Analysis of the Factors Affecting Consumer's Some Traditional Food Products Preferences by Multidimensional Scaling Method

Y. Oraman G. Unakıtan E. Yılmaz B. Başaran

Namik Kemal University, Agricultural Faculty, Department of Agricultural Economics,Tekirdağ

The aim of this study is to evaluate consumer behaviour towards factors affecting purchase decision of some traditional food products and grouping those consumer attitudes.

The original data was obtained from results of a survey conducted in 14 different districts in Tekirdag. The survey consisted of face-to-face interviews conducted within a total sample of 166 households randomly. In the study, multidimensional scaling analysis is used for evaluating the effective factors of consumer preferences for traditional products and grouping their preferences.

It is found that taste, food safety and freshness have similar effects on consumer preferences for yogurt, molasses and noodles. Price has an important and positive loaded effect on other variables for the three products.

Keywords: multidimensional scaling, yogurt, molasses, noodles, consumer preferences

Tüketicilerin Bazı Geleneksel Gıda Ürünleri Tercihlerini Etkileyen Faktörlerin Çok Boyutlu Ölçekleme ile Analizi

Bu çalışmada amaç, tüketicilerin geleneksel bazı ürünleri satın alımlarında etkili faktörlere karşı tutumlarını değerlendirmek ve tutum davranışlarını gruplandırmaktır.

Araştırmaya ait orijinal veriler Tekirdağ ili'nde14 ayrı mahallesinin oransal dağılımlarına göre tesadüfî örnekleme yöntemi ile seçilen toplam 166 adet hane halkıyla yüz yüze yapılmış olan anket bulgularından oluşmaktadır. Çalışmada tüketicilerin geleneksel bazı ürünleri satın alımlarında etkili faktörlere karşı tutumlarını değerlendirilmesi ve tutum davranışlarının gruplandırılması çok boyutlu ölçekleme analizi ile yapılmıştır.

Sonuç olarak tüketicilerin gerek yoğurt, gerek pekmez ve gerekse erişte tercihlerinde, lezzet, gıda güvenliği ve tazelik benzer etkilere sahip unsurlar olduğu, bununla birlikte fiyat her üç ürün için de bu ürünlere karşı olan talebi diğer değişkenlere kıyasla önemli düzeyde ve pozitif yönde etkilediği belirlenmiştir.

Anahtar Kelimeler: çok boyutlu ölçekleme, yoğurt, pekmez, erişte, tüketici tercihleri

Introduction

Traditional products are indispensable for consumers in Turkey. This study includes products especially yogurt, noodles and grape molasses which play an important role in consumer preferences.

There are several factors which have influence on purchase decisions for three products. The aim of this study is to determine the consumer behaviour and classifying consumer attitudes by determining effective factors.

Multidimensional scaling (MDS) analysis which is a common technique in marketing is used in this study. The usage of MDS in data analyses have several advantages. Namely, MDS is an extremely flexible technique, one that can model non-linear relationships and is not bound by the numerous assumptions associated with general linear models or even with factor analyses.

MDS also known as perceptual mapping is a procedure that allows a researcher to determine the perceived relative image of a set of objects (firms, products, ideas, or other items associated with commonly held perceptions). The purpose of MDS is to transform consumer judgments of overall similarity or preference (e.g., preference for stores or brands) into distances represented in multidimensional space. The underlying dimensions come from respondents' judgments about pairs of products. Because of these advantages, MDS is the most common technique used in perceptual mapping.

To perform a MDS analysis of data within SPSS there are a two main options; the ALSCAL and the PROXSCAL procedure. As Leydesdorff

and Vaughan (2006) state, 'the ALSCAL procedure assumes that the input is a dissimilarity matrix, while PROXSCAL allows one to specify whether the proximities are similarity or dissimilarity measures'.

Especially in marketing, MDS is a statistical technique for taking the preferences and perceptions of respondents and representing them on a visual grid, called perceptual maps (Pinnell, 1997). One of the important research papers in the field of marketing in MDS technique was used to answer the research question is Lacobucci and Ostrom's (1996) paper. In this paper, authors employ multidimensional scaling (MDS) models to investigate dimensions important to subjects in their perceptions of services. Multidimensional scaling is often used in marketing practice, but it has been used less frequently in academic research (Azabagaoglu et al., 2002; Oraman and Inan 2005; Huber, 2008; Gurcaylilar, 2008). However there are several important research papers that used MDS as a research technique (Gallivan and Jgarkava., 2008). Most of them use a MDS as a technique to measure the perceptions of customers about different subjects.

