

Determination of Young Consumers' Nonalcoholic Beverage Consumption Choices Using Fuzzy Pairwise Comparison Method

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Abstract: The aim of this research is to identify the young consumers' different types of nonalcoholic beverage consumption habits in daily life. Young consumers' nonalcoholic beverage consumption habits were investigated by face to face surveys. The research was carried out with 267 consumers in Izmir, which is the third metropolis city of Turkey. Fuzzy Pairwise Comparison Method was used for determining the consumption choices of consumers. Also consumer perceptions of young people have been mapped in two dimensions using Multidimensional Scaling. According to the weights, soft drinks were the most preferred products. Black tea, coffee, fruit juice and herbal tea followed soft drinks. The least preferred product was milk. Also, there were differences in consumption patterns by gender. Soft drinks and fruit juice were found competing products as perceptual. Also coffee had a perceptual position between the tea and herbal tea products.

Keywords Consumer preferences, Consumption analysis, fuzzy pairwise comparison

Bulanık Eşli Karşılaştırma Yöntemiyle Gençlerin Alkolsüz İçecek Tüketim Tercihlerinin Belirlenmesi

Özet: Bu araştırmanın amacı, gençlerin gündelik yaşamında farklı alkolsüz içecek türlerini tüketme alışkanlıklarını belirlemektir. Araştırmada gençlerin alkolsüz içecek tüketim alışkanlıkları yüz yüze anket çalışmaları ile incelenmiştir. Türkiye'nin üçüncü metropol şehri olan İzmir'de yürütülen araştırma kapsamında 267 kişi ile görüşülmüştür. Katılımcıların tüketim tercihlerinin belirlenmesinde bulanık eşli karşılaştırma yöntemi kullanılmıştır. Ayrıca çok boyutlu ölçekleme analizi ile gençlerin tüketim algıları iki boyutlu olarak haritalandırılmıştır. Elde edilen ağırlıklara göre; en çok tercih edilen ürün gazlı içecekler olmuştur. Bu tercihi sırasıyla siyah çay, kahve, meyve suyu ve bitki çayı takip etmiştir. En az tercih edilen ürün ise süttür. Cinsiyete göre tüketim alışkanlıkları arasında farklılıklar bulunmaktadır. Algısal olarak gazlı içecekler ve meyve suları algılarının birbirine rakip olduğu belirtilebilir. Ayrıca algısal olarak kahve, çay ve bitki çayı arasında konumlanan bir üründür.

Anahtar kelimeler Tüketici tercihleri, Tüketim analizi, Bulanık eşli karşılaştırma

Introduction

Nowadays, Europe is the continent where elderly population percentage is the highest in the world, with 20%. By the year 2050, it has been expected that the elderly population in Europe will be 37% of the total population (Anonymous, 2013). Beside that, the elderly population in Turkey is only 8,3% of total population (Anonim, 2017). This is an indication that there are potential markets for many products in Turkey. Thus,

food consumption is a good example of this situation. According to the results of the household budget surveys in Turkey; food and nonalcoholic beverage expenditures were 19,7% of total expenditures (Anonim, 2014a). Especially packaged nonalcoholic beverage sector has become one of the major emerging markets. Investments at the sector has grown faster and the sector was reached

a market share with \$3,6 billion (Anonim, 2014b).

Nonalcoholic beverage sector can be examined under significant subgroups in Turkey. These subgroups can be classified as soft drink and fruit juices industry, black tea and herbal tea industry, milk industry and coffee industry. Soft drink and fruit juices sector in Turkey has reached nearly \$ 1 billion (Anonim, 2012). 3,3 billion liters of soft drinks and 1,1 billion liters of fruit juices were consumed in Turkey in 2014 (Anonim, 2014c). Despite this development, annual per capita consumption of soft drinks are 31 liters in Turkey, which is well below of the European average (Anonim, 2003). Milk is ranked as the other important product in terms of consumption. 1.128.678 tons of packaged milk were produced in Turkey based on the data of 2013. Also, annual per capita consumption of milk was 37,3 kilograms in the same year (Anonim, 2014d). Turkey's another important product in terms of consumption is tea. Based on the World Bank database, Turkey is one of the countries with the highest per capital tea consumption in the World (Anonymous, 2015). Annual per capita consumption of dry tea is 3,2 kilograms in Turkey. The other important product in terms of consumption is coffee in Turkey. North America, Europe and Japan markets have accounted for %53 of the total coffee market size in the world. In developing countries, this market has a share of 9% of total market size. Per capita coffee consumption in Finland is 9,6 kilograms, while 5,5 kilograms in Australia and 3,1 kilograms in US. However, it is only 550 grams per capita in Turkey (Anonymous, 2014e).

