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DETERMINING OF THE EFFECT OF COSMETIC PRODUCT LABELS ON PURCHASING PROCESS USING LOGISTIC REGRESSION ANALYSIS

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ABSTRACT: *The aim of this study is to reveal whether label has an effect on cosmetic products purchasing process of 442 students chosen by simple random sampling at different departments in Dumlupınar University and the effect of the information on the labels of these products on the purchasing process using logistic regression analysis. In line with this purpose of the study, first, as a result of logistic regression analysis, using forward selection technique to determine whether label has an effect on cosmetic products purchasing process and what characteristics customers who check a label for information have, it is determined that gender (1-Female), preference of the same brand (1-Yes) and frequency of checking label information (1-Always, 2-Sometimes) are effective factors. Moreover, as a result of logistic regression analysis to reveal whether the information of the label of cosmetic products is effective on purchasing of these products, the important variables are determined to be product name, product brand, name of the manufacturer, ingredients, net weight, production date, expire date, shelf life, information about whether it is a natural/organic product/symbols, information about whether it involves substances hazardous to health/ symbols, information about the use / preparation of the product, quality assurance/ information about whether it has any standards, information about its probable side effect and product price.*

KEYWORDS: Label, cosmetic products labels, purchasing process, logistic regression analysis

INTRODUCTION

Label is an information note about the product (Gauhier et al. 2010:163-166). Evolving into complex graphs from a simple form, label is a part of packaging. Label introduces the product or the brand, shows when, where, how and by whom the product was manufactured, informs the buyer about the ingredients and promotes the product with graphic designs (Kotler and Armstrong, 2008:227). A strong corporate brand needs a label as well as a good image, logo, defining colours and advertisements (Kotler, 2003:27). Label is an important element in revealing the characteristics of a product that distinguish it from its rivals (Perreault and McCarthy, 2002: 176). Label is a communication tool used for such products

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as food, textile, medicine and cosmetics. According to the guideline determined by the European Cosmetic Association, it is compulsory to include information on cosmetic product labels about the manufacturer's name and origin, the product's volume, amount, package weight, expire date, batch number, functions, ingredients and special warnings like whether it is inflammable with a view to informing customers (Colipa, 2011:1-32).

The aim of this study is to determine whether label is effective on cosmetic product purchasing process of customers and the effect of the information of these product labels on the purchasing process of these products using logistic regression analysis. There are certain methods to accredit observations to the probable groups in data structure. These methods are cluster analysis, discriminant analysis and logistic regression analysis. In logistic regression analysis, the number of the groups in data structure is known and, thanks to these data, a discrimination model is obtained. Using this model, accrediting the new observations to the data set is done (Başarır, 1990: 1). The aim of using logistic regression analysis is the same as that of the other model structuring techniques used in statistics: forming a model that can define the relationship between dependent and independent variables using the fewest variables to achieve the best coherence. (Press and Wilson, 1978: 2).

In case of statistical assumptions breakdowns and in case of a binary dependent variable being 0 and 1 or in case of polychotomous discrete variable involving more than two levels, logistic regression analysis is recommended that does not restrict the independent variables as being categorical or continuous and can be used to accredit observations. Logistic regression analysis is an efficient and analyser method in marketing research is commonly used in determining the customers' profile of a certain product, their purchasing behaviours and forming marketing strategies accordingly (Yeung and Yee, 2011:71, Duquenne and Vlontzos, 2012:61-79, Bigne et al. 2005:193-204, Chandra and Menezes, 2001:77-96).

The study is comprised of five sections. In the first section, the problem examining the effect of label on customers' purchasing cosmetic products and the customer profile using label in purchasing process. In the second section, "label" concept and its importance in cosmetic products are explained. In the third section, research methodology; in the four section, application and findings of logistic regression analysis conducted to determine whether label is effective in cosmetic product purchasing process and the customer profile using label. In the last section, discussion and implications.

