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Analysis of Factor Affecting Tropical Fruit Consumption Preferences of Consumer: A Case Study Mersin Province of Erdemli District

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Abstract

The aim of the research was to analyze preferences of consumers in Mersin-Erdemli district on tropical fruit consumption and to determine socio-economic factors affecting their consumption. Data were obtained from 271 consumers through questionnaire method proportıonal sampling. The purpose of the study is to determine the consumption of tropical fruits by consumers. First, Consumers' purchasing behavior in tropic fruit consumption was divided into groups by factor analysis. Last, Binary Logit model was used to analyze the factors affecting the tropical fruit consumption of the consumers and result of binary logit show that income of the consumer processed product, attractiveness product and packaged product were variables likely to affect the level of consciousness.

Keywords: Tropical fruits, consumer consumption, binary logit model, influencing factors

Mersin İli Erdemli İlçesindeki Tüketicilerin Tropik Meyve Tercihini Etkileyen Faktörlerin Analizi

Özet

Araştırmanın amacı Mersin-Erdemli ilçesindeki tüketicilerin Tropik meyve tercihlerini belirlenmek ve tüketimi etkileyen sosyo-ekonomik faktörlerin analiz etmektir. Oransal örnekleme yöntemi ile 271 tüketici ile görüşülmüştür. Bu araştırmanın amacı, tüketicilerin tropik meyve satın alırkenki tutum ve davranışlarını belirleyen bazı faktörlerin belirlenmesi ve ortaya konulmasıdır. İlkin tropik meyve satın alımındaki bireylerin tutum, davranış ve bilgilerini ölçmek için 14 değişkeni 5'li likert ölçeği yardımı ile analiz edilmiş ve faktör analizi yardımı ile 4 faktör altında toplanmıştır. Sonra, tüketicilerin tropik meyve tüketim tercihlerini etkileyen faktörlerin belirlenmesinde Binary Logit modeli kullanılmıştır ve Binary Logit analizinin sonuçlarına göre; tropik meyve tüketimini etkileyen faktörler bireylerin gelirleri, ürünün işlenmişliği, ürünün çekiciliği ve ürünün paketli oluşu olduğu belirlenmiştir.

Anahtar Kelimeler: Tropik meyve, tüketicilerin tüketimi, binary logit modeli, etkileyen faktörler

Introduction

If fruit and vegetables, which are important nutrients in terms of a healthy and balanced diet, are added to daily diet, this, due to their high water and low fat content, reduces the energy content as well as contributing to an increase in the number of foods that can be consumed during the day owing to the low calorie they have. Fruits also have diversity in their consumption because they show differences in the variety and amount they contain. Generally, the citrus group and strawberry C vitamins; Cherry, black grape, black mulberry other antioxidants; Bananas, apples and other fruits are rich in potassium. Tropical fruit should be considered as an alternative for other fruit species, both in terms of production and consumption, which have limited possibilities of growing due to the special ecological conditions they need. (Adıgüzel and Kızılaslan, 2015).

In addition, they are known to help protect health as they are rich in vitamins and minerals and contain fibers (Tohill, 2004; Adıgüzel and Kızılaslan, 2015). On the other hand, tropical fruits have limited production possibilities due to their special ecological requirements. Therefore, they should be considered as an alternative to other fruit species in terms of both production and consumption. Tropical fruit consumption is increasing on domestic and international markets due to growing recognition of its nutritional and therapeutic value (Da Silva et al., 2014). With this motivation in mind, this study aimed to investigate the factors statistically affecting the consumption of tropical fruits by consumers in Erdemli County by analyzing their buying preferences and consumption attitudes.

Materials and Methods
Material
The material of this study was made up of data collected from individuals in the Erdemli county of Mersin Province through questionnaires.

Data collection method
The aim was to cover the whole population in this way. In order to determine the number of the individuals to be included in the survey, their rates in total individuals were taken into consideration (Pazarlioglu et al., 2007; Armagan and Akbay 2007; Kiziloglu and Kizilaslan, 2013), and individuals participating were identified randomly.

In order to determine the sample size representing the main mass, proportional sampling method was used (Newbold, 1995).

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

In the equation above, n represents sample size, N represents population size, p represents estimation rate (sample size 0.5 maximum), σ_p^2 represents rate variances (in order to reach maximum sample size, table value should have confidence interval of 90%, with 1.65 and 5% margin of error). As the characteristics of the enterprises which formed the main mass were not identified in the beginning, p was determined as 0.5 to maximize the sample size and it was determined as 271 subjects.