The aim of this study is to evaluate consumer behaviour towards factors affecting purchase decision of some traditional food products and grouping those consumer attitudes.

Materials and Method

The data in this study is obtained from consumers living in the town of Tekirdağ, between December and February 2010.

The finite population formula is used to determine volume sample for rates (Newbold, 2007). In Equation 1, 99% confidence interval, 10% sampling error and p=q=0.5 is used to calculate the maximum volume of sample.

$$n = \frac{N.p.q}{(N-1)\sigma_p^2 + p.q} \qquad \text{(Equation. 1)}$$

n= sample volume, N= main target volume (48.000), p= consumers preference rate of traditional noodles (0.5), q= 1-p, σ_p^2 = rate variances (0. 001502).

The original data was drawn from results of a survey conducted in 14 different districts in Tekirdag. The survey consisted of face-to-face interviews conducted within a total sample of 166 households randomly. The collected data was evaluated by PASW 18.0 package program. Test for normal distribution was not carried out as the data of analysis was categorical (Özdamar, 2004). It was assumed that t-test results were close to normal distribution as the sample size is n>30 (Özdamar, 2004; Nakip, 2003).

MDS analysis in this study is used for evaluating the effective factors of consumer preferences for traditional products and grouping their preferences.

Individual differences scaling ALSCAL is used in this study. The solution was derived using MDS analysis involving distance matrices.

Therefore, appropriate distance matrices should be calculated according to the type of data (Doğan, 2003). Euclidean distance (d) is used in this study, as seen on Equation 2.

$$d = \sqrt{\sum_{i=1}^{n}(x_i - y_i)^2} \qquad \text{(Equation. 2)}$$

Stress dimension (Equation 3) has a common use in MDS analysis and it is as a criterion for correlation or positive correlation and used in determining whether the dimension number is appropriate that was used in graphical organising gathered at the end of the analysis. (Filiz ve Çemrek, 2005).

$$stress = \sqrt{\sum\left(\hat{d}_{ij} - d_{ij}\right)^2 \Big/ \sum d_{ij}^2} \qquad \text{(Equation. 3)}$$

$\hat{d}$ = i. and j. data distance between individuals,

d_{ij} = i. and j. are shown as configuration distance between individuals (Doğan, 2003).

Stress ratio is used as a criterion in determining suitability of MDS analysis. A low stress value shows the correlation of the analysis; a good stress value shows a poor correlation. Kruskal provided a guide indicating correlation of analysis to interpret of stress value in 1964. (Table 1) (Wickelmaier, 2003).

Table1. Kruskal's rule of thumb

Stress-value	Goodness of fit
0.10 - <0.20	poor
0.05 - 0.10	fair
0.025 - 0.05	good
0 - 0.025	excellent

Results and Discussion

The aim of this study is to determine the factors influencing consumer behaviours towards traditional products group in the town of Tekirdağ and analyse the socio-economical characteristics of consumers, shown in Table 2. The average family size was 3.7 people. 38.0% of the respondents who took part in the survey are university graduates. 36.7% of the respondents are mainly are at the age of 31-40.

MDS analysis helps understanding the factors affecting consumer preferences. In this scope, factors affecting on consumer behaviour, traditional yogurt (Table 1) noodles (Table 3) and molasses (Table 5), have been presented in a two-dimensional graphical form.

Stress value was calculated at the first step of the analysis and established at 0.09780 which indicates a fair fit for molasses. Nevertheless, another statistic determination coefficient (RSQ) was calculated as 0.9753 and indicated a higher correlation between factors.

Stress = 0.1638 and RSQ = 0.9205 for yogurt in Kruskal Stress statistics MDS two dimensional representation. Those values are for Stress=0.1532 and RSQ =0.9020 for molasses (Table 3). There is a poor correlation between data distance and configuration distance.