LİTERATURE REVİEW

Label

Label is one of the elements of package communication. It varies depending on the package material and type and is printed either on the package or on a separate material. During purchasing process, customers access to important information about the product through label (Odabaşı and Oyman, 2002:244-251). Label should be easily recognizable on the package, should be legible and comprehensible and should show the product brand, logo and colors. Also, expire date, suggestions for safe use, product barcode and content should be involved in it (Erdoğan, 2014:316).

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Label is used as a communication tool that enables customers to recognize such goods used continuously lifelong as food, health goods, textile and cosmetics and to distinguish them from their rivals. It is obvious that food product labels have an important role in informing customers (Prathiraja and Ariyawardana, 2003:35). When they are designed as easily-comprehensible, customers can access to the necessary information and can make a healthier choice of products. Moreover, the fact that label is a guide for customers in product selection is motivating for food industry to develop healthier products as well as presenting better price, savor and suitable package (Philipson, 2005:262-264).

In the labels of food products, the product name should first of all exist together with amounts of the ingredients and other compulsory information like net weight of the product, expire date, special storage and/or using conditions, name of the manufacturing company, wholesale or vendor, its origin and in drinks the amount of alcohol, if any, and special signs should be easily-recognizable, legible and in unfading colors (Thomson, 2011:11-13).

Labels of food products should include the reasons for customers to buy those products. Using labels of food products consciously enables customers to get extensive information about the products, which stems from the healthy-life-oriented understanding (European Food Information Council, 2013:1-10). Nayga et al.(1998:106-119) state that socio-demographic characteristics of customers and health-related factors have effects on the use of food product labels and that the importance of food product labels has increased with the rise of education levels of customers. Drichoutis et al. (2006:1-22) emphasize that especially the customers demanding diet products are more sensitive to food product labels and generally prefer labels expressed with graphics or colors rather than amount-oriented ones. Furthermore, they also state that labels are effective on purchasing behaviors and these customers prefer healthier products. Kim et al. (2000: 215-231) reveal that food product labels are used to show the calorie content as well as cholesterol and sodium contents. They also advocate that using food product labels are beneficial to public health and long life as well as decreasing expenditure on health services.

Ollberding et al. (2010:1233-1237) claim that the usage rate of food product labels especially among adult customers should be raised and awareness of better nutrition should be emphasized to improve the positive effects of food product labels on public health. Kiesel et al. (2011:21-30) allege that such information as certain product characteristics, reliability and production place and even the color of the ink are effective in food product choice of customers. They reveal that customers generally perceive the label information about nutrition as useful, prefer short but essential information and believe that the claims of the producers about the product are audited by the state regularly. They also conclude that most customers read product labels while purchasing food products. They add that in the USA, food product labels have prompted a great enhancement in terms of health. They also state that using labels and food consumption behaviors have changed in time and that these behaviors are affected by such factors as health concerns, taste, income and culture.

Nayga (1999:29-43) emphasizes that perceptions and beliefs of customers about the use of food product labels are affected by certain factors and show discrepancies and adds that

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elderly customers with low-income believe that food product labels are beneficial for them. He also shows that compared with the black, the white know how to use food product labels while choosing healthy diet products. He claims that male customers with low income less adopt the opinion that reading labels simplifies food choice. On the other hand, he explains that low-income and black customers prefer using product labels less while choosing food products and trust their own knowledge about the products. Annunziata and Vecchio (2012:103-114) emphasize that the need for taking political measures for nutrition has been understood as obesity danger has exacerbated in the USA.

This understanding has led to new regulations for nutrition with the new laws for food product labels enforced in 2011. On the other hand, in Italy, the factors affecting comprehension and use of food product labels are determined, which has enhanced applications for such labels. In this process, educational campaigns have been a precious asset. Also, efforts of marketing experts and the state to lead customers to health programs through effective communication strategies have improved.

In parallel with food sector, label should also fulfill its duty of information in textile products. If textile products have been prepared for end customers, brand name, user manual and textile texture content should be shown on the label clearly and legibly. Texture content of textile products that include various components should be shown on the label. Also in shoe products, information about internal and external lining and insole of the product should be on the label with visual images (Thomson, 2011:p.177-179).