Beverage sector is an important sector and important market for Turkey. Turkey's favorable geographical location and climatic possibilities in agriculture can provide the beverage industry to make greater contribution to the Turkey's economy. But there is a huge competition in domestic market due to healthy eating trends, branding, price and consumption habits. Therefore it's necessary the find out consumer behaviours and the dynamics behind these behaviours. The constant change in lifestyles because of globalization affects consumer behaviours

with many factors. Understanding decision-making process is very important for the determination of individual consumption choices (Skreli and Imami, 2012). Therefore, understanding consumer preferences is considered important in agri-food industry development, both in private and public sectors (Badar et al., 2015). In this context, this research focuses on the young population in Turkey to determine their nonalcoholic beverage consumption.

The percentage of potential consumers in Turkey is higher than those in most European countries, with high young population. Also, beverage market is suitable to development in Turkey. Beside that, identifying the factors affecting young consumers' behaviour can help to predict the behaviours of the next generations. In this context, the main aim of this research is to identify the young consumers' different types of nonalcoholic beverage consumption habits.

The other aims of the research are:

- Determining the young consumers' beverage consumption habits according to demographic factors.
- Determining young consumers' beverage consumption choices according to taste and health.
- Determining young consumers' perceptual maps for different products.

Material and Methods

The basic material of the research consists of the primary data from personal surveys with the consumers between the ages of 20 and 24 living in Izmir. The metropolis of Izmir is Turkey's third largest province. While population of Izmir is 4 million, the young population is between 20 and 24 ages which compose the sample population is 307.443 (Anonim, 2016). The sample size, calculated using proportional sample size formula given below, is 267 (Newbold, 1995).

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

Here, n represents the sample size, N represents the population size (307.443), and p represents the prediction rate (0,5 for the maximum sample size) and the probability level confidence interval (95% confidence interval, σ_p : 0,030612 for 0,06 margin of error from the equation of $1,96\sigma_p$: 0,06). In this research, six different types of beverages were presented to consumers. These categories were soft drinks, fruit juice, black tea, herbal tea, milk and coffee. Fuzzy Pairwise Comparison Method was used for determining the consumption choices of consumers. In this context, Fuzzy Pairwise Comparison Method was used for determining the consumption choices of consumers. Method steps may be summarized as follows (Zadeh, 1983; Gunden and Thomas, 2012). First, pairwise comparisons were presented to indicate individual preferences. The total distance in comparison is equal to 1. If $G_{KH}=0,5$ then $K \approx H$; if $G_{KH} > 0,5$ then $K > H$ and if $G_{KH} < 0,5$ then $K < H$. The number of paired comparisons of the objectives (C) were determined as $C = [(Z \cdot (Z-1))/2]$. Z refers to preferred number of objectives in the formula. In this research, 15 comparisons of six different products were presented to each individual. For each pairwise comparison, g_{cr} preference was obtained. Measurement of the preference degree of r according to c can be expressed as $g_{cr} = 1 - g_{rc}$ (2). Then, fuzzy preference matrix was generated.

$$G_{cr} = \begin{cases} 0 & \text{if } c = r \quad \forall c, r = 1, \dots, n \\ g_{cr} & \text{if } c \neq r \quad \forall c, r = 1, \dots, n \end{cases} \quad (2)$$

