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Determination of a Market-Oriented Optimum Product Component in the Agricultural Sector by Conjoint Analysis: Potato Crop Scenario

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ABSTRACT

Determination of the optimum product components that would provide all actors is essential for agricultural products. Examining the most desired product characteristics for potatoes within the domestic market to contribute welfare and sustainability of a market-oriented agricultural production is of great importance for producers, intermediaries, and the community. In the present study, 3072 cross-sectional data acquired from consumers via face-to-face survey was used to determine optimum potato characteristics utilizing a multivariate Conjoint Analysis. It was found that potato has been consumed in fresh form in the domestic market. The factors affecting purchasing decision appeared to be 22.20% price, 20.22% sales point, 15.07% crust type, 22.13% crust color, and 13.23% view and package. The optimum product component scenario with a maximum utility value of 2.990 for the consumer at the community level was composed of the sales channels: local street market, price level: low (suitable), crust type: thin, crust color: yellow, view and product supply: 3 kg net, and scaling, and service: necessary. With the optimum product component set developed in the study, a market-oriented production model was determined for potatoes. Directing production within the determined scenario was considered a new way to assure sustainability of consumer and producer satisfaction and to solve market-related problems.

Keyowrds: Agricultural market, Consumer, Conjoint Analysis, Potato, Türkiye.

INTRODUCTION

Agriculture is the main sector with current innovations and improvements and is one of the most significant strategic industries in the global business world of the 21st century. In recent years, there are many problems for food security and food access, including increasing welfare in the most populated countries, lack of agricultural infrastructure investments, rising costs due to global warming, and occasions like the COVID-19 pandemic. Also, food supply sustainability and food security have become important for developed, developing, and underdeveloped countries. The rising global population causes hunger and famine in less developed countries, while people living in wealthy countries have obesity problems and face related diseases. It has been known that wealthy countries have more advantages than poor countries in accessing food products, and this is expected to be true for the future. Wealthy countries host 15% of the world's population, have population growth rates below 1%, whereas developing and underdeveloped countries host 85% of the world of population, and have a

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population growth rate between 2 and 3%. Also, 55% of developing countries are net importers of agricultural products resulting in a decreasing product supply and rising costs in a recognizable manner. In this context, self-sufficiency in agricultural production and sustainability has become a significant and privileged factor for all countries.

Potato is the most important product after grains and has a significant stance in the global food system (FAO, 2009). The volume of potato production is ranked 6th in the world, after sugar cane, corn, wheat, rice, and palm. It is also ranked 16th in terms of cultivation area. Potato is the main product as it is a single-year cultivar crop that produces high yield per unit area, has high nutritional value, adapts to different ecologies and grows easily, and has been produced and consumed widely all around the world (Arıoğlu, 2002).

Potato is a cultivated crop that is offered to especially low-income growers and consumers and protects these groups against the negative effects of changing food supply and demand. By the year 2009, the total amount of potato production was 325 million tonnes around the world (FAO, 2009). Also, potato is defined as the food of the future and 2008 was declared as the international potato year to raise awareness of the importance of potato for the world. In this context, developing sustainable growing systems to increase the welfare of producers and consumers is encouraged. Sustainable systems are necessary and beneficial and a focused market model should be encouraged in developing and underdeveloped countries for solving supply and demand problems. A focused market model has been considered essential to prevent losses in the supply chain and price-related problems for producers and excessive costs for consumers (FAO, 2009).

According to FAO data, 67.1% of potato is used in fresh form in the world, and Ruanda is the 1st ranked fresh consumer with 92.5%. Also, Denmark is in the last rank with 19.7%. Turkey is above the world average, with 88.5% of fresh potato usage ratio. Potato is used in the food industry with 2.5% share in the world (FAO, 2021). This ratio is higher in Denmark, the Netherlands, and Ireland. Of the potatoes produced, 10.6% is used as animal feed and 9.5% is lost within the supply chain. The demand of the feed industry in Turkey is 1.0% at most, and the loss rate is below the world average by 5.6% (FAO, 2021).

Due to the increasing population, projections and predictions about food security, potato is going to be the main food in the next 20 years. Here are four reasons: (a) It is a global food, (b) Can intervene and finish famine, (c) Has nutritional value, and d)Rising demand.

Potatoes can grow in low-yield soil and under bad climatic conditions.It can be grown faster than the other crops (FAO, 2009). Therefore, potato cultivation and processing industry may improve and develop in the near future. Therefore, increasing and improving potato crop types assuring healthy production and consumption, and innovation in processes will become more important (Keijbets, 2008).

