	C13
C11	(1,1,1)	(0.633, 1.044, 1.774)	(0.631, 1.039, 1.763)
C12	(0.563, 0.956, 1.578)	(1,1,1)	(0.604, 0.994, 1.638)
C13	(0.566, 0.962, 1.584)	(0.610, 1.005, 1.654)	(1,1,1)

	C21	C22	C23
C21	(1,1,1)	(0.633, 1.044, 1.775)	(0.698, 1.133, 1.864)
C22	(0.569, 0.922, 1.484)	(1,1,1)	(0.629, 1.045, 1.748)
C23	(0.536, 0.881, 1.432)	(0.571, 0.956, 1.588)	(1,1,1)

elements on the row and column of this matrix are in the following order:

The pairwise comparison matrix of high agricultural potential in Iran is presented below. The elements on the row

	C31	C32
C31	(1,1,1)	(0.666, 1.045, 1.645)
C32	(0.607, 0.956, 1.500)	(1,1,1)

	C41	C42	C43	C44
C41	(1,1,1)	(0.622, 0.986, 1.560)	(0.644, 1.027, 1.645)	(0.620, 0.982, 1.551)
C42	(0.640, 1.013, 1.606)	(1,1,1)	(0.655, 1.041, 1.663)	(0.631, 0.995, 1.568)
C31	(0.607, 0.973, 1.552)	(0.571, 0.956, 1.588)	(1,1,1)	(0.598, 0.955, 1.515)
C31	(0.644, 1.182, 1.611)	(0.637, 1.004, 1.583)	(0.659, 1.046, 1.663)	(1,1,1)

	C51	C52
C51	(1,1,1)	(0.608, 0.985, 1.596)
C52	(0.626, 1.014, 1.643)	(1,1,1)

	C61	C62	C63
C61	(1,1,1)	(0.637, 1.084, 1.755)	(0.698, 1.133, 1.864)
C62	(0.634, 1.008, 1.606)	(1,1,1)	(0.629, 1.045, 1.748)
C63	(0.627, 0.999, 1.594)	(0.571, 0.956, 1.588)	(1,1,1)

	C71	C72
C71	(1,1,1)	(0.616, 0.986, 1.576)
C72	(0.634, 1.013, 1.623)	(1,1,1)

	C8
C8	0.736

	C9
C9	0.73

and column of this matrix are in the following order:

	C10
C10	0.74

Step 2: Now each of the matrixes above are normalized in a linear way. Then, by using EA method, described earlier, the weight of each sub-criterion is measured. The obtained weight for each sub-criterion is presented in the following tables:

Table 4: The weight of sub-criteria of increasing the consumption of organic products

Sub-criteria	Weight
C11	0.3398
C12	0.3294
C13	0.3307

Table 5: The weight of sub-criteria of creating easy access

Sub-criteria	Weight
C21	0.3508
C22	0.3303
C23	0.3187

Table 6: The weight of sub-criteria of the support of government

Sub-criteria	Weight
C31	0.2498
C32	0.2512
C33	0.2451
C34	0.2529

Table 7: The weight of sub-criteria of gaining the trust of consumers

Sub-criteria	Weight
C41	0.5124
C42	0.4875

Table 8: The Weight of Sub-criteria of Increasing the Health Level of Society

Sub-criteria	Weight
C51	0.4963
C52	0.5036

Table 9: The weight of sub-criteria of decreasing the price of organic products

Sub-criteria	Weight
C61	0.3326
C62	0.3348
C63	0.3325

Table 10: The weight of sub-criteria of supporting the environment

Sub-criteria	Weight
C71	0.4964
C72	0.5038

In the next step, the weights of ten main criteria are measured and are placed in the final pairwise comparison matrix, as follows:

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
C1	1	1.0324	0.9922	1.0052	0.9879	0.9852	0.9878	1.3314	1.3435	1.3254
C2	0.9687	1	0.9611	0.9737	0.9570	0.9543	0.9568	1.2897	1.3014	1.2838
C3	1.0079	1.0405	1	1.0131	0.9957	0.9930	0.9956	1.3419	1.3542	1.3359
C4	0.9948	1.0270	0.9870	1	0.9828	0.9801	0.9827	1.3245	1.3366	1.3185
C5	1.0122	1.0450	1.0043	1.0175	1	0.9973	0.9990	1.3477	1.3600	1.3416
C6	1.0150	1.0479	1.0071	1.0203	1.0028	1	1.0026	1.3514	1.3637	1.3453
C7	1.0124	1.0410	1.0044	1.0176	1.0001	0.9974	1	1.3487	1.3602	1.3418
C8	0.7511	0.7754	0.7452	0.7550	0.7420	0.7400	0.7419	1	1.0091	0.9955
C9	0.7443	0.7684	0.7385	0.7482	0.7353	0.7333	0.7352	0.9910	1	0.9865
C10	0.7545	0.7789	0.7486	0.7584	0.7454	0.7433	0.7453	1.0045	1.0137	1

Based on the results, the factors affecting the promotion of customers' attitude to organic food products are prioritized, as follows:

Table 11: The priority of factors affecting the promotion of customers' attitude to organic food products

Criteria	Weight of Criteria	The Priority of Criteria
Decreasing the price of organic products (C6)	1.10960	1
Supporting the environment (C7)	0.10931	2
Increasing the health level of society (C5)	0.10930	3
The support of government (C3)	0.10883	4
Increasing the consumption of organic products (C1)	0.10798	5
Gaining the trust of consumers (C4)	0.10742	6
Creating easy access (C2)	0.10459	7
Increasing the awareness of consumers (C8)	0.08147	8
Competent inspection, supervision and control systems (C9)	0.08110	9
High agricultural potential in Iran (C10)	0.08037	10

The priority of sub-criteria is as Table 12.

7 Conclusion

Investigating the factors affecting the promotion of customers' attitude to organic food products is one of the most important needs of today's society. The model designed in the current study includes 10 main indexes as the criteria forming the theoretical model which are categorized by AHP. The findings of the study might be used to improve the customers' attitude to organic food products. Considering that many costs are spent to expand organic products, it is very important to be aware of the factors effective in improving the customers' attitude to use such products.

Table 12: The priority of sub-criteria of factors affecting the promotion of customers' attitude to organic food products

The priorities of criteria	The priorities of sub-criteria
Decreasing the price of organic products (C6)	High price of organic products compared to other products (C61)
	High intermediation costs while selling organic products and consequently low profit of producers (C62)
	High costs of transporting such products (C63)
Supporting the environment (C7)	Increasing the interest of consumers in improving the health of environment and conserving it (C71)
	Having healthy and non-polluted water for underground resources, aquatics, plants and human beings (C72)
Increasing the health level of society (C5)	Preserving the health of society by expanding the consumption of organic products (C51)
	Healthy and safe nutrition by consuming organic products (C52)
The support of government (C3)	Assigning supportive subsidies in many developed countries to the section of organic agriculture (C31)
	The cooperation of government and other relevant institutes to decrease the price of organic products (C32)
Increasing the consumption of organic products (C1)	Increasing the supply of organic products and achieving the economies of scale (C11)
	Expanding the area under cultivation of organic products in Iran (C12)
	The high level of customers' general satisfaction with consuming organic products compared to other products (C13)
Gaining the trust of consumers (C4)	The necessity of labeling system for organic products (C41)
	Using the capacity of media to prevail and increase the consumption of organic products (C42)
	The high level of customers' general satisfaction with consuming organic products compared to other products (C43)
	Increasing people's tendency to pay more for organic products due to their benefits (C44)
Creating easy access (C2)	Strengthening the system of supplying and selling organic products (C21)
	Difficult access to the sales market of organic products (C22)
	Lack of determining a suitable and fixed place for distributing and selling organic products for the public access (C23)

Considering the importance of decreasing the price of organic products, as the first criterion, it is recommended to expand the area under cultivation of organic products in Iran and to control the price of products by inspection and supervision, in a way that customers become able to buy and consume the products with suitable price.