On the other hand, label is also important for healthcare products. If it is considered necessary to reflect certain characteristics of a product on the label, this arises from the need for informing the customer about the purchasing and using process. If this requirement isn't taken into account while labeling medicine, consequences threatening human health might occur. Giving such information as how to use and in which conditions not to use a medical product on the medicine labels affects choosing that medicine and its usage process directly (The Controlled Substances, Drugs, Device and Cosmetic Act, 1972).

Cosmetic Product Labels

There are certain factors affecting the choice of cosmetic products by customers. Cultural and educational value judgments of the society in which the customer lives and his/her awareness of the advertisements about the product are effective on his/her consumption behavior. Moreover, such factors as product package, its window display, its fitness for the purpose, its smell, its image and price are also effective on the purchasing choice of customers. Information of customers about a product is mostly shaped upon what is written on the label. Product information on the label of cosmetic products are regarded to be true by customers and it is thought that product features are defined on the label (Kapucu,2013 :1-29). If there are special precautions to be taken by the customer while using a cosmetic product, presenting them on the product label enables customers to use this product safely (Turkish Drug and Medical Device Institution, p.3).

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Cosmetic products are useful in that they have a crucial role in personal hygiene, skin care and skin protection. It is rarely thought that cosmetic products could be hazardous; however, in fact, using cosmetics is not always safe. The benefit customers get from these products should be enhanced by controlling the content of such products as much as possible and producing reliable products seeing that they are used in a large portion of human life (European Commission, 1999: 32-37).

Cosmetic products, despite their useful functions, might also cause unpleasant or even dangerous cases due to the possibility of involving hazardous ingredients and microbiological contamination. If there are health-threatening ingredients in cosmetic products, customers should be informed about it and such products should be exposed to special classification. This obligation is conducted through labeling system according to Classification, Labeling and Packaging Regulation of EU. Risk reporting for customers should be promoted in terms of moral concerns (Klaschka, 2012:24-37).

CLP regulation enforced in 2008 encompasses classification of product ingredients and labeling and packaging the product according to this classification. CLP became compulsory in June 2009. In this process, United Nations came up with new criteria for classification and labeling of chemical substance involving products and the previous system was revised. Classification and labeling according to CLP continued until December 2010. The time between 2010 and 2015 is the transition period to the new system and during this time both systems are valid; however, after June 2015, the products are required to be classified and labeled according to the new CLP measures. The products in supply chain are expected to have completed their transition process by June 2017 (Prinz, 2013: 1-20). CLP entails businesses to check whether there are certain signs and risk words and whether they contain any hazardous cases on product labels. It also obligates involving safety content information on labels.

A cosmetic product label has to include signs showing the hazardous ingredients to do away with perception problem in different languages, appropriate sign words, danger expressions and appropriate precaution expressions (Fanghella and Catone, 2011:126-130). Cosmetic products are attached importance to and cared about less than medicine in terms of content and quality control. However, cosmetic products should also pass through a good production process. Today, labeling is required not only to show the ingredients of these products but also to inform customers about whether animal tests have been carried out during manufacturing processes, during which a policy of conserving animals should be followed.
When tests are carried out on animals and/or animal-based ingredients are used during manufacturing processes of these products, it is hardly surprising to meet reactions from vegetarians, religious groups and advocates of animal rights. In order to avoid such objections, these matter should be paid attention to and it should be stated clearly on product labels that no tests have been conducted on animals and the product does not involve any animal-based ingredients (Nanda, 2006: 3, Crowe, 2007:1-17).

The claims of cosmetic product brands that they are natural and organic should be on their label on the condition that they really are so (Turkish Drug and Medical Device Institution,

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p.4). Since organic products are preferred more, label is very important for such cosmetic products in informing customers about it. Labeling of organic cosmetic products is effective on diverting customer preferences to these products. However, when the labels on organic cosmetic products do not include such necessary information about the product features or there is a lack of information on the label, awareness in customers for these products cannot be achieved (Neweli-Guz, 2012:36-42).