Cultivation depends on a lot of parameters, such as crop type, product structure, natural conditions, the structure of manufacturers, and seasonal cost variations. Also, production and cost fluctuations in potato cultivation are observed frequently. These fluctuations occur in early, fresh, industrial, and seed potato types. Potato supply is affected by cost, replacement product cost of potato, cultivation technique and productivity, input price, and the number of potato growers. On the other hand, potato demand is affected by its own cost, the cost of the replacement product, advertisements and promotions, and increasing income. The most significant data is growers' cost. Total market demand and market margin are stable for potatoes, however, there may be some fluctuations in growers' cost and income. The main reason for this is the absence of planning for

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production of potatoes and market-oriented agricultural production.

According to studies linked to potato products, Lazarus and White (1984) indicated that potato cultivation is affected by environmental factors and rising crop rotation reduces both total pesticide use and variable costs. Accordingly, they offered potato–cauliflower rotation for the sustainability of potato production.

Loader (1997) assessed the fresh potato market system and relations within the market chain from Egypt to England. Moazzem and Fujita (2004) analyzed the economic relationships between farmers, traders, and cold storage owners that operate in potato production and market in Bangladesh. According to the study, it was set forward that tuber color and appearance are the most significant factors affecting consumer choice. Also, 96% of consumers assessed potatoes as a healthy food. Yue *et al*. (2008) evaluated factors affecting consumer behaviors regarding traditional and organic potatoes. It was determined that consumers find organic potatoes healthy and reliable. However, the lack of product types and low quality were the negative facts in their study. Bangalmış Kunt (2009) assessed fluctuations of seasonal costs in selected Turkish agricultural product markets utilizing the Cobweb approach. No effects were found of the current and previous year's price for onion, potato, and garlic cultivations. Greenway *et al*. (2010) examined effective factors in market demand for organic potatoes with econometric analysis. New England organic Yukon, russet, and red types of potato were used in the study. Accordingly, price elasticities were calculated as -0.60, 0.65, and 0.75, respectively. Elawady and Abdulkheir (2015) examined the improvements in Egyptian potato exports. The researchers determined that potato exports in 2010–2013 increased by 20% and potatoes constituted 14% of total exports. Also, the researchers assessed that there were three significant effective factors: foreign currency, population, and physical distance by the Gravity model. Janssens *et al*. (2013) examined potato cultivation in Kenya and determined that potato was the second most important crop after corn, and was grown in 128,000 ha. The main reason for the low yield was considered as lack of high-quality seeds. Bonabana-Wabbi *et al*. (2013) calculated the profitability and efficiency of potato and pineapple businesses in Uganda. Accordingly, income analysis and sthocastic frontier analysis for technical efficiency were used to measure the profitability of production. Rana *et al*. (2017) undertook a SWOT analysis for Indian potato cultivation. Reducing weak aspects and threats by using technology and rural development were focused on in the study. Rana and Anwer (2018) stated that India was in the second rank in potato production after China. The researchers made the calculation by utilizing the Malmquist Yield Index to explain rising cultivation in India. De Steur (2019) evaluated the acceptance of a genetically-modified potato and fungal disease-resistant cultivar called Bintje by growers in the Flanders region of Belgium. Accordingly, 54% of farmers found this cultivar of potato acceptable.

Making a holistic evaluation of the literature studies on the potato product, there were no studies found that directly overlapped with this current consumer research in terms of setup and scope. Therefore, it is important to contribute to the literature in the field with an innovative model approach at the level of potato production and consumer demand.

The present study aimed to reveal the optimum product components for potatoes in the prediction of the target market at the national level. With the study, how potato production and market should be carried out in terms of producer-trader-consumer welfare was set forward as the main question for the Turkey sample. Also, scientific methods adopted and the potential to direct potato production in the axis of the market-oriented product component that maximizes

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consumer benefit was considered as an application-oriented contribution.

