

Determination of Factors Affecting Potato Consumption Preferences Behaviors of Consumers by Analytic Hierarchy Process: The Case of Erzurum Province

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ABSTRACT: The study was conducted in Erzurum province to determine the factors that affect consumers' preferences in potato consumption. For this purpose, 281 consumers were interviewed in 2017 and Analytical Hierarchy Method was used in the analysis of obtained data. According to the results, consumers consumed an average of 10.42 kg potato and spent 10.46 TL per month. Consumers pay more attention to the taste while buying potatoes, followed by palate tastes, color and price. While the consumers in the research region are buying potatoes, they firstly place importance on criteria of "Hasankale", then "Ahlat" and "Nevşehir" respectively. Potato producers and the institutions and organizations that are active in the sector should make production considering the taste, palate taste, habit and color choices, which affect the purchasing preferences of potatoes, resulting in an increase in producers' income and in the utility level of consumers.

Keywords: Potato, Consumption, Proportional sampling, Analytic hierarchy process

Tüketicilerin Patates Tüketim Tercih ve Davranışlarını Etkileyen Faktörlerin Analitik Hiyerarşi Süreci İle Tespiti: Erzurum İli Örneği

ÖZ: Çalışma tüketicilerin patates tüketim tercihlerinde etkili olan faktörlerin belirlenmesi amacıyla Erzurum ilinde yürütülmüştür. Bu amaçla 2017 yılında 281 tüketici ile anket yapılmış ve elde edilen verilerin analizinde Analitik Hiyerarşi yöntemi kullanılmıştır. Analiz sonuçlarına göre tüketiciler ayda ortalama 10.42 kg/ay patates tüketmekte ve bunun için ortalama 10.46 TL/ay harcama yapmaktadırlar. Tüketiciler patates satın alırken en fazla tadına önem verirken bunu sırasıyla damak tadı, alışkanlık, renk ve fiyat seçenekleri izlemektedir. Araştırma yöresinde tüketiciler patates satın alırken, birinci sırada "Hasankale" daha sonra sırasıyla "Ahlat" ve "Nevşehir" kriterine önem vermektedirler. Patates üreticileri ve sektörde faaliyet gösteren kurum ve kuruluşların patates satın alma tercihlerini etkileyen tat, damak tadı, alışkanlık ve renk seçeneklerini dikkate alarak üretim yapmaları hem kendi gelirlerini artıracak hem de tüketicilerin fayda düzeyini yükseltecektir.

Anahtar kelimeler: Patates, Tüketim, Oransal örnekleme, Analitik hiyerarşi süreci

INTRODUCTION

It has great importance to consume vegetable and animal origin nutrients, by consisting of carbohydrate, fat, protein, vitamins and minerals on a daily basis in a balanced manner, to get the energy that the individual needs and to maintain a healthy life (İkikat Tümer et al., 2017). Potato is one of the main nutrients to be consumed in order to avoid hunger and malnutrition in the growing world population (Sahin, 2003). It has high starch content and high glycemic index (Atkinson et al., 2008).

Potato, which has an important place in human nutrition, contains high quality amino acids with high protein content (Gibson and Kurilich, 2013) in terms of building proteins that people need as a source of energy (Ahokaset et al. 2014). Moreover, 100 g of potatoes meets a minimum of 7% of daily protein needed by a normal person, 10% of iron, 20-50% of vitamin C, 10% of vitamin B1 and 3% of energy (Arioğlu, 2002). Potato, which is equivalent to Turkey's wheat as the basic food ingredient, is the third most important product after wheat and rice in the world. Potato, which is one-year cultivated plant,

also produces more products on a smaller scale than many products (FAO, 2008). With the development of the food industry, it is used as an important raw material in the production of many products such as starch, chips and ready-to-eat foods (Onaran et al., 2010). Food and Agriculture Organization of the United Nations (FAO) has announced the year of 2008 as "World Potato Year" with the slogan "Secret treasure" and many projects have been implemented to disseminate potato farming in underdeveloped countries (FAO, 2008; Çetiner, 2017). According to FAO data for the year 2014, 381.7 million tons of potatoes are produced in the world and China comes first with 95.5 million tons of potatoes, followed by India, Russia, Ukraine and the USA, respectively. Potatoes are seen as food security of rapidly growing populations in different parts of the world. Potato consumption varies according to countries' eating habits and socio-economic structures. For this reason, in recent years, potato has become an important product on which both production and consumption habits studies are conducted. Potato consumption

habits and analysis of quality of diet among adults and children (Gibson and Francis, 2015; Gibson and Kurilich, 2013; Cook et al., 2000; Abong et al., 2010; Ajmairand Akhtar, 2012; Rodriguez et al., 2012; Dukeshire et al., 2016; Teweldemedhin and Mulonda, 2016), potato products consumer preference and payment willingness (Jonathan and Huffman, 2017), are among the studies about potatoes. Leksrisompong et al., (2012) found that hedonic variables such as color, texture, taste price, etc. having significant influence in determining the consumer's preference for potato consumption. Ribeiro et al. (2016) listed the factors affecting consumer preferences (shape, color, texture, quality, etc.) on French potato varieties. Srivastava and Tiwari (2014) evaluated the consumer preference on Lay's potato chips and factors affecting brand preference of the consumers. In Turkey, there are studies on potato production, profitability and exports (Engindeniz and Karakus, 2008; Karsan and Gül, 2017) and consumer consumption behavior of potatoes (Karatas et al. 2017). However, there have not been enough studies about the consumption of potatoes and its products, which is an important food source in Turkey.