By considering the importance of supporting the environment, as the second criterion, it is recommended that the relevant authorities prevent the production of non-organic products, as much as possible.

Due to the importance of increasing the health level of society, as the third criterion, it is recommended to culturalize the consumption of organic products by advertisements and media, in such a way that people get familiar with the benefits of consuming organic products.

Considering the support of government as the fourth factor and due to the importance of its sub-criteria, it is recommended that the government makes a plan, as soon as possible, regarding the prosperity of the section of organic agriculture and supplying healthy food, by adjusting the population growth policies in Iran.

Due to the importance of increasing the consumption of organic products, as the fifth criterion, it is recommended to increase the distribution of organic products in shopping centers, in a way that customers become able to easily buy and consume such products.

Since gaining the trust of consumers is important as the sixth effective factor, it is recommended that the relevant authorities influence the perception of customers by suitable advertisements and accurate marketing, in a way that the benefits of consuming organic products are introduced to customers in a more effective manner. Due to the importance of easy access, as the seventh effective factor, it is recommended that the shopping centers of organic products and informing the customers to be in such a way that they can easily buy the products. Finally, considering the importance of increasing the awareness of consumers, competent inspection, supervision and control systems and the high agricultural potential in Iran, as the eighth, ninth and tenth factors, it is recommended to assign necessary budgets to farmers to encourage them to cultivate organic products. Moreover, by supervising and controlling the market, the unreasonable increase of the price of organic products by market brokers is prevented. Furthermore, the relevant authorities might increase the awareness of consumers regarding the benefits of organic products and harms of non-organic products, by advertisement and culturalization.

8 Applicable recommendations

One of the main goals of the current study is presenting a pattern by which it becomes possible to increase the consumption of organic food products in the trading conditions of Iran; a pattern which is applicable and by which the activists of marketing area become able to continue their job in the today's business competing world and have the requirements to maintain in this space. In lines with this, considering the results obtained from the current research, some recommendations are presented, as follows:

- The government system should completely recognize the importance of organic agriculture. In lines with this, it is necessary to provide the base of paying facilities and bank loans with low interest, which is the most efficient way of supporting the farmers.
- It is necessary to pay subsidies for buying organic products to the public in order to promote the health level of society and create the sales market of such products.
- Governmental organizations such as Health and Treatment, Agricultural Jihad, Food and Drug, etc., as the controllers of food health in society, should cooperate to support the producers of organic products.
- The government and state organizations should take measures to prosper the business of organic products inside and outside Iran, by insuring such products, expanding domestic markets to sell the products and also by giving assistance to export them.
- Using the experiences of other countries in the global area might result in the growth and development of organic agriculture. Many countries have invested in the area of strategic and non-strategic organic products. Germany has made organic its wheat, grains and meat. America has invested in the diary and protein products. Mediterranean countries have invested in organic olive and Latin America in organic fodder. Meanwhile, regarding the production of organic products, Australia has been ranked as the first country during the recent 10 years. It is recommended to use the experiences of these counties for producing more organic products.
- It is necessary to invest in the agricultural section, including the creation of required infrastructures, for example, creating irrigation system, road transportation system, constructing and maintaining the equipment and conducting studies in the field of sustainable and organic agriculture.
- The importers of organic products which are not available in Iran and the distribution of such products should be supported by certified institutes, with governmental and competing prices.
- It is necessary to set some rules for punishing those who abuse the name and brand of organic products, and the supervising bodies have to supervise the process of production to sale, seriously, systematically and continuously. Accordingly, the safety of organic agriculture and the sustainable development of this field are guaranteed accurately inside of the society.
- Due to the shortage of water resources in Iran and the necessity of productivity and optimization of consumption, it is necessary that the Agricultural Jihad and the organizations affiliated with water and soil issues in Iran identify the lands and locations suitable for cultivating organic products and introduce them to the applicants of producing organic products as a strategic and sustainable plan and support them.
- It is necessary to use NGOs to inform and make aware the individuals to better understand and accept using organic products, due to the influence of such groups on the members of the groups.