MATERIALS AND METHODS

Primary data retrieved from consumers with a face-to-face survey in 3 districts and 8 cities in August–September 2020 was used in the present study. In agricultural economics, different sample sizes are used considering certain confidence limits variance values for different population sizes and tolerance levels. Especially, if there is not enough information about the population, the following sampling formula is considered to reach the maximum number of respondents representing the population. A similar approach was adopted in this study as well. If 50% of the consumer households residing in urban districts within the scope of the research area consume potatoes, there may be a margin of error of ±0.05, and these limits are 95% reliable. Therefore, the sufficient sample size for the study was determined to be 384 at each province level (Kurtuluş, 1998).

$$n = z^2[(p * q)/d^2] = 1.96^2[(0.50 * 0.50)/0.05^2] = 384$$

Where, z: 1.96 (96% confidence level with standard z-value), p: The proportion of the population with a particular characteristic based on prior knowledge or estimation of the subject, q= (1−p): The proportion of the mass that does not have the relevant characteristic, and d: Accepted error tolerance level. It was accepted as ±5% in this study.

According to the sampling method mentioned above, the number of consumer households with sufficient samples was calculated to be 3072 within the scope of 8 provinces (384×8) where the field study was carried out.

Conjoint Analysis Method was adopted in the present study. In case the market is handled as a process that starts before production, Conjoint Analysis was preferred to bring an approach to the application process with a sample model study in agricultural products. Introducing the market-oriented potato production model at the specified level based on cross-sectional data and its applicability at the national level is also important in terms of solving the market problems at the producer-intermediary and consumer levels. Conjoint Analysis is a technique used to detect the preferences of individuals for different combinations of measurable and unmeasurable characteristics. Joel (2002) defines Conjoint Analysis as a method of systematically evaluating and estimating decision-makers' limited number of choices. Conjoint Analysis is also a method used in the planning of new product-service concepts and in studies to increase the current level of success. The starting point of the analysis is based on the "Total Utility Theory". Total utility expresses the function of price and quality benefits of the product or activity (Ness, 2002).

Total Utility= f (Price Utility+Quality Utility)

In the partial benefit contribution model of the Conjoint Analysis, the partial benefits of each feature level related to the product are independent of each other, and the sum of the partial benefits of these feature levels creates the total benefit at the target audience level. The general evaluation of the consumer about the product or service and the contribution of each product or service feature level to the consumer preference is determined by the part-worths. The theoretical explanation of the additive part-worth model, which is widely used in Conjoint Analysis, is defined as follows (Ness, 2002):

$Pref_{ijkl} = a_i + b_j + c_k + d_l$

Where, $Pref_{ijkl}$= Consumer choice and total utility, ai: Partial benefit of product A at level I, bj: Partial utility of product B at level j, ck: Partial benefit of product C feature at k level, and d1: Partial utility of product D at level 1

The purpose of Conjoint Analysis is to determine the priorities and options that affect the outcome at the decision stage (Schweikl, 1985). The first step of the the

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analysis is the selection of the preference function, which will determine the effect of the factor characteristics that have an effect on the preferences of the people participating in the analysis on the decision. This function is the basis for determining the partial values of the factor characteristics that affect the preferences of the people participating in the analysis (Gutsche, 1995; Green and Srinivasan, 1990). The most used models are the ideal vector model, the ideal point model, and the partial benefit model (Gustafsson *et al*., 2003). As in all statistical studies, the first step of Conjoint Analysis is to determine which decision mechanism and purpose the research problem is targeted. At this stage, the point to be noted is that the research problem can be solved by defining the preferences between variable and variable levels.

Two different data collection techniques are used in the analysis. These are the full concept method and the paired comparison method. Because the full concept method is more advantageous, it is preferred in practice (Ness, 2002). In the present study, the full concept method was used to compile the data evaluated in the analysis setup. Accordingly, question cards containing the determining characteristics of the potato production and market and each feature level were prepared and presented to the consumer. Thus, the degree of participation of the final consumers in each alternative as a market unit, or the level of preference for each alternative, was determined. The consumer evaluation is based on giving a higher score to the most demanded product scenario, which is in line with the market expectation and a high level of satisfaction.

In the orthogonal design of the Conjoint Analysis used in the present study, factors and factor levels were created in the optimum product component setup of the market-oriented potato production model (Table 1). The factors were determined in the research model in a way to reveal the differences in consumer preference in the domestic market, product type, product color, product packaging, grading-scaling service, retail point of sale, and retail price. In the optimum potato product scenario, factor levels important in terms of market preference are given in Table 1.

Within the scope of Conjoint Analysis, 24 different product component scenarios in Orthogonal Design, which consists of factor and factor levels, were presented to consumers. Preferences were evaluated for the domestic market. In the consumer evaluation, each option scored as the lowest (not-chosen): 0, and the highest (most-preferred): 10 points.