In recent years, fluctuations in prices of animal-derived products have forced consumers to buy plant-derived proteins. The objectives of this study is to determine the factors which are effective on consumer attitude and behaviors of potato purchasing by Analytical Hierarchy Process Method.

MATERIAL AND METHOD

The study was conducted in 2017 in the province and central districts of Erzurum. A face-to-face interview was conducted with households that consumed potatoes. The number of consumers to be surveyed was determined by using the "Proportional Sampling" method.

$$n = \frac{Np(1 - p)}{(N - 1)\sigma_{px}^2 + p(1 - p)}$$

In the formula; n: Sample volume, N: Population, σ^2p : Variance of the ratio, p: Ratio of the number of consumers consuming potatoes to the main mass. According to the number of samples (90% confidence interval and 5% deviation), 281 people were identified.

A Simple Pairwise Comparison Method (Torgeson, 1958) was developed based on the comparative basis of the individuals between the paired objectives, resulting in Numerical Size Estimation, Fuzzy Pairwise Comparison and Analytical Hierarchy Process. From these methods, the Analytical Hierarchy Process (AHP) has the ultimate aim at the top. There are criteria for the access to the object under this ultimate aim. Under these criteria, the decision tree, in which the alternatives / options exist, is created. The AHP model uses the AHP assessment scale (Equal preference: 1, even with low preference: 2, low preference: 3 ... absolute preference: 9) when choosing between the criteria, alternatives / options and alternatives / options according to the criterion. "Hasankale", "Ahlat" and "Nevsehir" varieties were presented as criteria for consumers to determine the tendency of consumers to consume potatoes and to determine the type of potatoes they wanted to consume. "Price," "Taste", "Habit", "Color" and "Taste" alternatives are offered to determine the weights of variables that affect consumers' consumption of potatoes under these criteria (Figure 1).

PAN 4 statistical package program was used in the analysis of the data obtained in the study by AHP method.

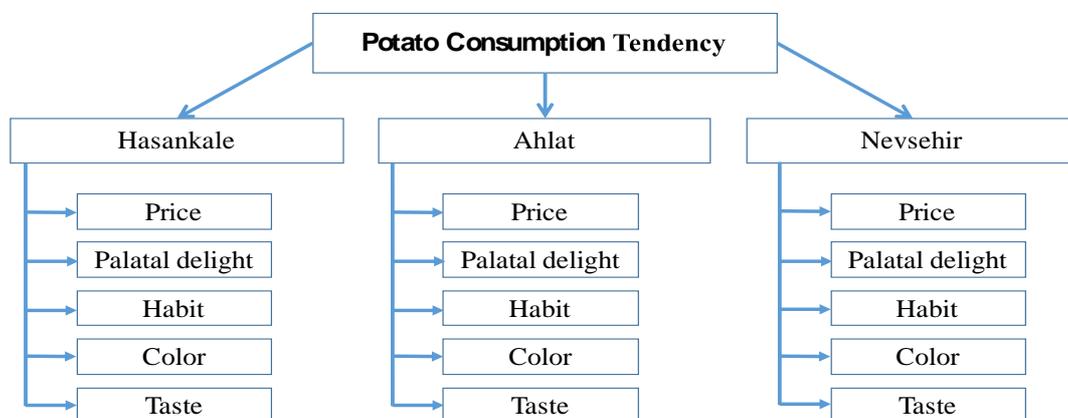


Figure 1. Factors affecting consumers' tendency to potato consumption.

RESULTS AND DISCUSSION

The average age of consumers participating in the survey is 39.23 and the household size is 4.43. However, monthly average income of the consumers is 4171.35 TL, average food expenditures is 927.15 TL and the share of food expenditures in total income

is 22.23%. According to the results of the analysis, daily consumption of potato per capita was calculated as 78.40 g. (Table 1). Potato consumption per capita in the UK is 85-90 g / day (Gibson and Kurilich, 2013; Gibson and Francis, 2015) and 52.21 g/ day in the US (Lacy and Huffman, 2015).

Table 1. Descriptive statistics

	Min.	Max.	Mean	Std. Dev.
Age	19	76	39.23	10.69
Number of individuals in the family	1	11	4.43	1.50
Income (TL / month)	400	20000	4171.35	2411.00
Food expenditure (TL / month)	80	4000	927.15	570.74
Monthly potato consumption (kg / month)	1	40	10.42	6.26
Monthly potato spending (TL / month)	1	42	10.46	6.47
Potato consumption per person (gr / day)	5	333	78.40	46.28

It was observed that 54.8% of the respondents were male, and 84.3% were married (Table 2). The share of respondents have less than eight years of education was 56.9%. On the other hand, 19.9% of the consumer families had diabetes and 6.8% of them had obese individuals (Table 2). The rate of diabetic-patients in the world is 5.68%, while in Turkey it is 7.5% (Anonym, 2017a). Food such as rice and

potatoes are not preferred for diabetics because rice and potatoes contain a large number of glycemic index (Memis and Sanlier, 2009; Anonymous, 2017b). Consumers use potatoes as boiling, frying, baking or cooking; according to the result potatoes were consumed as, fried (47.0%), cooking (37.0%) and boiling 16.4%).

