DETERMINATION OF MEDICINE AND DENTISTRY STUDENTS? MARKET CHOICE AND THEIR ATTITUDES IN PREFERRING BRAND NAME PRODUCTS USING BINARY LOGISTICS REGRESSION METHOD**

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Abstract

The aim of this study is to determine Medicine and Dentistry students' market choices and their attitude in buying brand name products. Currently, price and quality of products in hypermarkets are the common features consumers care when shopping. It is well known that many people prefer cheap and quality products and maintain a relative attitude due to increasing economic difficulties.

229 medicine and 222 dentistry (totally 451) students comprise the samples of this study. A poll of 28 questions was conducted to determine the preferences of the students in shopping. Taking market preferences as dependent variable, and other related variables as independent, the parameters affecting market preferences are analyzed with Binary Logistic Regression Method.

To the question "Which market do you prefer in shopping?", 155 students (%34,4) replied BIM, 138 of them (%30.8) replied Grocer's, 88 of them (%19.5) replied Migros, 70 of them (%15.5) said Carrefoursa is the market they prefer in shopping. As result of the survey, in the first and second analysis, correct classification rates have been found to be 81.6% and 76.3% respectively. It has been found out that the most effective parameters in preferring markets for shopping are age, father's education, type of accommodation (house, dorms, with parents, etc.), buying the markets' brand name products, selling quality products, product variety, market's being modern and spacious.

In field works, because it produces more reliable results than both univariate logistic analysis and other statistical analysis when the variables representing the data are discrete variables, multivariate logistic regression analysis is considered to be the best method to be used.

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Introduction

Currently, price and quality of products in hypermarkets are the common features consumers care when shopping. Especially because of economic conditions, it is known that many people prefer cheap and quality products and maintain a relative attitude.

Multivariate statistical analysis takes the examined condition as a whole and tries to explain the dependency structure of the variables maintaining the integrity of the whole. Thus, the most important purpose of the multivariate statistics is suggested as examining the dependency structure of the variables.

Today, when the data obtained from researches is multivariate, advanced statistical methods are preferred.

Accurate and sensible results are gained only when the multivariate statistical methods are chosen properly and used according to their assumptions.

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Logistic Regression has become popular and been used frequently over the past years. This method can be an alternative to crosstabs when various assumptions, such as normality and having common covariance, cannot be maintained, and to linear regression when normality assumption is distorted as dependent variable is binary, such as 0.1, or polychotomous discrete variable. In addition to being user-friendly because of having no limit to assumptions, the analysis model's being mathematically very flexible and easily interpreted raise the interest to this method[1].

Materials and methods

The universe of our study is the students studying medicine and dentistry at Dicle University. The paradigm consists of totally 451 students, 229 of whom are studying medicine and 222 of whom dentistry. The data of our study is obtained by face to face meeting method with the help of a questionnaire. As an implementation of Logistic Regression method, a questionnaire of 28 questions is used to determine the markets which are used most frequently. Two staged logistic regression method is used to analyze the answers given to the questions in the questionnaire.

In this study the following variables have been examined: age (x1), sex (x2), the number of members in the family (x3), mother's education (x4), father's education (x5), who supports you to supply your needs? (x6), monthly approximate income (x7), place of accommodation (x8), do you get credits (x9), do you get scholarship (x10), which do you prefer most in your shopping? (x11), do you buy products named after markets? (x12), which do you buy more among the product groups (food) named after markets? (x13), which do you buy more among the product groups (cleaning products) named after markets? (x14), which do you buy more among the product groups (beverage) named after markets? (x15), how is the price of the market brand named products compared to rival firms? (x16), how is the quality of the market brand named products compared to rival firms? (x17), which market or shop card do you use in shopping? (x18), do you think the discounts in the market or shops are sufficient? (x19), the criteria affecting your preference of brand name products: price (x20), quality (x21), package attraction (x22), the

supermarket where the product is sold (x23), ease of finding the product on the shelves (x24), product range (x25), special discounts (x26), modern and spacious shopping atmosphere (x27), cleanness and neatness of product exposition (x28).

For the analysis of the data SPSS 15.0 (SPSSFW, SPSS Inc., Chicago, Il., USA) packet software was utilized. The proper method was determined to identify the reference groups and coefficients of categorical variables. By implementing logistic regression analysis to these data, Wald statistics and degrees of freedom, standard error, 95% confidence intervals, odds rates and proper classification rates were calculated.

Binary Logistic Regression Analysis

This is the examination of logistic regression analysis identifying the relation between the binary answer set and independent variables set consisting of discrete and continuous variables.

Besides being a regression analysis, Logistic Regression analysis also functions as a method of discriminatory analysis. Logistic regression bears the ability of filtering ineffectual variables by modeling the variables effective on dependent variables. Normal distribution does not necessitate the presuppositions of continuity assumption. Using logistic regression, by determining possible effects of independent variables on dependent ones, the risk factor is determined as possibility[2].