RESULTS

The main purpose of agricultural market is to provide the producer with a high price for their product, average profitability at the intermediary level, and an affordable price level that is worth paying for. In terms of reaching this objective, the development and dissemination of the market-oriented production model in the agricultural sector will be beneficial in terms of solving the market problems in the field. It is important in terms of producer and consumer welfare that the products that are compatible with the demands, needs, expectations, and

Table 1. Factors and component set.

Color	White	Light yellow	Yellow	
Packaging	Bulk	3 Kg In Net	6 Kg In Net	
Variety	Thick crust	Thin crust	Not important	
Grading-Scaling service	Yes	No		
Retail point of sale	District market	Super-hypermarket	Market-neighbourhood	Greengrocer
Consumer sales price	Low	Medium	High	

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tendencies of society are placed on the market within the scope of agricultural products. The main purpose of the producers in the agricultural sector is profit maximization, and the consumers' purpose is utility maximization.

The product component setup that provides the highest benefit to the consumer was created in 22 different scenarios within the scope of product, price, and distribution strategies where marketing is carried out. In this context, multivariate Conjoint Analysis was adopted. The product presentation scenario included in the analysis was formed from 6 factors and 18 factor levels. In line with the priority criteria that became prominent in terms of consumer preference, the price level of potatoes, product characteristics (color, skin, grading, packaging), and the willingness of the market for sales points were questioned in the prediction of distribution strategy. The data obtained by face-to-face survey method with a total of 3072 consumers were analyzed within the scope of the project area.

According to the consumer market findings of the Conjoint Analysis, the importance of the price was 22.20% in potato production and marketing strategy. The importance of the sales point was 20.22%, the product variety was 15.07%, and the skin color was 22.13%. Finally, the product display packaging was found to be important and effective in terms of public preference at 13.23%. Accordingly, the price level, skin feature, and point of sale appeared as the main criteria determining consumer preference. In terms of factor levels, the suitability of the consumer price level in potato market, the neighborhood markets as a retail sales channel, the thin skin and yellow skin color in terms of product characteristics, and presentation of the product in net in graded format reflect the market's willingness for potatoes.

Considering the partial benefit values of the factors and factor levels selected in the optimum product component scenario were detected. At the distribution channel level, consumer benefit was 0.364 in neighborhood markets, -0.184 in super-hypermarkets, -0.104 in grocery stores, and -0.075 in greengrocers. When the price per kg of potato was 1.2, the consumer utility was 1.258. The partial benefit values were -0.431 and -0.827 for 0.090 and 0.135 $ per kg, respectively. Depending on the price increase, a decrease was observed in the consumer utility value and thus in the level of satisfaction. This result coincides with the importance and necessity of presenting agricultural products to consumers at affordable prices. However, the habit or willingness to purchase fresh fruit and vegetable products selectively, the inadequacy of marketing services, and the distrust of the seller are effective in the display of the products in question. In terms of solving this problem, it is important to fulfill the grading service in potato sales at the retail level. In this scenario, a consumer benefit of 0.150 is realized by dividing each of the products into groups in terms of the same quality characteristics (size-shape-color, etc.) (Table 2). The grading-scaling service in potatoes with the stated willingness is considered important and necessary in terms of reducing product loss at the retail sales stage. On the other hand, this service is considered important in increasing consumer satisfaction by selectively purchasing a product that does not match the health conditions and eliminating the problems of distrust in the seller.

Partial benefit values in terms of variety preference were determined to be 0.481 for thin-skinned potatoes and -0.285 for thick-skinned potatoes. Similarly, in terms of the color of the product, the yellow potato had a lower partial benefit value of 0.687, and the light yellow potato was preferred by the market with a 0.178 partial benefit value. As a result, in terms of utility maximization in consumer preferences, the producer's choice of product should be in line with the willingness of the market, not according to the price or income obtained in the previous season. In this definition, encouragement,

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Table 2. Results of Conjoint Analysis of the Internal Market.