In this research, 6x6 fuzzy preference matrix was created for each individual as follow (G)

$$G = \begin{vmatrix} 0 & g_{12} & g_{13} & \cdot & \cdot & g_{1r} \\ g_{21} & 0 & \cdot & (3) & \cdot & \cdot \\ g_{31} & g_{32} & 0 & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & 0 & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & 0 & \cdot \\ g_{c1} & \cdot & \cdot & \cdot & \cdot & 0 \end{vmatrix} \quad (3)$$

Seperately preferred density of each objective (μ_j) was obtained using the following equation (4)

$$\mu_{j=1} = \left(\sum_{c=1}^n G_{cr}^2 / (n-1) \right)^{1/2} \quad (4)$$

The value of μ_j ranges between 0 and 1. The purpose of the comparison was determined whether they are equally important using Friedman Test. Objective hierarchy obtained by fuzzy pairwise comparisons are converted to perceptual maps using Multidimensional Scaling. This analysis get the projection of the objects in a k -dimensional space based on the determined distance between n objects according to p argument. It uses the sort of distance between units. It was used with Kruskal's Stress in order to determine concordance with distances between the estimated distance.

$$\text{Stress} = \sqrt{\frac{\sum \sum (d_{ij} - k_{ij})^2}{\sum (d_{ij}^2)}} \quad (5)$$

In this equation, d_i refers to the predicted distances and k_{ij} refers to the original distances. Kruskal's Stress values near zero refers the increasing concordance. Also, Mann-Whitney U test and basic statistical calculations were used in the study.

Results

The average age of the consumers who participated in this research was found 22,1. The average monthly food and beverages expenditure of this group was found \$239,2 (1\$ equals to 2,28TL at the time of the study). Descriptive statistics for Fuzzy Pairwise Comparison results were given in Table 1. All beverage product preferences were separated significantly different from each other according to the result of the Friedman's test ($p < 0.01$). Fuzzy Pairwise Comparison results can be interpreted based on these data. According to the obtained weight, the most preferred products were soft drinks. This finding supported previous studies (Ratnayke and Ekanayke, 2012; Jensen et al., 2012). Black tea, coffee, fruit juice and herbal tea followed the soft drinks,

respectively. The least preferred product was milk. Soft drinks were also the most preferred products by female consumers. Coffee, black tea, fruit juice, herbal tea and milk followed the soft drinks, respectively.

Tea was the most preferred product by male consumers. Soft drinks, fruit juice, coffee, herbal tea and milk followed the tea, respectively.

Table 1. Fuzzy paired comparison results
Çizelge 1. Bulanık eşli karşılaştırma sonuçları

	Gender <i>Cinsiyet</i>				General <i>Genel</i>	
	Female <i>Kadın</i>		Male <i>Erkek</i>		Mean <i>Ortalama</i>	Std. Deviation <i>Standart Sapma</i>
	Mean <i>Ortalama</i>	Std. Deviation <i>Standart Sapma</i>	Mean <i>Ortalama</i>	Std. Deviation <i>Standart Sapma</i>		
Soft drink <i>Alkolsüz içecek</i>	0,49871	0,18897	0,48304	0,17938	0,4901	0,18357
Fruit juice <i>Meyve suyu</i>	0,39627	0,17518	0,43587	0,15897	0,4181	0,16730
Milk <i>Süt</i>	0,37505	0,16276	0,34059	0,15205	0,3561	0,15759
Black tea <i>Siyah Çay</i>	0,43823	0,18247	0,52801	0,17139	0,4877	0,18172
Herbal tea <i>Bitki Çayı</i>	0,38568	0,15737	0,34986	0,16163	0,3660	0,16043
Coffee <i>Kahve</i>	0,45042	0,18112	0,40870	0,17650	0,4275	0,17946

The differences among consumption preferences of the consumers exercising regularly and irregularly were determined using Mann-Whitney U test. There is a

significant difference between beverage consumption preferences of those who exercise regularly and those who do (Table 2).