Table 2. Demographic features of individuals in survey

	Number	%		Number	%
Sex			**Monthly Income (TL)**		
Women	143	86.1	Lower than 750	18	10.8
Men	23	13.9	750-1500	71	42.8
Age Groups			1501-3000	63	38.0
≤ 30	26	15.7	3001-5000	13	7.8
31-40	61	36.7	5000 +	1	0.6
41-50	51	30.7	**Marital Status**		
51 ≥	28	16.9	Married	142	85.6
Education Groups			Single	19	11.4
Primary school	56	33.8	Divorced/Widow	5	3.0
High school	47	28.3	**Family Member Num.**		
University Graduate	63	37.9	1-2	18	10.8
			3-4	120	72.3
			5-6	28	16.9
Family origin			**Number of children**		
Village	87	52.4	0	30	18.1
City	79	47.6	1-2	118	71.1
			3-4	18	10.8

Tablo 3. Stress values of MDS

Iteration	Yogurt		Noodles		Molasses	
	S-stress	Improvement	S-stress	Improvement	S-stress	Improvement
1	0.22228		0.23066		0.09764	
2	0.19254	0.02974	0.20094	0.02972	0.07327	0.02437
3	0.18959	0.00295	0.20010	0.00085	0.03792	0.00706
4	0.18940	0.00019			0.03695*	0.00097*
	Stress = 0.16387		Stress = 0.15327		Stress = 0.09780	
	RSQ = 0.92054		RSQ = 0.90202		RSQ = 0.97530	

*Result of 19th iteration

Stimulus coordinates, shown above, are the numerical coordinate locations relating stimuli to dimensions (Table 4). Taste, food safety and freshness are determined to have important effects on consumer preferences for the three products. Price has a high and positive effect on the demand towards these three products comparing to other variables (Figure 1, 3 and 5). Regional production of yogurt and noodles has an important effect on consumer preferences.

In all three cases, it is possible to determine the data in 2 dimensional forms. Price was positive loaded for yogurt, molasses and noodles in the first dimension. Other than price, type, package size and regional production are positive loaded factors for yogurt and noodles. Brand and appearance are the positive loaded factors for molasses.

In the second dimension, factors such as price, brand, freshness, taste, food safety and appearance are positive loaded factors for the three products, other factors are negative loaded. When loads are analysed, for yogurt (1.9426), noodles (2.0426) and molasses (3.6346), price is the highest and positive loaded criterion (Table 4). Price is the most important factor in consumer preferences for yogurt, noodles and molasses. Freshness, brand and taste are the second important and positive loaded factors and in consumer preferences. Considering loads only for three products, some loads are close to zero. These factors can be considered as secondary factors.

Showing the data in a 2 dimensional geometrical form showed correlation with linear form and observational distances and differences (disparities) are in a linear correlation (Figure 2, 4, 6).

Table 4. Stimulus coordinates

	Yogurt		Noodles		Molasses	
Stimulus name	**1**	**2**	**1**	**2**	**1**	**2**
Price	1,9426	2,0189	2,0426	1,6378	3,6346	0, 9056
Brand	-0,4090	0,2089	-0,0167	0,7330	0,1837	0,4604
Freshness	-1,3838	0,3149	-0,9963	0,4214	-0,9229	0,6860
Package	0,5586	-1,1030	1,5764	0,1393	0,5024	-0,5985
Taste	0,9810	0,3238	-0,8824	0,4053	-0,8168	0,4601
Appearance	0,5078	-0,0144	-0,0235	0,2861	0,0760	0,4057
Food safety	-1,2436	0,2769	-1,4527	0,3341	-0,9012	0,3837
Quality label	-0,5931	-0,2144	-0,7326	-0,5322	-0,7070	-0,4428
Regional product	1,8503	-1,5590	1,0276	-1,8533	-0,2277	-1,5279
Type	0,8611	0,0724	0,1180	-1,3733	-0,2612	-0,5241
Ingredient	-0,7597	-0,3250	-,6604	-0,1982	-0,5600	-0,2083