Factors	Factor level	Partial utility	Degree of importance (%)
Retail sales venue	District market	0.364	20.223
	Super-hypermarket	-0.184	
	Market-neighborhood	-0.104	
	Greengrocer's	-0.075	
Price level	2 TL kg^{-1}	1.258	22.204
	4 TL kg-1	-0.431	
	6 TL kg^{-1}	-0.827	
Scaling	Scale exists	0.150	7.118
	Scale inexists	-0.150	
Variety	Thick-crust	-0.285	15.069
	Thin-crust	0.481	
	Not important	-0.196	
Packaging	Bulk	-0.090	13.258
	Net- 3 kg	0.050	
	Net- 5 kg	0.040	
Color	White	-0.865	22.129
	Light yellow	0.178	
	Yellow	0.687	
TOTAL			100.00
Correlation [a]			
		Value	Sig
Pearson's R		0.988	0.000
Kendall's tau		0.853	0.000

[a] Correlations between observed and estimated preferences

and expansion of production of thin-skinned-yellow potato varieties in the domestic market were suggested in terms of producer income and consumer welfare maximization (Table 2).

According to the results of the analysis, the optimum product component in terms of market satisfaction due to consumer utility maximization in Turkey refers to thin-skinned yellow potato packed at 3 kg net and scaled, which was priced 1.2 TL per kg (as of the date of the research). The optimum product component developed was realized in the market scenario (card) no. 22 with a total benefit value of 2.990. In this foresight, the development of the packaging at the retail sales stage, along with the grading of the fresh fruit and vegetable group products, especially in potato market service should be preferred. Also, the transition to the sale of products with an alternative weight in the net instead of the bulk display becomes important due to market demand. In terms of transporting the product, reducing losses, facilitating sales, protecting the product from external environmental conditions, and realizing healthy product presentation in the domestic market, potato packaging service becomes important. This is related to the current willingness of the consumer market, and its development will be suggested in terms of increasing consumer utility with the results obtained. The product component, where the consumer benefit is at the lowest level, was determined in scenario 3 with a benefit value of -1.420. Accordingly, consumers in the domestic market do not have the desire to buy the thick-crust potato variety. Considering the relationship between the potato variety and the thickness and color of the skin, it is not possible to achieve consumer satisfaction with a potato variety that is not produced in accordance with the market expectations.

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In terms of the price level, it was found that the high consumer prices or high price variations do not comply with consumer expectations. This is important in terms of showing consumer sensitivity to the prices of potato products, which are included in the basic agricultural product category and are consumed fresh at the household level. Therefore, in potato production at the producer level, the choice of variety, ease of production, genetic condition, resistance to diseases and pests, and seed price were considered important. Market guarantee and consumer benefit were considered beneficial in terms of producer price as well (Table 3).

DISCUSSION

The variables that affect the final consumer's decision to purchase potatoes in the domestic market in the optimum product component setup are the price level, the color of the product, retail sales point, skin/peel properties depending on the potato variety, packaging, and grading service. Selling potatoes at an affordable price level in terms of consumer benefit maximization requires the implementation of production planning throughout the country in a way that will ensure the potato supply and demand balance in the domestic market. Sensitivity to product color and peel thickness is related to product appeal and taste and aroma variables. The fact that the market demand is concentrated in the direction of yellow color and thin peel in potatoes requires the producer to choose the variety in this direction during the production process. Therefore, an approach in the form of production first, then, marketing indicates a production-oriented marketing approach and does not coincide with today's modern marketing approaches. Grievances at the producer and consumer level in a production orientation where the market is not taken into consideration would be regarded as a natural result. In the optimum product component, the high purchasing sensitivity shown to the peel/skin properties of the potato should be considered as another important criterion at the production decision stage. Potato varieties grown intensively in the domestic market include Melody, Madeleine, Jelly, Marabel, Agria, Florice, Arizona, and Lady Amarilla. These varieties constitute 81.37% of the potatoes grown in the research area. At the current level, the seeds of potato varieties produced in the domestic market are imported from countries including the Netherlands, Germany, France, and the USA, and the cost of seeds in potatoes is an important cost factor for the producers. The number of domestic varieties bred and registered has increased in recent years; however, it has not yet reached the desired level. The commercial production of the registered varieties is low and has not economically reached the desired market level. In this study, the product color and skin characteristics determined as the willingness of the market are related to the potato variety or species characteristics and require the commercial development of domestic potato varieties compatible with the domestic market demand and the expansion of their production.

Evaluating this issue in terms of distribution strategy, widespread or intensive distribution strategy is carried out in agricultural products. The fact that the product is directed to the buyers in the market from a large number of sales points to ensure product access to every point, where the consumer is located, is also due to the ordinary goods of these products at the social level. Potato, like other fresh vegetable products, is supplied to the consumer market from many retail outlets in line with the widespread distribution policy. Potatoes had been initially offered for sale by a traditional retailer in the Turkish domestic market through grocery stores, greengrocers, and street markets, whereas now have become a product that can be purchased in modern retailer formats such as grocery stores, supermarkets, and hypermarkets chains. Increases in sales via e-mail and the Internet during the pandemic process have also

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Table 3. Consumer Utility Values of Conjoint Analysis.