- To execute the extension plans among farmers, through the extension centers of Agricultural Jihad, Broadcasting Organization, making people familiar with the manner of production and consumption of organic products, and creating specific centers for selling such products.
- To present useful information to farmers regarding the management and controlling weeds, pests and the diseases of agricultural products, and also presenting information with regards to suitable climatic conditions for cultivating organic products.

References

[1] S. Alhosseini Almodarresi, H. Bagheri Gara Bolagh, A. Dehghani Ghahnavyeh, M. Gholami and S. Radfar, *The effec of consumers' perceptions on the attitude towards organic foods in the Yazd*, Organ. Culture Manag. **16** (2018), no. 1, 195–217.

[2] L. Andervazh, S. Jalili and S. Zanjani, *Studying the factors affecting the attitude and intention of buying organic food consumers: structural equation model*, Iran. J. Health Educ. Health Prom. **8** (2020), no. 1, 35–44.

[3] A. Attafar and H. Mansouri, *Model of improving customer loyalty in electronic stores*, New Market. Res. J. **1** (2011), no. 3, 145–164.

[4] V. Azizi, *Strategies of market development of for healthy food products in Hamadan*, J. Agricul. Econ. Dev. **27** (2014), no. 4, 328–337.

[5] S. Cachero-Martínez, *Consumer behaviour towards organic products: The moderating role of environmental concern*, J. Risk Financ. Manag. **13** (2020), no. 12.

[6] C.H. Cheng, K.L. Yang and C.L. Hwang, *Evaluating attack helicopters by AHP based on linguistic variable weight*, Eur. J. Oper. Res. **116** (1999), no. 2, 423–435.

[7] M. Dadashi, M. Mohammadian, Z. Dehdashti Shahrokh, V. Khashe'ie, *Determining the impact of the management of market orientation dimensions on the performance of organic food production industries in Iran*, Public Manag. Res. **10** (2017), no. 35, 267–297.

[8] M. Dadashi, M. Mohammedan, Z. Dehdashti Shahrokh and V. Khashe'ie, *Indigenous pattern of market development of organic products in Iran*, Agricul. Econ. Res. **9** (2018), no. 36, 231–258.

[9] A. Gholampour, A. Naami and A. Moshabaki, *Presentation of social media based marketing model in Iranian food products and organic drinks industry using theme analysis*, Agricul. Econ. Res. **11** (2019), no. 44, 31–58.

[10] J. Golijan and B. Dimitrijević, *Global organic food market*, Acta Agricul. Serbica **23** (2018), no. 46, 125–140.

[11] R.L. Gruner, A. Vomberg, Ch. Homburg and A.L. Lukas, *Supporting new product launches with social media communication and online advertising: sales volume and profit implications*, J. Product Innov. Manag. **36** (2019), no. 2, 172–195.

[12] M.R.T. Khan, S. Chamhuri and H.S. Farah, *Green food consumption in Malaysia: a review of consumers' buying motives*, Int. Food Res. J. **22** (2015), no. 1, 131–138.

[13] S. Khoiriyah and M.J.S. Toro, *Attitude toward green product, willingness to pay and intention to purchase*, Int. J. Bus. Soc. **19** (2018), no. 54, 620–628.

[14] R. lavaei, *A model of limiting factors Of organic crops consumption according to agricultural experts in Karaj county: a grounded theory*, Iran. J. Agricul. Econ. Dev. Res. **47** (2016), no. 3, 647–656.

[15] H. Mansori, M. Ghorbani and M. Rajabzadeh, *Evaluation of factors affecting willingness to use of organic products in mashhad county*, J. Agricul. Econ. Dev. **27** (2013), no. 3, 188–194.

