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Decision-Making Process for Vegetable Production: The Case of Bafra Plain, Turkey

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Abstract: The purpose of this study is to reveal the decision-making process for vegetable production. Semi-structured interviews were conducted with selected vegetable growers, using the theoretical sampling method in Bafra plain of Samsun province, Turkey. The quantitative data were analyzed through descriptive statistics and qualitative data on the decision-making process were analyzed through content analysis. The vegetable growers generally make decision in two stages: thinking and implementation. In the thinking stage, they evaluate encouraging factors (experience, product characteristics, the availability of resources (land, labor, capital, and managerial skills), the social environment, positive trends in product prices, a desire to produce, rural dependence, customer demands and a desire to earn money) and the restricting factors (debts, pests, and diseases, the cost of products, weather conditions, unsuccessful experiences, negative perceptions towards specific products, the neighborhood of the land, lack of a sustainable contract with commissioners and limited terms for leasing land). In the decision-thinking stage, the decision-makers evaluate what decisions they want to make and then implement production plans. In the thinking stage, the growers need data on factors affecting production patterns. In economic theories, the farmer is believed to be only a rational entity that tries to maximize profits. However, this research shows that farmers' economic decisions are not always taken as rational but also behavioral. The research results showed that not only the price but also human behavior should be taken into consideration in the decision-making process.

Keyword: Decision, Decision-Making Process, Product Pattern, Qualitative Data

Sebze Üretimine Karar Verme Süreci: Bafra Ovası Örneği, Türkiye

Öz: Bu çalışmanın amacı, sebze üretimine karar verme sürecini ortaya koymaktır. Samsun ili Bafra ovasında teorik örnekleme yöntemi kullanılarak seçilen sebze yetiştiricileri ile yarı yapılandırılmış görüşmeler yapılmıştır. Nicel veriler betimsel istatistiklerle, karar verme sürecine ilişkin nitel veriler ise içerik analiziyle çözümlenmiştir. Sebze yetiştiricileri genellikle iki aşamada üretim kararı vermektedir: düşünme ve uygulama. Düşünme aşamasında, teşvik edici faktörleri (deneyim, ürün özellikleri, kaynakların mevcudiyeti (arazi, emek, sermaye ve yönetim becerileri), sosyal çevre, ürün fiyatlarındaki olumlu eğilimler, üretme arzusu, kırsala bağımlılık, müşteri talepleri ve para kazanma arzusu) ve kısıtlayıcı faktörleri (borçlar, zararlılar ve hastalıklar, ürünlerin maliyeti, hava koşulları, başarısız deneyimler, belirli ürünlere yönelik olumsuz algılar, arazi komşuluğu, komisyoncularla sürdürülebilir bir sözleşmenin olmaması ve arazi kiralama için sınırlı koşullar) değerlendirmektedirler. Karar verme aşamasında, karar vericiler hangi kararları almak istediklerini değerlendirmektedir ve ardından üretim planlarını uygulamaktadır. Düşünme aşamasında yetiştiriciler üretim modellerini etkileyen faktörler hakkında verilere ihtiyaç duymaktadırlar. İktisat teorilerinde çiftçi, yalnızca karını maksimize etmeye çalışan rasyonel bir varlıktır ancak bu araştırma, çiftçilerin ekonomik kararlarının tamamen rasyonel olmadığını aynı zamanda davranışsal da olduğunu göstermektedir. Araştırma sonuçları, karar verme sürecinde sadece fiyatın değil, insan davranışlarının da dikkate alınması gerektiğini göstermektedir.

Anahtar Kelimeler: Karar, Karar Verme Süreci, Ürün Deseni, Kalitatif Veri

1. Introduction

People have to consume nutrients in order to survive. Agriculture is necessary to produce food resources. For a smooth food supply for present and future generations, agriculture needs to be sustainable (ul Haq et al., 2020). Therefore, careful decisions should be made for agricultural production. However, the decision-making environment in agriculture has a complex structure. Many researchers believe that farmers take into account mostly economic factors (such as the price of products, input prices, the cost of products, capital status, etc.) in agricultural activities. Öhlmér et al. (1998) proposed to include the case of a farmer's agricultural decision-making in the agricultural decision process due to farmers socio-cultural and personality characteristics.