Data analysis method
Logit model was used to analyze the socio-economic factors affecting individuals' consumption of tropical fruit in the urban areas of Erdemli district. Binary choice models were used for econometrics applications in which dependent variables are qualitative and bivalent, and the most common of them are probit and logit models. The main difference between probit and logit models results from the distribution of error term. While the distribution of error term in the logit model is accepted logistically, it is assumed that error term is normally distributed in the probit model (Greene, 2011; Gujarati, 2001). The logistic regression procedure is the most frequently used method to study individuals' perceptions and behaviors (Gempesaw et al., 1995). A choice model is specified with a dichotomous dependent variable representing the individuals' final choice to be explained by a set of variables such as demographic factors, socio-economic factors, perception, experience, and preferences. Dependent variable is a dummy and estimated likelihood values change between 0 and 1. The estimation method utilizes the Maximum Likelihood Estimation (MLE) procedure as they provide consistent parameter estimates that are asymptotically efficient (Amemiya, 1983; Grimm and Yarnold, 1995; Tabachnick and Fidell, 1996; Tatlıdil, 1996; Akkuş and Çelik, 2004; Hatırlı et al., 2004; Leech et al., 2005; Poulsen and French, 2008; Cankurt et al., 2010; Kalaycı, 2010).

The logit model for a representative consumer *i* can be expressed as follows (Gujarati, 2001);

$$F_i(\beta X_i) = \frac{\exp(\beta X_i + \varepsilon_i)}{1 + \exp(\beta X_i + \varepsilon_i)}$$

where F (βX_i)= index function (preferences for the studied tropical fruit for I[th] individual, j=0 represents no preference and j=1 represents preference)

β= The coefficient vector of the explanatory variables

X_i= The explanatory variables representing the characteristics of individuals

ε_i= Error term

In order to understand logistic coefficients, one needs to think in terms of odds ratio of a happening (Akgül and Çevik, 2005). When estimating the parameters of the logistic regression model, obtained by taking the natural logarithm of the odds ratio, the maximum likelihood method is widely used (Berenson and Levine, 1996). Some variables included in the logistic model were translated into categorical variables in order to obtain the differences between categories as odds ratios. Some of the independent variables were taken into the model

as dummy to provide convenience of interpretation. Education was coded as 1 for high school and over and 0 for lower than high school. Consume season was coded as 1 for the consume season, 0 for not consume season. Having grown place was coded as 1 for important and 0 for not important. Dummy variables with categorical structure were used for variables representing the effect of gender and marital status. Age, number of households and income factors taken into consideration to investigate the factors effecting individuals' preferences towards tropical fruit were analyzed as continuous variables.

Binary logit model was used in the study to determine the factors affecting the individuals' tropical fruit preferences. The individuals interviewed appropriately to determine dependent variables in the model were divided into two categories: those who purchased and consumed tropical fruit to protect the traditions and those who did not. That is, the group with individuals sensitive to and consuming tropical fruit was coded as 1 and the other as 0. The group with low level or no awareness of tropical fruit was taken as reference in the model. Therefore the analysis was done based on low level or no awareness for tropical fruit taking the group with high level of awareness for tropical fruit as a reference. Since the P value of the created model is less than 0.05, the model can be considered in 95 % confidence interval.

Table 1 presents explanations about the dependent and explanatory variables used in the analysis and descriptive statistics.

The answers to questions determining the importance level given to features in individuals' knowledge, attitude and behaviors about tropical fruit were measured with 5-point Likert scale. As the states showing the scaled purchasing behaviors and attitudes outnumbered, it was impossible to use each one as explanatory variable. Therefore the variables had to be presented in summary. The summary of the variables were obtained using factor analysis and this factor was used as an explanatory variable in Logit analysis (Dölekoğlu and Yurdakul, 2004).

Factor analysis is a kind of multi-variable statistical analysis providing the presentation of data more meaningfully and in a summary format based on the relations between variables (Kurtuluş 2004; Tekin 2007; Karpati and Szakal 2009). The main purpose of this analysis is to interpret each factor individually by explaining the relationship between the original variables with a group of factors with minimum loss of data. In short, factor analysis makes it possible to work with less data while retaining the original data as much as

possible. It is usually not possible to measure the behavior of individuals with a single question. Several factors affecting this behavior have a close connection. The purpose of factor analysis is to help work with fewer factors by reducing the data loss as much as possible and bringing the close factors together (Ness, 2000; Kızıloğlu et al., 2015).