Table 2. Consumption preferences by exercising regularly
Çizelge 2. Düzenli egzersiz yapma durumuna göre tüketim tercihleri

"I exercise regularly" <i>Düzenli egzersiz yapıyorum</i>	N <i>Sayı</i>	Mean <i>Ortalama</i>	Mann-Whitney U	Z	Significance <i>Önem (P)</i>
Soft drink <i>Alkolsüz içecek</i>	No/ <i>Hayır</i> Yes/ <i>Evet</i>	135 132	0,48 0,50	8402,5	-0,70384 0,481534
Coffee <i>Kahve</i>	No/ <i>Hayır</i> Yes/ <i>Evet</i>	135 132	0,41 0,43	8409,5	-0,69266 0,488523
Tea <i>Çay</i>	No/ <i>Hayır</i> Yes/ <i>Evet</i>	135 132	0,47 0,49	8389,0	-0,72559 0,468093
Milk <i>Süt</i>	No/ <i>Hayır</i> Yes/ <i>Evet</i>	135 132	0,33 0,37	7798,0	-1,66753 0,095410*
Herbal tea <i>Bitki Çayı</i>	No/ <i>Hayır</i> Yes/ <i>Evet</i>	135 132	0,34 0,39	7353,5	-2,37664 0,017471**
Fruit juice <i>Meyve suyu</i>	No/ <i>Hayır</i> Yes/ <i>Evet</i>	135 132	0,39 0,44	7707,5	-1,81216 0,069961

*p<0.10, **p<0.05

The results of Mann-Whitney U test showed that there was a meaningful difference in term of herbal tea consumption between two groups, who watches their

weight and who doesn't watch their weight. Milk consumption was at 10% level. Those who care about health consume more herbal tea and milk. But, there was not statistically

significant relation between caring about preferences (Table 3).
weight and other beverage consumption

Table 3. Consumption preferences by caring about weight

Çizelge 3. Vücut ağırlığına dikkat etme durumuna göre tüketim tercihleri

"I care about my weight" Vücut ağırlığıma dikkat ediyorum		N Sayı	Mean Ortalama	Mann-Whitney U	Z	Significance Önem (P)
Soft drink Alkolsüz içecek	No/Hayır Yes/Evet	165 102	0,50 0,48	7843,5	-0,932	0,351
Fruit juice Meyve suyu	No/Hayır Yes/Evet	165 102	0,42 0,42	8254,0	-0,263	0,793
Milk Süt	No/Hayır Yes/Evet	165 102	0,35 0,36	8188,0	-0,37	0,711
Tea Çay	No/Hayır Yes/Evet	165 102	0,48 0,49	8061,5	-0,577	0,564
Coffee Kahve	No/Hayır Yes/Evet	165 102	0,42 0,42	8281,5	-0,218	0,828
Herbaltea Bitki çayı	No/Hayır Yes/Evet	165 102	0,33 0,39	6695,0	-2,806	0,005***

***p<001

In this section, nonalcoholic beverages were positioned according to the taste and health perception (Figure 1). In aspect of taste perception; milk and herbal tea were determined to be more disadvantageous than other products. These data support the earlier researches carried out about herbal tea (Vickers and Holton, 1998; Son et al., 2010). In aspect of both taste and health perception; fruit juice and coffee had come into prominence. A research made in China

showed there were three different types of customers at the fruit juice market (Lee et al., 2015). These different type of customers have different opinion abouts price, shelf life, health and imported products issues. Also, Zhao and Tepper (2007) found that sweeteners had a minor role in nonalcoholic beverage consumption. Similarly, emphasis on health can make benefits for brands in fruit juice sector.