Decision-making means choosing the most suitable one among the available alternatives. Farmers may prefer products that they have never grown regardless of the land conditions and the suitability of the operating characteristics, because of their personality traits. Farmers do not just decide on new technologies or practices emerging in the agricultural sector; rather, they decide which product will be the most suitable crops for their farm properties and which product will be produced. In addition, depending on the

characteristics of the season they can produce a wide variety of vegetables.

"The process" refers to the stages of the event, not to the outcome of any event, until the event takes place. Therefore, when the decision-making process is mentioned, this refers to the stages that are passed until the decision event is realized. However, most research on the decision-making process focuses not only on the process itself, but also on the final decision as a result of the process (Alorcon et al., 2013; McDonald et al., 2016).

Generally, some studies on decision-making are particularly concerned with the role of women farmers in farm management and how decisions are made within the family (Tsegaye et al., 2012; Sarma and Payeng, 2012; Kutlar et al., 2013; Sucharita and Bishnoi, 2016; Chayal et al., 2017; Mittal et al., 2018). Several studies have been dedicated to determining the factors that affect farmers' land consolidation decisions, agricultural insurance decisions, production branch preferences, input usage decisions and product production decisions (Aydın et al., 2016; Günden 2016). However, the researchers have failed to determine the processes that the farmers go through until they make the decision and the factors that are affected (restricting and encouraging) during the stages of the process. Furthermore, most of researchers in Turkey have focused on the decision and the results of the decision rather than determining the types of decision-making of farmers.

Consequently, the researchers examining the decision-making process of farmers are limited. However, the decision-making behavior of farmers and the results of their decisions are closely related to the success of their businesses. To help farmers make better decisions, the decision-making process needs to be thoroughly understood. Therefore, the aim of this study is to reveal the decision-making process of the product pattern of farmers especially in the field of vegetable growing, where the number of varieties is high.

2. Materials and Methods

2.1. Research area and data collection

Samsun is one of the provinces that has the highest vegetable production in Turkey with 1.162.037 ton (TSI, 2017). The Bafra district, which was selected for the research area, is the county that produces the most vegetables in the province of Samsun. In 2017, 539,017 tonnes of vegetables were produced from 151,626 decares of land. 34,587 ton of this production included roots and tuberous vegetables (TSI, 2017). Therefore, this research aims to determine how vegetable growers in the Bafra district of Samsun decide among various products.

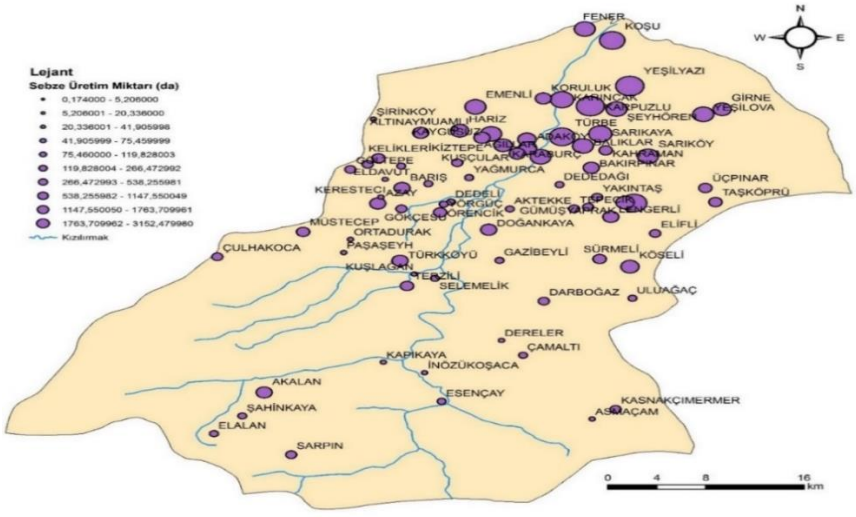

Figure 1. Map of villages included in the scope of sampling
Şekil 1. *Örnekleme kapsamına alınan köylerin haritası*

The vegetable farmers in 81 villages of Bafra district constitute the sampling unit of the research. A map was created by using the ArcGIS 9.3 program to select the villages that can represent the research area (Figure 1). The amount of vegetable production produced in all villages on the map has been visualized with the help of this program and the the villages

where the production was intense were selected in accordance with the purpose.