RESEARCH METHODOLOGY

The aim of the study is to determine whether label is effective on cosmetic product purchasing process of 442 students at various departments of Dumlupınar University chosen by simple random sampling method and the effect of the information on the product labels on product purchasing process using logistic regression analysis. Logistic regression analysis has recently been used commonly especially in social sciences.In numerous socio-economic studies conducted to reveal the cause and effect relations, some of the variables consist of two-level data like positive-negative, yes-no, satisfied-not satisfied. Logistic regression analysis has an important place while analysing the cause and effect relation between dependent and independent variables when the dependent variable is composed of two-or-multiple-level data (Agresti, 1996: 103).

In logistic regression analysis, as well as classification, the relation between dependent and independent variables is also sought and there is no obligation for all or some independent variables to be continuous or categorical. Logistic regression analysis, when some statistical assumptions aren't ensured as in the case of regression analysis not possessing normality, equal variances and covariances, is an alternative method for discriminant analysis and crosstabs.

Attention to this method increases thanks to its mathematical flexibility and easy interpretation as well as its applicability in the case of a dependent variable being discrete variable involving two or more levels like 0 and 1. Logistic regression analysis is a regression model enabling classification and accrediting. It has no prerequisites like normal distribution or continuity assumptions. The effects of independent variables on dependent ones are obtained as probability, which allows determining the risk factors (Hosmer and Lemehow, 2000:2-4).

Logistic regression is well suited for describing and testing hypotheses about relationships between a categorical outcome variable and one or more categorical or continuous predictor variables. The simple logistic model is based on a linear relationship between the natural logarithm (ln) of the odds of event and a numerical independent variable. The form of this relationship is as follows:

$$\mathrm{L} = \operatorname{logit}(Y) = \ln(odds) = \ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 X_1 \quad (1)$$

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where Y is binary and represent the event of interest (response), coded as 0/1. The logistic formulas are stated in terms of the probability that Y=1, which is referred to as π. The probability that Y is 0 is $1-\pi$. X is the independent variable, β_0 and β_1 are the Y-intercept and the slope, respectively. The logistic regression model may be written in terms of π, the risk of event Y, assuming that L is a linear function of X as follows:

$$\pi = \frac{e^{\beta_0+\beta_1 X_1}}{1+e^{\beta_0+\beta_1 X_1}} \quad (2)$$

where π is the probability of outcome of interest or "event", and e=2.71828 is the base of the system of natural logarithms. X can be categorical or continuous, but Y is always categorical.

Extending the logic of the simple logistic regression to multiple predictors, one can construct a complex logistic regression for Y as follows:

$$\mathrm{L} = \mathrm{logit}(Y) = \ln(odds) = \ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 X_1 + \ldots\ldots\ldots\ldots + \beta_k X_k \quad (3)$$

Therefore,

$$\pi = \frac{e^{\beta_0+\beta_1 X_1+\ldots\ldots\ldots\ldots+\beta_k X_k}}{1+e^{\beta_0+\beta_1 X_1+\ldots\ldots\ldots\ldots+\beta_k X_k}} \quad , \quad \left(Y = \beta_0 + \beta_1 X_1 + \ldots\ldots\ldots + \beta_k X_k\right) \quad (4)$$

where π is once again the probability of the event, β_0 is the Y-intercept, β_k are regression coefficients, and X_k are a set of predictors. When $\pi \geq 0.5$, Y=1 and when $\pi < 0.5$, Y=0 categorizing is done. β_0 and β_k are typically estimated by the maximum likelihood (ML) method, which is preferred over the weighted least square approach.

The ML method is designed to maximize the likelihood of reproducing the data given the parameter estimates (Haberman: 1978; Schlesselman: 1982). Interpreting the predicted

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regression coefficients in logistic regression analysis isn't as easy as in linear regression model. It is difficult to compute the effect of 1 unit increase in X axis in logistic regression model prepared for a starting point on X axis. For example, while interpreting β_1 coefficient, logistic regression function obtained by multiplying exp(β_1) with $\left(\frac{\pi}{1-\pi}\right)$ odds prediction for 1 unit increase on X_1.