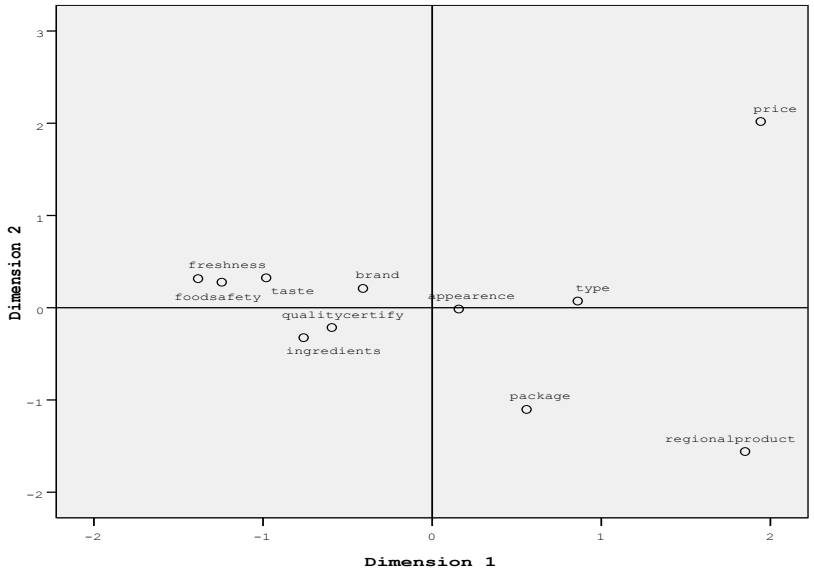

Figure 1. MDS results of factors affecting yogurt purchasing

Scatter plot of linear fit (*Sheppard diagram*) displays disparities on the Y axis and disparities on the X axis (Figure 2, 4 , 6). Distances are the original distances for any two points in the input matrix. Disparities are the reproduced distances and measure the distance of two points in the MDS space created by two dimensions.

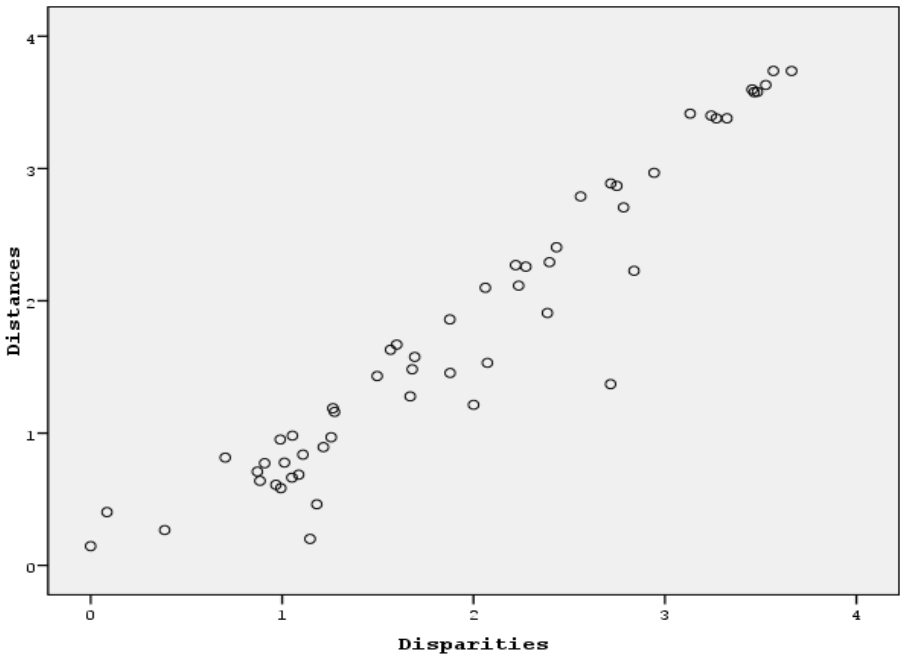

Figure 2. Distances for yogurt and the sheppard diagram for configuration distances