Card No	Retail sales venue	Partial utility	Price level	Partial utility	Scaling	Partial utility	Variety	Partial utility	Packaging	Partial utility	Colour	Partial utility	Total utility
22	District Market	0.364	2 TL kg^{-1}	1.258	Scale exists	0.15	Thin-crust	0.481	Net - 3 kg	0.05	Yellow	0.687	2.99
19	District Market	0.364	2 TL kg^{-1}	1.258	Scale inexists	-0.15	Thin-crust	0.481	Bulk	-0.09	Light Yellow	0.178	2.04
10	Super-Hypermarket	-0.184	2 TL kg^{-1}	1.258	Scale exists	0.15	Thin-crust	0.481	Net - 5 kg	0.04	Light Yellow	0.178	1.92
24	Greengrocer's	-0.075	2 TL kg^{-1}	1.258	Scale exists	0.15	Not important	-0.196	Net - 3 kg	0.05	Yellow	0.687	1.87
11	Market - neighborhood	-0.104	2 TL kg^{-1}	1.258	Scale exists	0.15	Thin-crust	0.481	Bulk	-0.09	Light Yellow	0.178	1.87
14	District Market	0.364	2 TL kg^{-1}	1.258	Scale exists	0.15	Thick-crust	-0.285	Net - 3 kg	0.05	Light Yellow	0.178	1.72
1	Greengrocer's	-0.075	2 TL kg^{-1}	1.258	Scale inexists	-0.15	Thick-crust	-0.87	Net - 5 kg	0.00	White	0.00	0.17
23	District Market	0.364	4 TL kg^{-1}	-0.431	Scale inexists	-0.15	Thin-crust	0.481	Net - 5 kg	0.04	Yellow	0.687	0.99
5	District Market	0.364	2 TL kg^{-1}	1.258	Scale exists	0.15	Thick-crust	-0.285	Bulk	-0.09	White	-0.865	0.53
4	Market - neighborhood	-0.104	2 TL kg^{-1}	1.258	Scale inexists	-0.15	Thick-crust	-0.285	Net - 3 kg	0.05	White	-0.865	-0.10
17	Super-hypermarket	-0.184	2 TL kg^{-1}	1.258	Scale inexists	-0.15	Not important	-0.196	Bulk	-0.09	White	-0.865	-0.23
7	District market	0.364	4 TL kg^{-1}	-0.431	Scale inexists	-0.15	Thick-crust	-0.285	Net - 3 kg	0.05	Light Yellow	0.178	-0.27
18	Market - neighborhood	-0.104	4 TL kg^{-1}	-0.431	Scale exists	0.15	Not important	-0.196	Net - 5 kg	0.04	Light Yellow	0.178	-0.36
21	District market	0.364	4 TL kg^{-1}	-0.431	Scale exists	0.15	Thin-crust	0.481	Bulk	-0.09	White	-0.865	-0.39
16	Super-hypermarket	-0.184	4 TL kg^{-1}	-0.431	Scale inexists	-0.15	Thick-crust	-0.285	Bulk	-0.09	Yellow	0.687	-0.45
2	Market - neighborhood	-0.104	6 TL kg^{-1}	-0.827	Scale exists	0.15	Thick-crust	-0.285	Bulk	-0.09	Yellow	0.687	-0.47
20	Greengrocer's	-0.075	6 TL kg^{-1}	-0.827	Scale inexists	-0.15	Thin-crust	0.481	Bulk	-0.09	Light Yellow	0.178	-0.48
25	Super-hypermarket	-0.184	4 TL kg^{-1}	-0.431	Scale exists	0.15	Thick-crust	-0.285	Net - 3 kg	0.05	Light Yellow	0.178	-0.52
9	Greengrocer's	-0.075	4 TL kg^{-1}	-0.431	Scale exists	0.15	Thick-crust	-0.285	Bulk	-0.09	Light Yellow	0.178	-0.55
6	District market	0.364	6 TL kg^{-1}	-0.827	Scale inexists	-0.15	Not important	-0.196	Net - 3 kg	0.05	Light Yellow	0.178	-0.58
12	Greengrocer's	-0.075	4 TL kg^{-1}	-0.431	Scale exists	0.15	Thin-crust	0.481	Net - 3 kg	0.05	White	-0.865	-0.69
15	Market - neighborhood	-0.104	4 TL kg^{-1}	-0.431	Scale inexists	-0.15	Thin-crust	0.481	Net - 3 kg	0.05	White	-0.865	-1.02
13	District market	0.364	4 TL kg^{-1}	-0.431	Scale exists	0.15	Not important	-0.196	Bulk	-0.09	White	-0.865	-1.07
8	Super-hypermarket	-0.184	6 TL kg^{-1}	-0.827	Scale exists	0.15	Thin-crust	0.481	Net - 3 kg	0.05	White	-0.865	-1.20
3	District market	0.364	6 TL kg^{-1}	-0.827	Scale exists	0.15	Thick-crust	-0.285	Net - 5 kg	0.04	White	-0.865	-1.42