Logistic regression is a guide in deciding about products. Demirtaş et al. (2009:866-975) explain the perceptions of consumers about product style using logistic regression method, determine the most appropriate design parameters for product image and with that study, contribute to that product's manufacturers. Utami et al. (2007:79) determine the marketing strategies to be followed by manufacturers of a national food product so as to maintain its sustainability using logistic regression method. And in that study, the importance of low-price applications, determination of customer characteristics and appropriate promotion efforts are emphasized.

Logistic regression method is also used commonly while determining product users. Uva and Cheng (2005:177-184), using logistic regression method, define the customers characteristics who are willing to pay high price for better quality fruits and it is revealed with that study that opportunities can be created by applying different distribution channels and marketing strategies to different customer base. Cruz et al. (2011:549-554) find in their study, conducted to determine customers' approval of probiotic yoghurts and intend to purchase them using logistic regression method, that the most important factor in decision-making is savor due to the change in product ingredients.

On the other hand, Gordon et al. (2009:66), using logistic regression method, reveal a relation between starting to have alcohol, drinking behaviors and intends of 12-14 aged youngsters and varieties of alcohol marketing communication. Calafat et al. (2005-2006:679-684), also using logistic regression method, analyze the urine samples of 2.548 people aged 6 and above years in the USA to determine exposure to four paraben types in products in terms of gender, race, age and household income and conclude that compared with the white, the black are exposed to these substances more at 60 or above ages.

They also reveal that young and adult females are more exposed to these substances tan males of the same age group. Press and Simms (2010:183-196) separate the customers in England who have used teeth-whitening service into certain segments and, using logistic regression method, determine the differences of these segments from one another and how marketing strategies of these market segments should be. Abduh et al. (2012:933-938), again using logistic regression method, put forth the factors in defining the bank customers in Indonesia as Islamic and conventional bank customers. Toppinen et al. (2013:775), using logistic regression method, reveal the consumer perceptions about environmental and social sustainability of wooden products and determine the customer profile using these products.
As a result of this analysis, they determine that customers are willing to pay the required price for these products, possess environmental and social conscious and are elder people and

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female. Kulcsar (2010:75), using logistic regression method, try to determine the characteristics of tourists in terms of development of the visited area upon the factors of visiting aims and frequencies. Shao and Li (2011:258-263) also uses logistics regression method in measuring the effect of individual advertisement channels as well as customer classification that determines positive and negative attitudes towards digital advertisements in purchasing decisions.

Baxter (2009:1-13) use logistics regression method while trying to determine whether previous direct experiences are effective on the brand awareness of children of 7-12 age group about child brands and find that previous direct experiences are significantly effective on the brand awareness of children. Agaku et al. (2013:1) compare in their study the incidence of exposure to tobacco products in children of 13-15 age group in countries with medium-level income, using logistic regression method, evaluate the effect of exposure to tobacco advertisements on this age group smoker youngsters and reveal that precautions are required to decrease exposure to such advertisements.

Ling et al. (2014:751), in their study emphasizing the importance of social advertisements in decreasing tobacco use among teenagers, in order to determine the changes in daily tobacco use and excessive alcohol consumption, make use of logistic regression taking demographic characteristics, alcohol use, openness to advertisements, sensitivity to trends and attitude factors towards tobacco and conclude that social branding decreases tobacco use among teenagers.

Migueis et al. (2013:6225) use logistic regression method to determine the customers likely to leave a business within the context of customer relations management which is important for profitability of a business and thus contribute to decreasing the risk levels of customers and businesses' taking necessary precautions to prevent customer. Guido et al. (2011:993), in order to determine the factors effective in purchasing decisions of customers and reply rates of customers to direct marketing applications of businesses, taking the criteria of customer profile, probability of being attracted to promotions and expected purchasing behavior into account, use logistic regression method to reveal the relation between the variables. Winterich and Barone (2011:1547) classify choices of customers for monetary and non-monetary promotions with logistic regression method according to social identity and self-interpretation of customers.