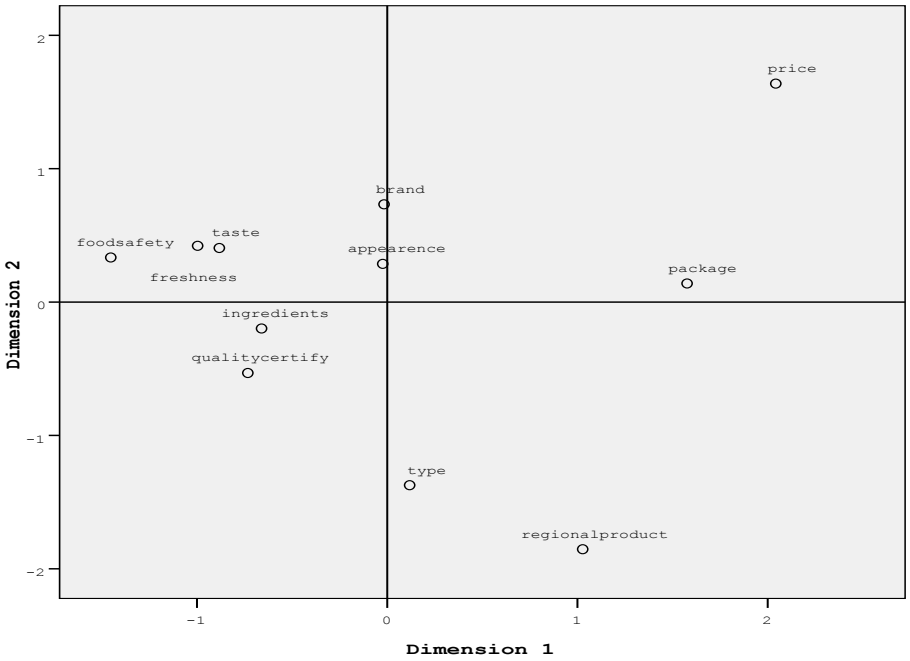

Figure 3. MDS Results of factors affecting noodle purchasing

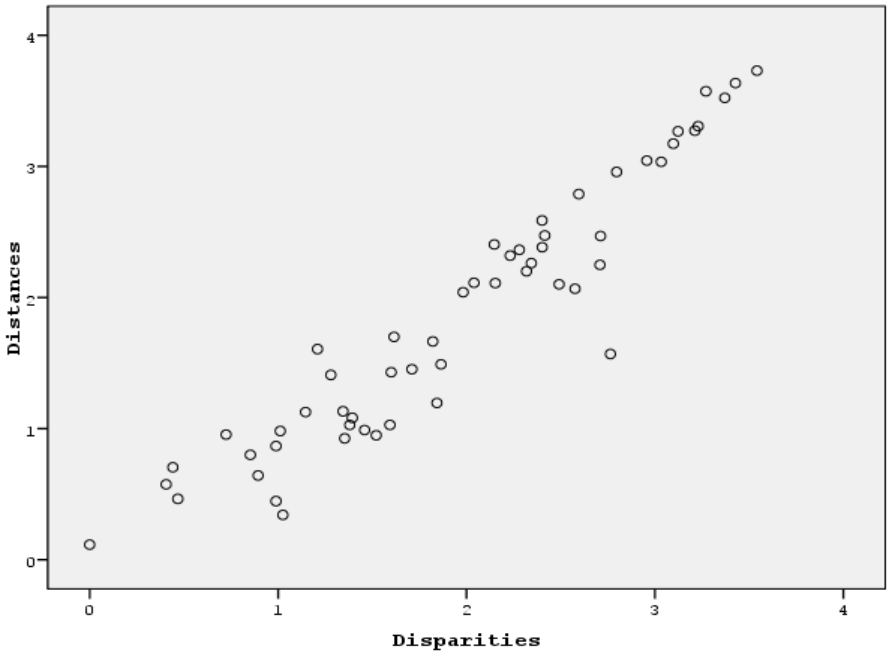

Figure 4. Distances for noodles and the sheppard diagram for configuration cistances