Table 2. Socio-demographic characteristics of consumers

		Frequency	%			Frequency	%
Gender	Female	127	45.2	Being diabetes in the family	No	225	80.1
	Male	154	54.8		Yes	56	19.9
Marital status	Single	44	15.7	Being obese in the family	No	262	93.2
	Married	237	84.3		Yes	19	6.8
Education (years)	≤8	160	56.9	The using methods of potato intensively	Frying	208	74.1
	≥9	121	43.1		Boiled	73	25.9

Analysis of the potato varieties that the consumers want to consume by AHP method

Potatoes can be grown in all regions of Turkey. Potatoes are produced extensively in Central Anatolia, Black Sea, Aegean and North Eastern Anatolia regions. The average consumption of potatoes per capita is calculated as 54.4 kg / year in Turkey (Anonymous, 2017b). The weight of each of the options and criteria obtained with the help of the AHP method was calculated in accordance with the purpose of the study. According to the weight obtained from the AHP method, the options that are

effective in consumers' preference of the potato varieties are listed in Table 3 from large to small according to their weight. However, consumers are most interested in the taste while buying potatoes and then habits and colors. The price is the least important choice for the consumption of potatoes, by which a meal is often made and consumed easily every day. Nevertheless, the consumers give most importance to the taste rather than the price of the potatoes. The Friedman test is used to test whether there is a significant difference between distributions by comparing distributions of two or more related

variables. It was found that there is statistically significant difference between consumers' choices for potato consumption by the Friedman test ($P < 0.01$).

The Friedman test has shown that consumers prefer at least one of the choices they take while purchasing potatoes to others.

Table 3. Weight of choices that are effective in consumers' preferences for potato variety

	Min	Mean	Max	Std. Dev.
Taste	0.094	0.295	0.536	0.100
Palatal Delight	0.073	0.275	0.569	0.102
Habit	0.020	0.154	0.489	0.094
Color	0.015	0.141	0.517	0.108
Price	0.020	0.135	0.493	0.103

* Friedman test is statistically significant for $p < 0.01$.

According to the weight obtained from the AHP method, consumers' purchasing criteria for potatoes are listed in Table 4. When consumers buy potatoes in the research region, they place the "Hasankale" criterion in the first place; thereafter, "Ahlat" and "Nevsehir" come. The Friedman test, which was used

to determine whether at least one is preferred to another the criteria offered as a variety of potatoes they wanted to buy, was statistically significant ($P < 0.01$). With this test it was determined that consumers preferred at least one of the potato variety criteria they wanted to buy.

Table 4. Consumers' weights of potato purchasing criteria

	Minimum	Mean	Maximum	Std. Deviation
Hasankale	0.052	0.614	0.818	0.228
Ahlat	0.052	0.199	0.818	0.176
Nevsehir	0.052	0.187	0.818	0.205

* Friedman test is significant for $p < 0.01$.

All interviewed consumers gave most importance to taste of potato regardless of potato variety. The least attention is given to the price of potatoes produced in Hasankale while least importance is given the color of potatoes produced in

Ahlat and Nevsehir (Table 5). Consumers prefer the potatoes produced in the region where they live, which are suitable for their taste, regardless of the price.

Table 5. Weights of options according to consumer purchasing criteria of potatoes

	Price	Palatal Delight	Habit	Color	Taste
Hasankale	0.117	0.286	0.154	0.143	0.299
Ahlat	0.187	0.242	0.141	0.140	0.290
Nevsehir	0.194	0.244	0.136	0.132	0.293

CONCLUSIONS

The Analytical Hierarchy Process method has been used in the study to determine the factors that affect the consumers' attitude and behaviors on purchasing potato, which is the most important protein source of the people in Erzurum. According to the results of the analysis, while the consumers in the research region are buying potatoes, the "Hasankale" type criterion is the first place and then "Ahlat" and "Nevsehir" are the criteria. Consumers pay more attention to the taste when purchasing potatoes, then palatal delight, habit, color and price

options come in order of priorities. People who consume potato, whose food is often made and consumed comfortably at every meal of the day, give most importance to the taste of the potatoes rather than price of the product while purchasing the delicious product.

In the study, per capita consumption of potatoes in Turkey, it seems to be far behind the European countries. In order to increase the consumption of potato, which is a source of protein throughout the country, production should be directed by giving importance to the factors that are effective in consumption of potatoes. Ahlat and Nevsehir

potatoes are not preferred because of the different taste in the study area.

Potato producers, sellers and other companies that are operating in the sector may be advised to carry out the production taking into consideration factors that affect the preference for buying potatoes. In this respect both producers will gain and consumers will get more benefits from the products.

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