[16] M. Mirlohi and Z. Esfandiary, *Food characteristics in the organic processing industries*, J. Health Syst. Res. **8** (2012), no. 3, 349–358.

[17] H. Moeini, M. Jamipour and F. Ebrahimidelavar, *The effect of social commerce capabilities on customers' attitude to ward buying by the mediator role of trust (Case study: Instagram users)*, J. Bus. Manag. **9** (2017), no. 1, 173–192.

[18] T.T.H. Nguyen, N. Nguyen, T.B.L. Nguyen, T.T.H. Phan, L.P. Bui and H.C. Moon, *Investigating consumer*

attitude and intention towards online food purchasing in an emerging economy: an extended TAM approach, Foods **8** (2019), no. 11.

[19] F. Omidi, M. Sadrehashemi, A. Adenehfar and S. Zaenali, *Investigating the effects of commercial advertising on the attitude and intention of consumers to buy green products*, J. Appl. Stud. Manag. Dev. Sci. **5** (2017), no. 7, 60–76.

[20] S. Perçin, *se of fuzzy AHP for evaluating the benefits of information-sharing decisions in a supply chain*, J. Enterprise Inf. Manag. **21** (2008), no. 3, 263–284.

[21] F. Pezeshki Najaf Abadi and S.M. Alhossaeni Almodaresi, *Investigating the consumption intentions of organic food products using planned behavior theory*, J. Commerc. Strateg.. **14** (2017), no. 10, 35–46.

[22] S. Rajesh, G. Raj, S. Dhuvandranand and D. Kiran, *Factors influencing customers' attitude towards SMS advertisement: evidence from mauritius*, Stud. Bus. Econ. **14** (2019), no. 2, 141–159.

[23] S.H. Ranjbar and N.M. Omidi, *Affecting factors on consumption' attitudes of organic agricultural products in Tehran*, J. Agricul. Ext. Educ. Res. **7** (2014), no. 2, 51–62.

[24] A. Sanayei and R. Shafei, *Designing a model for analyzing and forecasting of the customers purchasing behavior based on the functional attitude theory*, Iran. J. Trade Stud. **16** (2012), no. 62, 153–192.

[25] A. Sandoghi and H. Raheli, *Extending the model of planned behavior to predict the intention of producing organic products among Isfahan cucumber greenhouse owners by Moral norm variable*, Iran. J. Agricul. Econ. Dev. Res. **47** (2016), no. 4, 961–974.

[26] Y. Sulaiman and H.M. Janai, *A study of consumption patterns on green food among students in universiti utara Malaysia*, J. Adv. Res. Soc. Behav. Sci. **7** (2017), no. 1, 20–32.

[27] S. Tabatabaei Nasab and F. Parish, *Consumers' attitude towards advertising*, J. Bus. Admin. Res. **7** (2015), no. 13, 1–23.

[28] H. Vijith, *Customer's attitude, preference and buying behavior towards organic food using fishbein multi-attribute model*, Int. J. Recent Technol. Engin. **9** (2020), no. 1, 1598–1602.

[29] E. Woo and Y.G. Kim, *Consumer attitudes and buying behavior for green food products: From the aspect of green perceived value (GPV)*, Br. Food J. **4** (2019), no. 2, 176–191.

[30] E.E. Yazar and M. Burucuoğlu, *Consumer attitude towards organic foods: A multigroup analysis across genders*, Istanbul Bus. Res. **48** (2019), no. 2, 176–196.

[31] L.A. Zadeh, *Fuzzy sets*, Inf. Control 8 (1965), no. 3, 338–353.

[32] A. Zarei and M. Siahsarani Kojouri, *Discovery and analysis of shopping behavior of older customers decide to buy organic products: The combination of clustering and decision tree*, Mod. Res. Decision Mak. **2** (2017), no. 3, 17–147.