Semi-structured interviews were conducted using the theoretical sampling method. Theoretical sampling is a concept that was introduced by Glaser and Strauss in 1967. When the researcher collects data, the resulting concepts and processes can decide that they have reached an adequate number of data sources when they start to repeat each other (Yildirim and Simsek, 2013). According to the theoretical sampling method, 20 face to face in-depth interviews in Bafra region were found to be sufficient. The farmers should be recorded in order to ensure that the content analysis was correctly implemented. An ethics certificate was obtained from the Social Sciences Ethics Committee of Ondokuz Mayıs University (Decision No: OMU KAEK 2015/340) to record the interviews. In-depth interviews were performed with up to two farmers per day. In addition, necessary care was taken to create an environment where farmers could express themselves comfortably, and notes were carefully taken into the interview notebook according to the code of ethics.

2.2. Data analysis methods

The analysis of the data was implemented into two stages. In the first stage, the socio-economic characteristics of vegetable growers were examined, and in the second stage, the farmers' decision-making process was analyzed.

The socio-economic characteristics of the vegetable growers was analyzed by descriptive statistics. The analysis was made with the SPSS 21.0 package program. The qualitative data analysis was then used to reveal the decision-making process. The qualitative data obtained in-depth interviews with farmers are shown in Figure 2. First of all, digital voice recordings were transcripted. Secondly, the notes and voice records during the semi-structured interviews were combined and meaningful data were obtained. Then the coding phase was started. Coding stages, ensured defining the concepts and theme words provided a better understanding of the analysis. Coding is the process of naming meaningful sections (words, sentences, paragraphs, etc.) among the data obtained. The coding process requires sections to be subsections, examined, compared and correlated (Yildirim and Simsek, 2013). The concept is the meaning given to meaningful sections and events in the data. Concepts form the basic analysis units in content analysis. Theme (category) is the classification of the concepts obtained in the content analysis under a specific theme. The categories or themes are more abstract and general than the concepts obtained in the content analysis (Collins, 1999). As a result of examining the concepts, the relationships with each other were revealed and these relations were explained with a higher-level theme. NVIVO package program was used for coding qualitative data and creating figures.

3. Results

3.1. The socio-economic characteristics of farmers

The average age of the farmers interviewed was 43 (between 32 and 57). When farmers' education distributions were examined; it was determined that 55% were primary school, 20% a middle school and 15% were high school graduates. The interviewed farmers had an average of 24 years (3 to 47 years) of agricultural experience. It was determined that 5% of the farmers owned between 1 and 49 decares, 40% of them 50 and 99 decares and 55% of them more than 100 decares. In the research, only the farmers who produce vegetables (50%) and those who carry out other agricultural business activities besides vegetable farming (50%) are equals. While half on the farmers produce only vegetables, the other half carry out other agricultural activities in addition to vegetable production. However, the business activity was mainly done with vegetable production. It was determined that 55% of the farmers had also non-agricultural income from trade or other source of reveues. In addition, it was determined that 70% of the farmers kept records abouted their sowing dates, yields, expenses and inputs of their products by taking notes on the calendar or by writing on their agendas. 70% of farmers were members of agricultural organizations such as vegetable producers association and agricultural credit cooperatives. It was seen that important decisions within the enterprise were made by the head of the male household, mostly (50%) in consultation with their families. In addition, 35% of them made their decisions with expert advice, while 15% made solely on their own decisions.

The farmers produced at least 3 and at most 11 kinds of products and with an average of 6 kinds of products. Farmers allocated 73% of their land to field crops and 27% to vegetable production in the summer period. The vegetable farmer preferred to produce watermelon with a rate of 59% in summer. Watermelon is followed by red pepper (19%), melon (17%), tomato (2%) and other vegetable products, respectively. The top three field crops farmers grown

the most were listed as 57% paddy, 21% wheat, and 13% corn. As winter crop, farmers produced vegetables on 96% of their lands and field crops on 4%. Farmers cultivated cauliflower on 42% of their land, red cabbage on 21%, white cabbage on 19%, broccoli on 13% and other vegetable crops on 5% as winter vegetables. Silage corn was the most grown product as field crop grown for winter.