The difference of logistic regression from other regression methods is that it is such a flexible method that can be applied if the dependent variable has the nature of discrete or categorical variable containing more than two categories[1,2-5].

In logistic model, y is a dichotomous dependent variable and 1xp size independent variable vector is x, $\pi(x)= E(y| x)$ cardinality is used to show conditional mean of y with respect to x. Logistic regression model is written as

$$\pi(x)= \frac{e^{\beta_0+\beta_1 x_1+\beta_2 x_2+\ldots\ldots \beta_p x_p}}{1+ e^{\beta_0+\beta_1 x_1+\beta_2 x_2+\ldots\ldots \beta_p x_p}}$$

Here β_0 is invariant, $\beta_0, \beta_1, \ldots, \beta_p$ are regression coefficients, and $\pi(x)$ is the conditional

probability of dependent variable with respect to x when it equals[1].

In this model, it is difficult to guess the value of dichotomous dependent variable referring to independent variables that may have the value between -∞ and +∞.

The best solution to dispose this condition is to make the probable value of dependent variable identified between -∞ and +∞. To achieve this, relying on π(x), the following model is gained by implementing logit transformation to logistic regression model.

$$g(x) = \ln\left(\frac{\pi(x)}{1-\pi(x)}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \text{.......} + \beta_p x_p$$

Logit g(x) is a linear function that can have a value between -∞ and +∞ abide by the range of $x^{1-3,5}$.

Results

Logistic regression has implications in many areas. After determining independent variables by univariate logistic regression analysis, the importance of each variable added to multivariate model should be presented.

Logistic regression method was applied to the data gained from the questionnaire about students' market preferences and their attitude in buying brand name products. As the result of application, coefficients of variables in the equation, standard errors, Walt statistics, degrees of freedom in Wald statistics, materiality levels of coefficients (p), Exp(B) and 95% confidence intervals were examined.

The unimportant variables in multivariate model were excluded though they had been found important in univariate model. Thereby, the resulting model was derived.

Analysis was carried out in two stages. In the first stage, all the variables were taken into the model and variable filtering method was applied.

Logistic regression analysis was carried out considering dependent and independent variables. The success of filtering equation in classification was calculated as 81.6%.

The results showing the success rates of filtering equation in classification can be found in Table 1.

Observed	Expected 0	Expected 1	Percentage Correct(%)
(Grocery) 0	82	56	59,4
(Supermarket) 1	27	286	91,4
Total			81.6

Table 1. Classification results for the dependent variable of y

The main goal in the established models is to choose independent variables that can explain the variation in dependent variable best and that can be effective in identification of dependent variable's various levels.

For this, 28 independent variables were taken into model, and these variables' confidence intervals of 95% probability of odds rates, Wald statistics probability, standard error, degrees of freedom of regression coefficients related to the variables, and materiality levels were added.

It was decided that the variables whose p values in question are smaller than 0.25 (p<0.25) would not be taken into multivariate logistic regression model[6].

In the process, considering Hosmer and Lemeshow's suggestion of p<0.25 materiality level, it was decided that the contribution of 17 of independent variables to the model was significant, and that they deserve to be added to the model, however, that other variables are to be excluded.

In the second step of our analysis, backward selection method was applied. As a result, the variables kept in the model, coefficients related to variables, standard errors, Wald statistics, materiality levels of coefficients (p), Exp(B) and 95% confidence interval values can be found in Table 2.

Variable	B	Std.Error	Wald	p	OR	95% CI Lower	95% CI Upper
X1	-0.205	0.058	12.613	< 0.001	0.815	0.728	0.912
X3	-0.117	0.052	5.035	0.025	0.890	0.804	0.985
X8			8.900	0.031			
X8(1)	1.012	0.388	6.799	0.009	2.752	1.286	5.890
X12(1)	0.661	0.242	7.499	0.006	1.938	1.207	3.111
X16			9.525	0.049			
X18			11.225	0.047			
X18(2)	1.336	0.651	4.207	0.040	3.804	1.061	13.640
X25			12.420	0.014			

Table 2. Results of logistics regression analysis with backward selection method

Considering Table 2, seven variables were kept in the equation as a result of backward selection method. They are X1:age, X3:number of family members, X8:place of accommodation, X12:buying products with markets' brand name, X16:how do you find the price of market brand named products compared to their rivals, X18:which market or shop's card do you use, X25:Product range. Other variables were excluded from the equation considering their materiality levels and at the gradual steps of backward selection method. The coefficients of the variables kept in the model are considered to be material with respect to the criterion of p<0.05.

In the second step of our analysis, the results were derived using backward selection method. The successful classification rate of the equation derived from backward selection method was calculated to be 76.3%.

Since the result given in this part reveals the analysis of step by step backward selection method (Backward LR), the results are also presented stepwise.

The classification results in each step and proper classification rates are given in Table 3.