come to the fore in agricultural products, especially potatoes.

There is a strong relationship between sale location preference and the demographic characteristics of the consumer. According to income and lifestyles, the same product, concept, and brand are supplied from different sales points. In terms of consumer, benefit maximization in the direction of the sales points' preference for potatoes, local markets are prominent. Therefore, as the sales point in the distribution channel of the potato product, the highest social benefit in the domestic market are the local markets. This result reveals the differences in consumer benefit expectations of the sales points used in market access of agricultural products. In terms of sales points, the highest benefit value among the alternative retail points of the consumer in the domestic market is in the local markets. This result indicates the consumer perception of product freshness and price appropriateness in the local markets. Sensitivity to packaging and grading service in the retail sale of potato products reflects another willingness of the market in terms of consumer benefit maximization. In general, in developing countries, fresh fruit and vegetable products are offered for sale in bulk form at retail outlets. This is mostly true for potato sales and brings the consumers' needs and habits to buy the product by choosing the product among the bulk. Bulk sales and selective purchasing methods, which do not comply with health and hygiene conditions, are evaluated as a result of inadequacy and malfunctions in marketing services, which also cause product losses at the retail sales stage. Benefits of the packaging function include protecting the product from external conditions, making the loading and unloading operations easier and faster, extending the retail sale period with the packaging material suitable for the product, and a healthy product perception emerges. The necessity of grading, standardization, and quality control services, which is on the agenda within the scope of auxiliary marketing services of agricultural products, is suggested in the example of potato products with the results of the present study. Although the features used in the grading of agricultural products vary depending on the quality of the product, it is important to perform the grading process at the level of intermediaries in the market channel with a percent tolerance value according to the size criterion in terms of meeting the needs and expectations of the consumer market. In a holistic assessment, the "retail point in distribution strategy" for the potato product of the product component providing utility maximization in the consumer market corresponds to the followings:

- Neighborhood market,
- Price setting in price strategy: suitability (cheapness),
- Grading service in product strategy: required,
- Packaging: 3 kg in a mesh bag,
- Product color: yellow,
- Product type: Thin-skinned and essentially constitutes the answer to the question of how to direct the potato production,
- Distribution process in the country in the foresight of marketing management.

Today, development of agricultural production in line with the domestic and foreign target market is necessary for terms of supply-demand harmony and increasing producer-consumer welfare. The optimum product component obtained in the present study is valid for the final consumer market target, where potatoes are mostly consumed fresh in the domestic market. In future studies to be carried out in the field, it may be suggested that the product or service component that provides the highest benefit and satisfaction to the buyer in the industrial market or fast food, cafe, and restaurant businesses, where the product is processed, or in the foreign market target, should be investigated at the level of marketing chain. Planning the activity in the direction of the product or service component that provides the highest benefit to the buyer is important

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in terms of achieving the profit maximization goal of the producers or sellers in the market environment where competition is increasing.

CONCLUSIONS

Ensuring resource use efficiency in production, distribution, and consumption stages, reducing volume and value losses in the product, and increasing producer and consumer satisfaction at the social and sectoral level require the direction of the production and market activities in the agricultural sector in line with the demands and needs of the target market. Agricultural products are the main strategic products that have no substitute for human nutrition and health. In the pandemic process in the world, self-sufficiency in agricultural products and access to these products has become a priority in every country. Among agricultural products, potato is the main nutritional product consumed fresh as home meals. Differences in time, quantity, variety, price, and supply channel levels become significant in potato demand in both industrial and consumer markets. Meeting the potato supply in accordance with the demands and expectations of the market, in a specific target market focus, has become a necessary and valid business approach in terms of both the sustainability of production and increasing the benefits of producers and consumers. The present study was carried out in this manner and the optimum product component that maximizes consumer benefit in the target of the Turkish domestic market and the final consumer market sample is explained for potatoes within the context of agricultural products. The product component obtained here refers to how potato production and market activity at the national level should be directed in terms of sustainability.