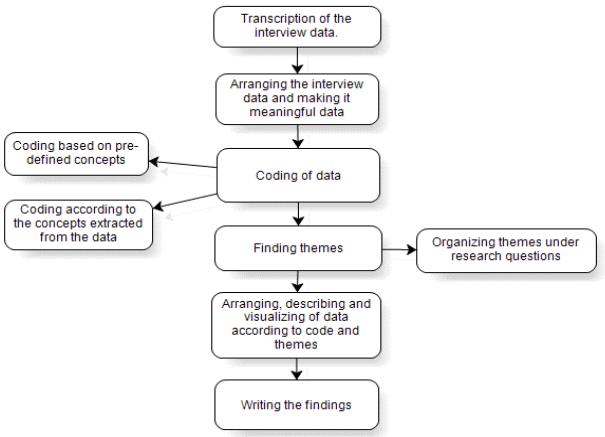

Figure 2. The steps followed in the content analysis
Şekil 2. *İçerik analizinde izlenen adımlar*

3.2. An overview of the decision making process of farmers in the research area

The production patterns of the farmers were shaped according to their habits. However, the production decisions of farmers were made through a quite complicated, dynamic and challenging process. Farmers have to take into account all possible risks that they may encounter before planting the seeds, and must act accordingly. Every production's dynamic is different. Even if experience, habit and desire to make money seem to be at the forefront, motivation and the psychological state drive farmers to think for their decisions. Especially for farmers who produce vegetables, internal drift, in other words, the desire to act according to their feelings can be quite high. Research conducted by behavioral economists also confirms this conclusion. According to behavioral economists, the economic behavior of people, psychological and sociological factors should be included in economic data because people can reject material inferences due to various psychological reasons such as uncertainty, risk, fear of losing, and desire to gain reputation (Can, 2012). The most important determinants of the decision-making process for farmers in the research area were brokers, input dealers, and other farmers. They were very influential in the thinking phase. Farmers mainly advised and obtained information from these people. They considered the demand for products from which pesticides are produced, the number of seed/seedling orders from seed and seedling dealers, and the products and prices made by the brokers in Bafra plain and other provinces. In planning the production, farmers generally decide the pattern for the next two years. This is because of crop rotation requirements.

Other factors were the duration for renting contract and the landowners possible interferance with the product pattern. Farmers have been following a different product that has not been in production patterns for years. In the first year of growing a different product, if a farmer gets less than he expected then he replaces it, and may abandon their previous decision. There were many varieties of vegetable products, including early and late species. Some farmers keep records and follow the previous years' information about what kind of vegetables on which periods and which varieties of species grown according to this situation. The interviewed farmers did not take into account the risks such as weather conditions because they had already accepted due to their belief (i.e. fatalism by Rogers (1995). When the farmers decided, they did not consider the habits or prices of the previous year. Particularly, they consider which crops, how much area other farmers will produce in the following year and the decision on how much of the chosen products they decided to grow rather than how they choose the products. The behavioral characteristics and the size of the enterprises, affect the decision-making strategies. As a result of the analysis between the decision-making styles of the farmers and the size of the enterprises, this relation is confirmed statistically significant (Abaci, 2018). Small-scale agricultural enterprises decided to grow the products sold at a high price in the previous period to earn a high income, in other words, they considered about the prices of the previous year. This is confirmed by Cobb-web theorem. However, farmers who had large-scale enterprises generally apply an inverse strategy compared to small enterprises. They think that a product with a higher price in the previous year will be produced by other farmers and will suffer from production surplus, therefore they either reduce production of the product or give up the product altogether. Particularly, they consider which crops, how much area other farmers will produce in the following year. At the same time, the decision on how much of the chosen products they decided to grow, rather than how they choose the products.