Result and Discussion
The general characteristics of the consumers

Table 1 determinates some of the social-economic and demographic characteristics of the matters interviewed. The average age of the consumers interviewed was 42.93. 17.7 % of the consumers were females and 82.3% males. 92.3 % of the consumers were married and left with 3.13 individual.

The educational status of the research interviewed with consumer were taken into two groups as under high school for literate, elementary and secondary school, and high school and above for high school, undergraduate, graduate and postgraduate. Interviewed with consumers of 73.4% have to graduate from high school or above. The mean for monthly income of the consumers was calculated to be TL 2,220.81. It was found important to have consumed tropical fruit season 77.1% and grown place %52.4 by consumers. The tropical fruits consumed by the consumers are as follows; bananas (98.89%), kiwi (87.08%), avacado (42.44%), pineapple (36.90%), pepino (11.81%), coconut (6.27%) and mango (2.58%).

Consumers' knowledge, attitudes and behaviors on tropical fruit purchase

5-point likert scale was used to determine consumers' knowledge, attitude and behaviors about tropical fruit purchase. According to the results of factor analysis 14 factors could be gather one group. The KMO coefficient in this research was 0.712, which meant a very good sampling (Field, 2000; Yılmaz, 2009; Kızıloğlu et al., 2013) (Table 2).

As a result of eigenvalues statistics and screen plot examination in factor analysis of consumers' "knowledge, attitude and behaviors on tropical fruit purchase", 14 titles were gathered under four factors. The first factor, total and cumulative variance, was found to explain 27.49 %, 2. factor was found to explain 16.08%, 3. factor was found to explain 12.00% and 4. factor was found to explain 7.35% of the total variance (Table 3).

Factor number and variance based on eigenvalues statistics for consumers' knowledge, attitudes and behaviors on tropical fruit purchase.

It was understood from the rotated component matrix factor loads in Table 4 that the

14 variables of "consumers' knowledge, attitudes and behaviors about tropical fruit purchase" could be gathered under four titles "Product of Property,

Product Processed, Attractiveness Product and Packaged Product".

Table 1. Consumers of social-economic characteristics

Variables, Groups and Descriptions		Frequency	%	Std. Dev.	Mean
Dependent variable					
High consumption of awareness of tropical fruit:1		173	63.8	0. 481	
Low consumption or no awareness of the tropical fruit:0		98	36.2		
Explanatory Variables					
age	continuous variable				42.93
gender	female: 0	48	17.7	0. 382	
	male: 1	223	82.3		
marital status	single: 0	21	7.7	0. 268	
	married: 1	250	92.3		
educational status	Under high school:0	72	26.6	0. 443	
	High school or above:1	199	73.4		
Income	Continuous variable				2.220.81
Number of households	Continuous variable				3.13
In-season consumption	Not important: 0	62	22.9	0.421	
	important: 1	209	77.1		
Place of production	Not important: 0	129	47.6	0.500	
	important: 1	142	52.4		
Factor 1: Product of Property	continuous variable				
Factor 2: Processed Product	continuous variable				
Factor 3: Attractiveness Product	continuous variable				
Factor 4: Packaged Product	continuous variable				

Table 2. KMO and barlett test for consumers' on tropical fruit purchase

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.712
Bartlett's Test of Sphericity	Approx. Chi-Square	1384.346
	Df	91
	Sig.	0.000

Table 3. Consumers' knowledge, attitudes and behaviors about tropical fruit purchase

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	3.848	27.488	27.488	3.848	27.488	27.488
2	2.251	16.078	43.566	2.251	16.078	43.566
3	1.681	12.004	55.570	1.681	12.004	55.570
4	1.029	7.350	71.241	1.029	7.350	71.241

Some factors affecting the consumers' preferences

Possible variables that affect consumers' consumption of tropical fruit were determined and Table 5 is given the results of the binary logit analysis.

According to binary logit analysis results that income of the consumer processed product, attractiveness product and packaged product were variables likely to affect the level of consciousness. Adıgüzel and Kızılaslan (2014) reported in their study conducted in 2014 that the number of family members and women in the family, regular fruit

and vegetable consumption, frequency of fruit and vegetable purchase, and preferring super/hypermarkets had an influence on tropical fruit consumption of consumers living in İstanbul. Chen et al (2012) used Ordered Multi-Variable Discrete Choice Model to analyze tropical fruit consumption of consumers living in the urban and rural areas of Guangdong. The results show that income, economic development level and educational background influenced tropical fruit consumption.