According to the American Marketing Association, marketing is defined as the process of planning and executing the creation, pricing, distribution, and sales efforts of products, services, and ideas to bring about change in accordance with the goals of individuals and organizations. In another approach, marketing is defined as an organizational function and set of processes to create, communicate, and deliver value for customers and to manage customer relationships in a way that benefits the organization and its stakeholders (Gundlach, 2006). In agricultural products, in underdeveloped and developing countries, repetitions in the processing, handover and transportation processes bring along high market margins, without providing any added value to the product. In this case, grievances at the producer and consumer level become prominent. At a level where marketing is basically oriented within the scope of product, price, distribution and promotion strategies, product price expresses one of the main variables affecting the demand in agricultural products in terms of consumer preference and satisfaction. Also, product quality, distribution, sales point and environment, promotion activities at the level of stakeholders in the market chain for social information purposes (mass advertising, public service announcements, sales promotion efforts, etc.) are effective in consumers' preference. In the present study, in line with the current modern marketing understanding, the market-oriented optimal product component combination was demonstrated with the example of potato product among the agricultural products. In this study evaluating the price and non-price variables together in the optimum product composition setup determined. Consumer expectation for marketing services in potato product emerges as medium level. Similarly, the price acceptance level of the consumer is determined as medium level. This result shows the consumer's sensitivity to price in the purchase process. This result is consistent with the general expectations. In the product expectation at the lowest price level, it was observed that non-price variables were not important in terms of consumer preference. Analyzed at the level of market segments, a result in this direction

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is considered normal, especially for the consumer group, which has a high price sensitivity in purchasing.

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تعیین اجزای محصول بهینه بازار-محور در بخش کشاورزی با روش تجزیه و تحلیل مشترک: سناریوی محصول سیب زمینی

م. گوکسل آکپینار، م. گول، ی. تاسیوغلو، ب. کارلی، ب. کاداکوغلو، ب. سیکتی سیریکچی، م. آکار، و ه. یلماز

چکیده

برای محصولات کشاورزی، تعیین مولفه های محصول بهینه (Optimum product components) که پاسخگوی همه افراد ذینفع باشد ضروری است. در مورد سیب‌زمینی، برای تولیدکنندگان، واسطه ها و جامعه در بازار داخلی، و کمک به رفاه و پایداری تولید کشاورزی بازار-محور، بررسی مطلوب ترین ویژگی‌های محصول از اهمیت بالایی برخوردار است. در این پژوهش، ۳۰۷۲ داده مقطعی به دست آمده از مصرف کنندگان از طریق نظرسنجی چهره به چهره برای تعیین ویژگی های بهینه سیب زمینی با استفاده از تجزیه و تحلیل ترکیبی (Conjoint Analysis) چند متغیره استفاده شد و مشخص شد که در بازار داخلی سیب زمینی به صورت تازه مصرف می‌شود. به نظر می رسد عوامل موثر بر تصمیم خرید شامل ۲۲.۲۰ % قیمت، ۲۰.۲۲ % محل فروش، ۱۵.۰۷% نوع پوسته، ۲۲.۱۳% رنگ پوست و ۱۳.۲۳% شکل و بسته بندی باشد. سناریوی اجزای محصول بهینه با حداکثر ارزش مطلوبیت ۲.۹۹۰ برای مصرف کننده در سطح جامعه از جنبه‌های مختلف فروش تشکیل شده است که شامل: بازار خیابانی یا محلی و سطح قیمت: پایین (مناسب)، نوع پوسته: نازک، رنگ پوسته: زرد، شکل و عرضه محصول: ۳ کیلوگرم خالص، و جرم گیری (Scaling) و سرویس: لازم. با تعیین مجموعه اجزای محصول بهینه در این پژوهش، یک مدل تولید بازار-محور برای سیب‌زمینی

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تعیین شد.(درنتیجه) به عنوان راهی جدید برای تضمین پایداری رضایت مصرف کننده و تولید کننده و حل مشکلات مرتبط با بازار، هدایت کردن تولید در سناریوی تعیین شده در نظر گرفته شد.

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