3.3. Stages of the decision-making process of farmers

In this section, farmer decision making processes was modeled and the affacting factors on decision making were presented. Interview data were coded for the modeling and the decision-making process. Codes are grouped into main categories. Figure 3 shows the process of decision-making in Bafra district consists of two stages: (1) Thinking Stage and (2) Action Stage. Farmers assessed production patterns for the following year while evaluating their conformity to the products they intended to produce in general. This happens through thinking, which is a result of the mental activities. Therefore, the first stage is the "decision-thinking stage." If farmers think that they can overcome the constraints, they start to prepare their minds into the next stage. This part of the process is expressed as the stage in which the farmers implement their product choices.

The stage in which farmers apply their product pattern decisions is the stage in which they prepare the soil for the product of their choice and make seedling/seed orders. The farmers then plant the crops and receive the results of their decisions at harvest time. Therefore, the most important decision stage is the thinking stage. In this stage, farmers make all their calculations about the products they will produce and make their decisions accordingly. After making their decisions, they can not undo them.

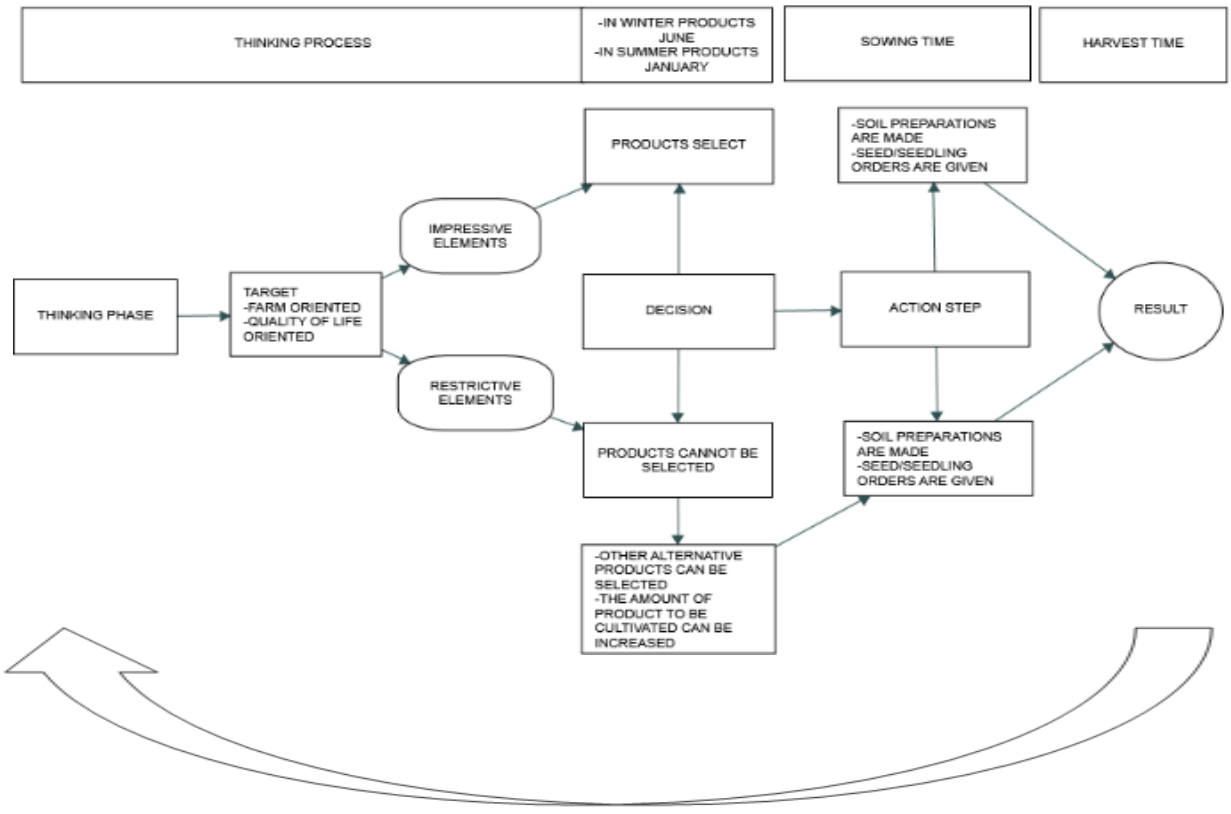

Figure 3. Farmers' decision-making process (Abaci, 2018)
Şekil 3. *Çiftçilerin karar verme süreci*