Processed product and attractiveness product, found significant at 5% significance level,

affected preference level negatively. That is, the unprocessed product was expected to be 5% more fond of tropical fruit than those processed product. Or a variance of one unit in processed product was likely to change the level of consciousness 5%.

The consumers considering tropical fruits of attractiveness were expected to prefer tropical fruits 7 % lesser than those who did not. The income of the consumers and packaged of the product, found significant at 1 % significance level, had a positive effect on the preference level of the tropical fruits. A change of one unit in consumers'

income was expected to affect the likelihood of tropical fruits consumption 1%. That is, as the income of the consumers increased, the likelihood of tropical fruits consumption was expected to decrease. Consumers who wanted to buy packaged tropical fruits for health reasons were 8% more likely to prefer consuming the tropical fruits than those who didn't care about packaging. That is, an increase of one unit in the consumers who preferred buying packaged tropical fruits was expected to change the likelihood of tropical fruits consumption 8%.

Table 4. Consumers' about tropical fruit purchase in rotated component matrix

	Product property	Processed product	Appeal of the product	Packaged product
Quality	**0.743**	0.076	-0.058	-0.135
Hygiene	**0.711**	0.064	-0.260	-0.069
Natural product	**0.657**	-0.162	-0.399	0.280
Nutrition value	**0.629**	-0.040	-0.123	-0.022
Product Image	**0.624**	-0.297	-0.295	0.221
Freshness	**0.571**	-0.133	0.473	-0.052
Clean	**0.544**	-0.324	0.403	0.194
Taste and Flavor	**0.506**	-0.208	0.420	0.332
Canned	0.043	**0.817**	0.148	0.383
Dried	0.096	**0.804**	0.235	0.366
Trademark and company name	0.500	**0.595**	0.132	-0.305
Price	-0.270	-0.069	**0.614**	-0.145
Color	0.332	-0.266	**0.547**	-0.224
Packaged	0.502	0.463	-0.120	**-0.532**

Table 5. The results of binary logit analysis for factors affecting consumers' tropical fruits preference

	Coefficient	Standard Error	Z	$|z| \phi Z*$	Marginal Effect
constant	-.97028	1.12729	-.86	.3894	
AGE	-.01106	.01726	-.64	.5215	-.00184
GENDER	.03408	.47959	.07	.9433	.00566
MD	.54730	.57008	.96	.3370	.09283
ED	-.43638	.42991	-1.02	.3101	-.07067
NUMBER	-.03547	.09847	-.36	.7187	-.00589
INCOME	.00082***	.00022	3.77	.0002	.00014***
SEASON	.36883	.40659	.91	.3643	.06263
PLACE	.40467	.34821	1.16	.2452	.06848
FACTOR 1	.17162	.17716	.97	.3327	.02848
FACTOR 2	-.32090**	.15664	-2.05	.0405	-.05324**
FACTOR 3	-.44459**	.18005	-2.47	.0135	-.07377**
FACTOR 4	.46537***	.16498	2.82	.0048	.07722***

Note: ***, **, * ==> Significance at 1%, 5%, 10% level; log likelihood: -134.25225; Chi squared [12 d.f.]: 86.15138; Significance level 0.000; McFadden R^2: 0.2429154

Conclusion

This study tried to investigate the views of consumer about tropical fruits, one of the well-known products, and their attitudes and behaviors towards tropical fruits. The interviewed individuals were mainly young and middle aged. The education level of the majority of the subjects was

high school or above. That is, the study tried to measure the consciousness level for tropical fruits by collecting the views of individuals with high level education.

First, the knowledge, attitudes, and behaviors of individuals in purchasing tropical fruits was measured using 5-point likert scale with 14 variables and the variables were gathered under four factor with the help of factor analysis. The factor loads gathered under four factors as a result of factor analysis were analyzed as four of the independent variables affecting the individuals' consciousness level about tropical fruits.

It was statistically revealed that tropical fruit consumption of individuals was directly proportional to their income. As a result of the analyses, packaging, which represents both health and hygiene conditions, was also found to be a factor likely to positively affect tropical fruit preference. Appeal was expected to have a negative effect on tropical fruit purchase of individuals. That is, it was found that individuals had a willingness to buy tropical fruit and it was expected that buying preference would increase depending on the likelihood of an increase in income, and that individuals would have a tendency towards consuming tropical fruit under healthy and hygienic conditions.

The results show that income, economic development level and educational background influence consumption of tropical fruit. Along with the rapid development of Erdemli's national economy, the consumption of tropical fruit will increase by large margins in the foreseeable future.

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