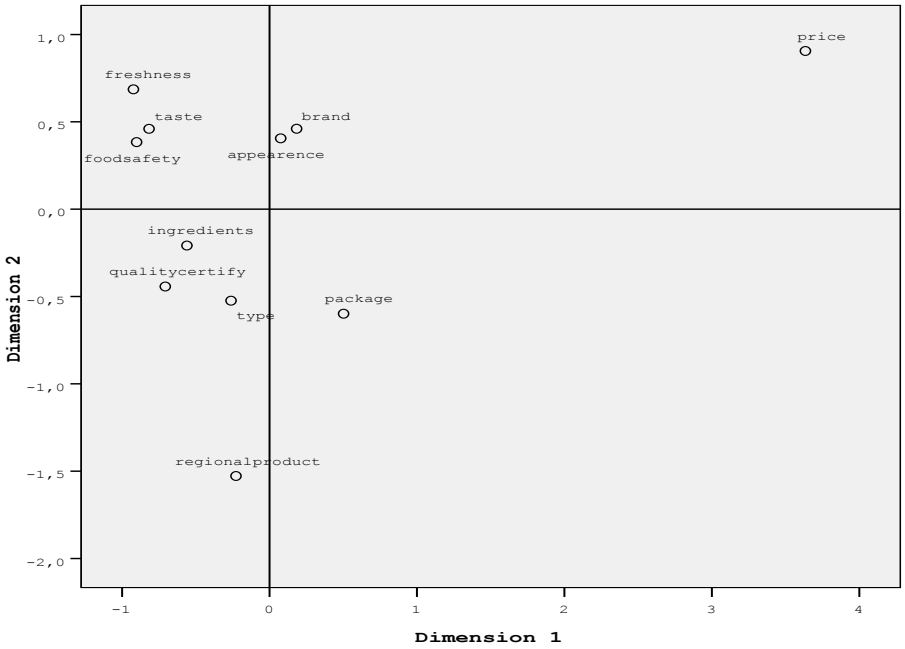

Figure 5. MDS Results of factors affecting molasses purchasing

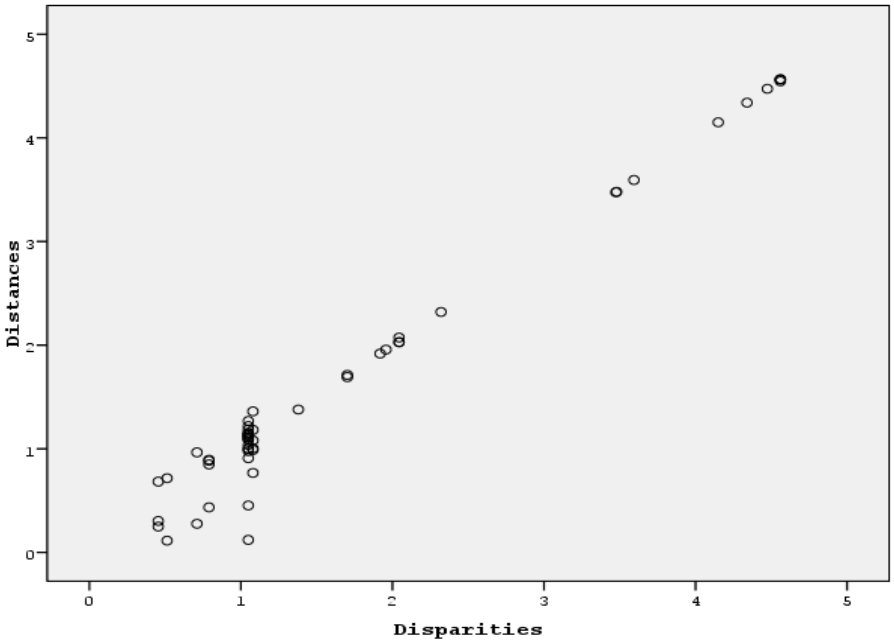

Figure 6. Distances for molasses and the sheppard diagram for configuration Distances

Conclusion

Multidimensional scaling is an exploratory data analysis technique that could be used in testing the hypothesized existence of particular dimensions or structures within a data set.

MDS analysis in this study is used to evaluate the factors affecting consumer preferences for traditionally produced yogurt, molasses and noodles and grouping consumer behaviours towards those products. It is found that taste, food safety and freshness have similar effects on consumer preferences for yogurt, molasses and noodles. Price has an important and positive loaded effect on other variables for the three products. Another important finding in this study is regional production that has a significant effect especially on yogurt and noodle preferences.

As result, the previously existing research deficiency in this area has been slightly reduced; however, additional research is required to understand sufficiently such a complex processes as traditional food choice.

Research priority must be given to study more in details opinion about consumer expectation and behaviour for traditional foods in Turkey in the future.. What is also needed is specialized market research to monitor the consumption trends and probabilities, and to assist those involved in the marketing and promotion process, by providing information and feedback.

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