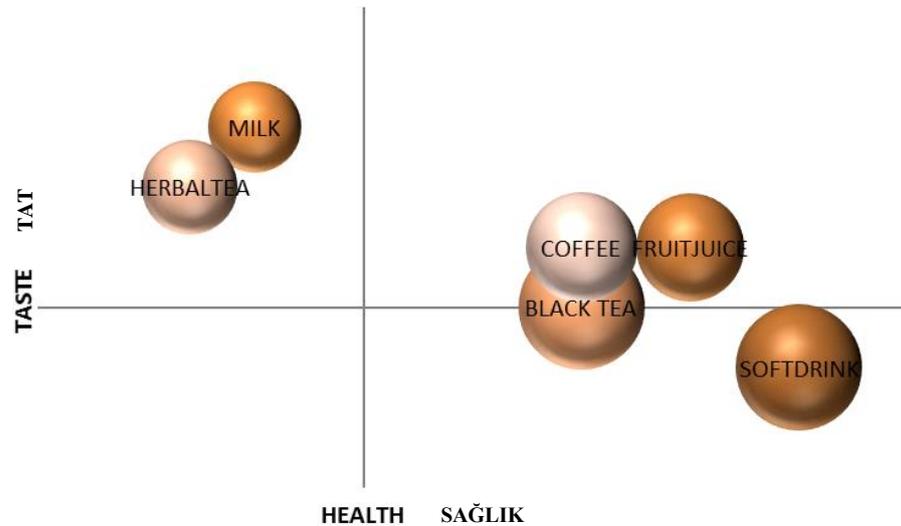


Figure 1. The positioning of products according to the taste and health perception
Şekil 1. Tat ve sağlık algılarına göre ürünlerin konumlandırması

The data obtained from fuzzy pairwise comparison was used for positioning the beverage perception using Multidimensional Scaling. Kruskal Stress Value was 0,06694 and R^2 was 0,96720 in the two-dimensional representation of Multidimensional Scaling. The results showed good level of accordance between the data distances and configuration

distances. Two geometric representations of the data showed accordance with the linear form and it was determined that observational distance and disparities were of a linear relationship (Figure 2). The results showed a good level of interdimensional accordance, and the analysis can be interpreted.

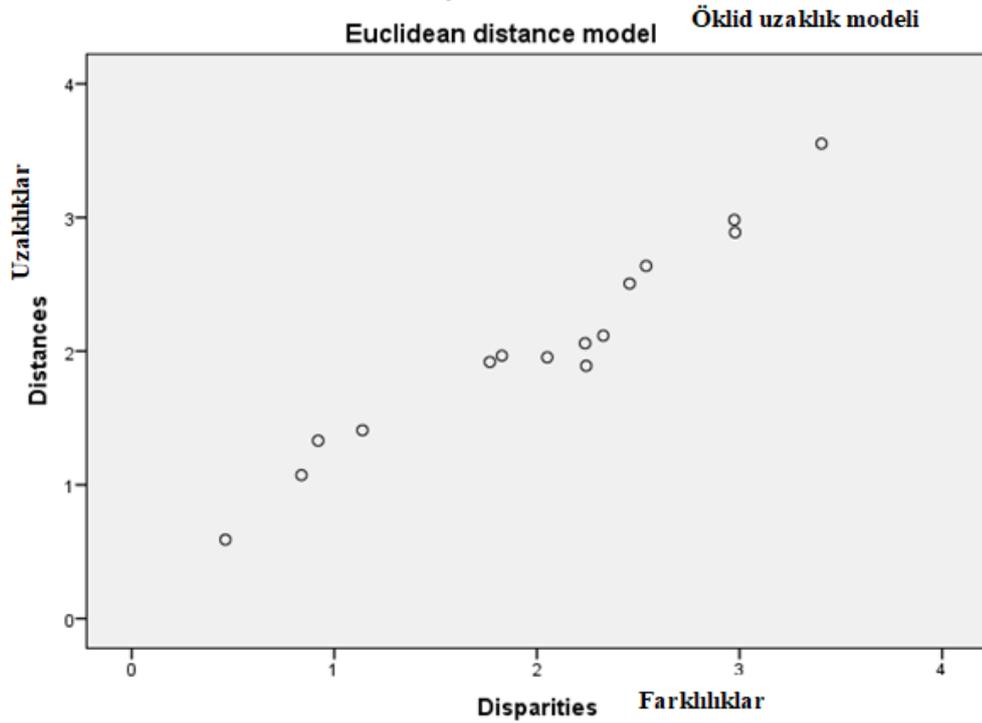


Figure 2. Diagram of the relationship between distances and differences

Şekil 2. Uzaklıklar ile farklılıklar arasındaki ilişkinin diyagramı

Based on the analysis results, beverage perception levels didn't show close proximity to each other. But, soft drinks and fruit juices were clustered closely. Accordingly, it was seen that these two products were perceived as substitute goods for each other. It was observed that coffee was positioned between the tea and herbal tea. Therefore, coffee may be noted as a substitute for tea and herbal tea. An other beverage, milk also had a different perceptual position for young consumers when compared with the other products. According to the results obtained from the differences matrix; perceptually farthest