3.4. Decision thinking stage

In the decision thinking stage, decision-makers evaluate what decisions they want to implement and perform production planning. They consider various elements in the evaluation process. Some of these elements are encouraging farmers while others restrict. For this reason, these elements are described in detail in order to understand what the farmers are experiencing during the first stage of the decision-making process. It should also be noted that the findings obtained in this section may differ depending on the research area. For this study, the research area is a plain, and the farmers who perform their production in this plain have not mentioned certain factors such as irrigation availability and organizational infrastructure because they do not have problems with these factors. Therefore, these factors are not included in the constraints of the study. It should be stated that the farmers in the research area start to make research about the products that they will produce in the

following season from the production period to the end of the harvest. During the interviews, the farmers were asked how they chose the products they included in the product designs, and the factors that motivate and restrict farmers are categorized according to this data (Table 1).

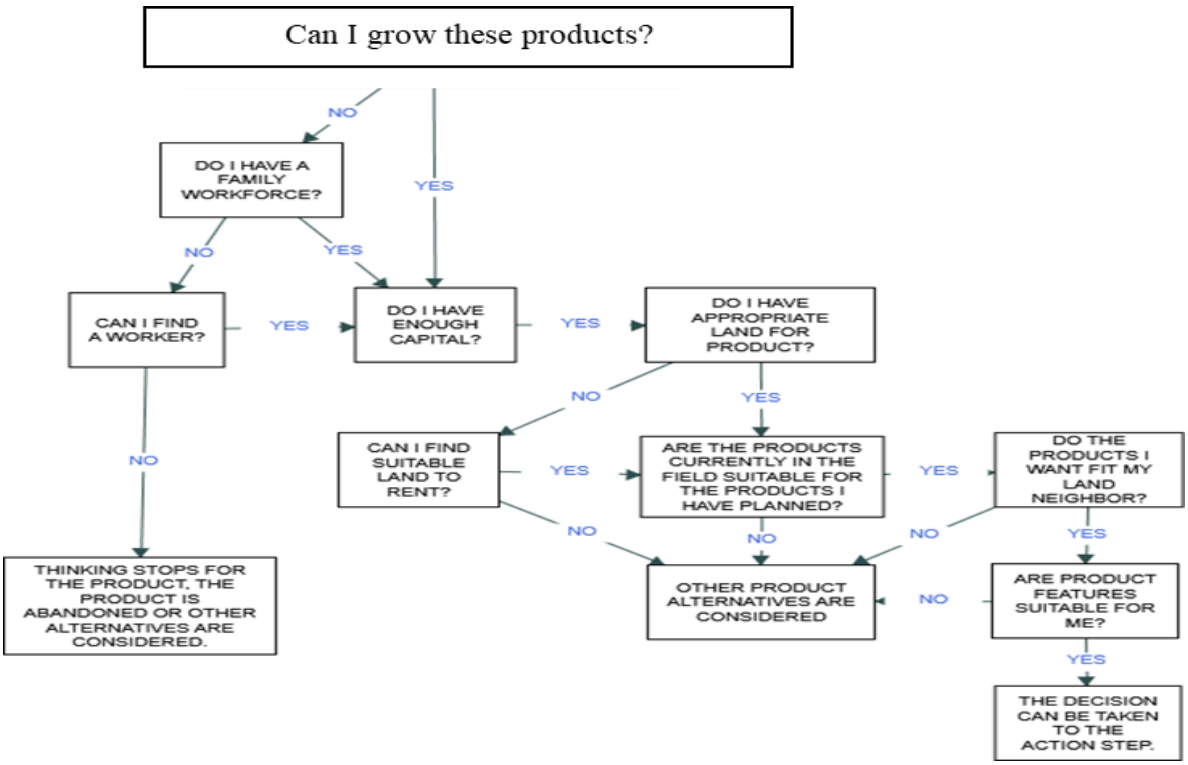

Figure 4. The decision thinking process of farmers (Abaci, 2018)
Şekil 4. *Kararı düşünme süreci*