As seen in Table 3, the backward selection method was carried out in 12 steps. In the last analysis, you can find the results of the equation derived. According to the result, the proper classification rate found with backward selection method is 76.3%.

Observed		Expected		
		Y		Percentage Correct %
		0.00	1.00	
Step 1 Y				
0.00		69	69	50.0
1.00		28	285	91.1
				78.5
Step 3 Y				
0.00		66	72	47.8
1.00		33	280	89.5
				76.7
Step 6 Y				
0.00		64	74	46.4
1.00		35	278	88.8
				75.8
Step 9 Y				
0.00		59	79	42.8
1.00		31	282	90.1
				75.6
Step 12 Y				
0.00		56	82	40.6
1.00		25	288	92.0
				76.3

Tablo 3. Classification results at each steps in backward selection method

As clearly seen at double step analysis, it can be said that the best approach is the second one because it is not a proper approach taking all variables in the model for calculation when using multivariate models. In such models, a proper model should be derived using a way of filtering variables. As a matter of fact, it is said that the models that take into consideration all the variables are not so practical because they contain too many variables[7].

According to the results of the analysis, it is found out that while students are making up their mind where to shop, the most influential factor on this decision is the price of the products. Among the students who declared that they decide where to go shopping according to the prices of the products, 73% of them said that they go shopping in supermarkets, while only 26.8% in grocer's.

In preferring brand name products as well, it is seen that students prefer supermarkets (74.3%) more than grocer's (25.7) as in price of the products. (OR= 1.671   (1.116-2.501) ; p=0.012).

It is found out that the kind of product is also important in choosing a shopping place and in whether to prefer brand name products or not. For instance, it is found out that in their preferring brand name products, students rank food (60.3%), cleaning stuff (52.3%), and beverage (51.0%).

When they consider product quality, in their preference of supermarket or grocer's, students replied supermarkets with the rate of 68.9 and grocer's 31.1%.

Another important parameter influential on students' preference of supermarkets or grocer's has been found to be the "special discounts". Among the ones who find this factor important, 74.4% of them said that they prefer supermarkets, whereas only 25.6% replied grocer's.

Discussion

Shopping habits are affected by various factors. They can be listed as needs, previous experiences, and location of the shopping centers. Apart from them, brand name of products is also known to be influential on shopping preferences[8]. In a survey, it was found out that there is a very significant correlation between tendency to special brand names and income level, education level, and family size[9]. In another study, there could not be found a sensible correlation between brand name tendency and age, however, it was said to be

found a relation between the tendency and family income, marital status, and family size[10].

In a study conducted by Burton and his friends to identify the reasons to prefer brand name products, worked out that special brand name tendency is not independent of education level and family's income level, and that consumers differ from each other to prefer special brand name product according to their personal characteristics on the area. On the other hand, another result of the study was that the tendency to prefer special brand name products does not differ meaningfully according to age and sex of customers[11].

In another study, it was found that when buying food and a cleaning stuff, the brand name is important to be preferred, however, that price advantage is considered more important[12]. In another study on special brand name products conducted in the USA, they discovered that the desire for buying brand name products can be correlated with customers' demographic and financial status[8].

Another study presented that there exists a significant relationship between possession of a market card and age, gender, education level, income, household size, and occupation[13].

In another study conducted in Erzurum, Turkey showed that education level and marital status are significant parameters in preference of brand name products[14].

Another face to face meeting survey conducted with 600 people in Konya, Turkey discovered that women consider ease of transportation, while men consider credit card acceptance, car park, and children's park to be the most influential factors in the market preference[15].

About another subject of this study, which is market preference, a study discovered that markets are preferred by lower income individuals due to their fresh, quality, cheap, and wide range of products supply[16].

In this study, it has been ascertained that students prefer markets for shopping. The ranking of the product types they buy there is food, cleaning stuff, and beverage. In their market preference, BIM takes the first place with the preference rate of 34.4%.

This ratio is approximately 4% higher than that of those who declared that they prefer grocer's for shopping.

Conclusion

In this study to identify the parameters determining students' preference of market/grocer's and of brand name/unmarked products, according to logistic regression results, price and quality of product and special discounts are significant parameters influential on preference of market/grocer's. In this research, in which preference of brand name products could not come to the fore, it is determined that preference of brands has a clearer effect on shopping in markets.

The Consumer Style Inventory (CSI) that they have developed consists of eight mental consumer style characteristics; Perfectionistic-high-quality conscious, brand conscious-"price equals quality", novelty-fashion conscious, recreational-hedonistic, price conscious-"value-for-money", impulsive-careless, confused by overchoice and habitual, brand-loyal consumer.

According to the findings of this study, the university students in Turkey have been found to possess the characteristics of Perfectionistic-high-quality conscious, brand conscious-"price equals quality" and price conscious-"value-for-money". The reason for this is thought that they live on the financial support of their parents rather than scholarship from the state[17].

The students' budget being so limited drives the price of product forward in market preference. As a result of this, the market chains selling cheap and quality products come to the fore.

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