products were soft drinks and coffee with 3,517 matrix value. Similarly, soft drinks and tea; soft drinks and herbal tea and soft drinks and milk were perceived differently with 2,645, 2,644 and 2,363 values, respectively. Perceptually closest products were soft drinks and fruit juices with 1,556 matrix value. On the other hand, coffee was positioned between the tea and herbal tea with 2,121 and 1,718 values (Figure 3). Also, milk had a different position compared to other products. The results shows that brands could improve their competitiveness focusing on different areas.

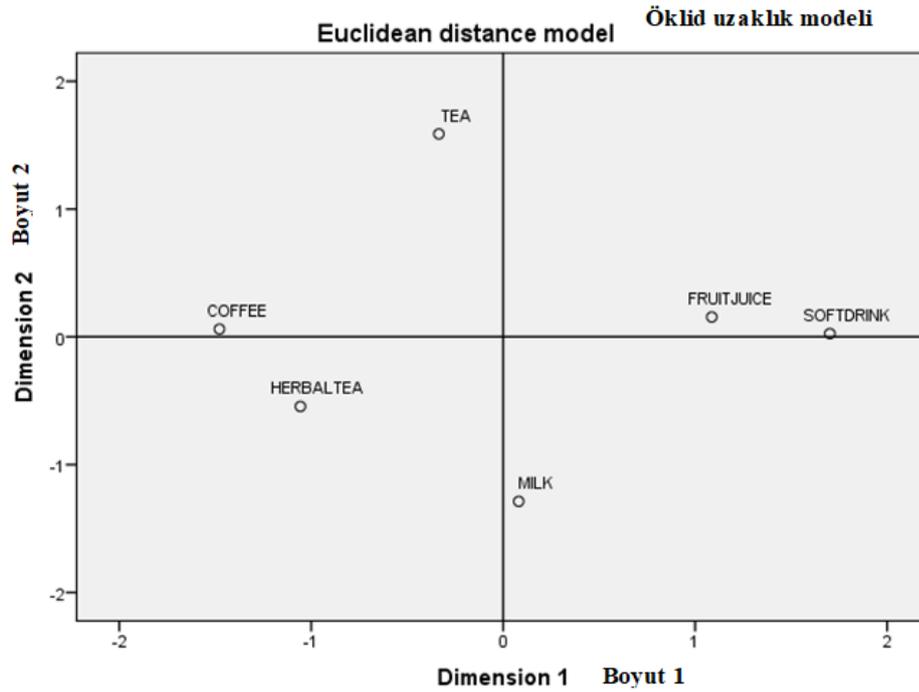


Figure 3. Two-dimensional positioning of the general perception for the products
 Şekil 3. Ürünlerin genel algılarına göre iki boyutlu konumlandırması

Conclusions

This research was conducted to identify the young consumers' different types of nonalcoholic beverage consumption habits in daily life. According to the percentages, soft drinks were the most preferred products. Black tea, coffee, fruit juice and herbal tea followed the soft drinks. The least preferred product was milk. Also, consumers who watch their weight, have a different preferences about herbal tea than other group. In addition, there was a meaningful difference for milk, herbal tea and fruit juice consumption preferences between the consumers who exercise regularly and don't exercise regularly. It was found that fruit juices and soft drinks were the substitution products for young consumers. Moreover, coffee had a perceptual position between the tea and herbal tea products.

As a result, these findings can help firms to find their perceptual differences, target consumers and superior aspects. In addition, the research can reveal the consumer dynamics of young consumers in Turkey and it can offer opportunities to compare the market in Turkey and other countries.

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