Table 1. Factors affecting farmers in the thinking phase
Çizelge 1. *Çiftçileri düşünme aşamasında etkileyen faktörler*

Encouraging elements (+)	**Restrictive elements (-)**
Agricultural experience	**Debts**
Source presence	**Diseases and pests**
Land, labour, capital, managerial skills	
Positive trends in product prices	**Costs of products**
Product features	**Weather conditions**
Resistance to diseases	Climate change
Varieties with short harvest times	
Ease of harvesting,	
Products that require less labour and workforce	
Ease of marketing	
Products giving two crops in one year	
Social environment	**Failed experiences**
Final decision-makers (brokers, dealers selling pesticides, seedlings and seed sellers, other farmers)	
The desire to produce and love for the village	**Negative perception against the product** (Intuitions)
Customer requests	**Lease period of land.**
The desire to make money	**Neighbourliness**
	The lack of a fixed broker.

3.6. The decision implementation stage

If there is no restrictions, the decision-makers will arrange the planting date. During this time, they prepare the soil and make seedling/seed orders. The farmers who have limited cash have difficulty in orders from dealers. The farmers who order late will have to sow the field late. If such constraints occur, farmers can sometimes abandon their decisions to produce certain products and may prefer to increase the area for other products. In this way, the decision-making process can continue after the decision stage. If farmers considered to be negatively affected by the products, they can decide not to wait for harvest time. Instead, they try to grow a suitable vegetable variety as a second crop. At the same time, farmers continue the

process by evaluating the decision they made at the time of planting and harvesting.

4. Conclusion

Since some farmers see only vegetable production as a risk in their business, they carry out another income-generating activity alongside vegetables. Variability in vegetable prices, potential plant disease risks, the lack of trust to input dealers, worker dependency and expenses, conservation, and marketing problems are critical very challenging factors for farmers who earn their livelihood only from vegetable production.

In Bafra district, the decision-making process of vegetable producers consists of the process of thinking and applying stages. The product pattern decision is taken at the end of the thinking process, when farmers consider the factors that are encouraging or restrictive. If the encouraging elements are stronger, farmers consider the other features necessary for the product. At the end of the thinking process, the final decision is made. Afterward, the farmers implement the decision. Finally, the farmer obtains the results of the decision at the time of harvest.

In the decision-making process of farmers, actors (brokers, and input sellers, are of great importance and considered as determinants of farmers' decisions. Therefore, the correct orientation by actors will contribute to the diversification and quality of production. Informing these actors will help farmers to obtain the most accurate information before the decision stage, and enable the extension staff to apply the right strategy.

In this study, it is more important to understand how farmers decide on the land size of the products, rather than how they decide on their production patterns. To manage their land as best as possible, farmers should be able to distribute the products they decide to produce and to pay attention to practices such as crop rotation (alternative). Therefore, agricultural advisers should inform farmers about this issue.

This study found that the vegetable farmers in the research area do not act according to the concept of perfect rationality propounded by classic economic theories in their decision-making process, rather they act according to their interests and often make behavioral decisions according to their feelings.

In addition, this study implies that the decisions of farmers cannot be defined as right and wrong. This situation can only be determined when individuals begin to get results after implementing their decisions. Thus, it is not pragmatic to determine the factors that affect the decisions of farmers. Therefore, decision support systems should be developed to enable farmers to make their decisions most appropriately.

The encouraging and restrictive factors deciding on the production models have a potential impact on the improvement of consultancy services. For this reason, it can be ensured that the decision support systems with these variables are developed and presented to the use of farmers/consultants so that farmers can decide on the optimum production pattern. The limitation in establishing this support system is the difficulty in determining psychological variables. When deciding on a subject, variables such as emotional state of people, influence of the environment in which they grow and live, decision-making styles, and personality traits (attitudes, values they have, etc.) are difficult to identify but extremely important. However, it is thought that this difficulty will be overcome with the expert team of researchers in psychology and sociology.

Conflict of Interest

The authors declare that they have no conflict of interests.

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The study was approved by the Social Sciences Ethics Committee of Ondokuz Mayıs University (Decision No: OMU KAEK 2015/340)