Fogel and Raghupathi (2013:28-35) use logistic regression method to evaluate opening and reading cosmetic product spam mails and purchasing the cosmetic product whose advertisement are shown in spam mails in terms of demographic characteristics, internet and attitude towards internet. They find that compared with males, females open and read the advertisements in cosmetic product spam mails and they emphasize that trust in internet is crucial in purchasing the product advertised in spam mails. Unnithan (2003:146), in his study to determine the effects of personal factors on consumption of personal-care products using logistic regression method, classifies the participants according to their using cosmetic products rarely and frequently taking the variables of self-esteem, self-consciousness, plausibility and gender into account.

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ANALYSIS AND RESULTS

In this study conducted to determine whether label is effective on cosmetic product purchasing process of 442 students of Dumlupınar University and the effect of the information on the product labels on product purchasing process using logistic regression analysis, the research data are obtained from a questionnaire conducted on students personally. The first part of the form contains questions about the demographic characteristics of the participants and the second part is comprised of 7 questions about the participants'' cosmetic product purchasing frequency, brand preference, health factor affecting purchasing, individual social responsibilities, label reading frequency, customer experience of label using and the effect of label information on purchasing process. In this study, since the dependent variable is a two-level categorical variable, the most important independent variables in "label information is effective on cosmetic product purchasing process" during logistic regression analysis are given below.

X_1=Gender (1-Female, 2-Male)

X_2=Monthly Allowance (1-500 and below, 2-501-1000, 3-1001-1500, 4-1501-2000, 5-2001 and above)

X_3=Purchasing Frequency (1-often, 2-sometimes, 3-never)

X_4= Preference of the same brand (1-yes, 2-no)

X_5= Existence of a health problem that affects purchasing (1-yes, 2-no)

X_6= Individual social responsibilities (membership to environmental protection clubs) (1-yes, 2-no)

X_7= Individual social responsibilities (membership to animal protection clubs) (1-yes, 2-no)

X_8=Frequency of reading label information (1-often, 2-sometimes, 3-never)

X_9= Adequacy of label information (1-yes, 2-no)

The dependent variable Y is coded as;

1- Label information is effective on cosmetic product purchasing process.

2- Label information is not effective on cosmetic product purchasing process.

Table 1 shows frequency and percentage of demographic characteristics of 442 participant students.

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Table 1. Demographic Characteristics of Students

Variable		Frekans	Percent	Valid Percent	Cumulative Percent
Gender	Female	247	55.9	55.9	55.9
	Male	195	44.1	44.1	100.0
	Total	442	100.0	100.0	
Monthly Allowance	500 & below	288	65.2	65.2	65.2
	501-1000	130	29.4	29.4	94.6
	1001-1500	6	1.4	1.4	95.9
	1501-2000	2	0.5	0.5	96.4
	2001 & above	16	3.6	3.6	100.0
	Total	442	100.0	100.0	
Purchasing Frequency	Often	244	55.2	55.2	55.2
	Sometimes	193	43.7	43.7	98.9
	Never	5	1.1	1.1	100.0
	Total	442	100.0	100.0	
Preference of the Same Brand	Yes	293	66.3	66.3	66.3
	No	149	33.7	33.7	100.0
	Total	442	100.0	100.0	
Existence of a Health Problem	Yes	31	7.0	7.0	7.0
	No	411	93.0	93.0	100.0
	Total	442	100.0	100.0	
Membership to Environmental Protection Clubs	Yes	44	10.0	10.0	10.0
	No	398	90.0	90.0	100.0
	Total	442	100.0	100.0	
Membership to Animal Protection Societies	Yes	10	2.3	2.3	2.3
	No	432	97.7	97.7	100.0
	Total	442	100.0	100.0	

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Table 1 shows that the participants are composed of 55.9% female and 44.1% male students. In terms of their monthly allowance, it is seen that 65.2% have 500 tl and below allowance, while it is between 501 and 1000 tl for 29.4%, between 1001 and 1500 tl for 1.4%, between 1501 and 2000 tl for 0.5% and 2001 tl and above for %3.6. Accordingly, it can be said that for the majority of the students, their allowance 500 tl and below. In terms of cosmetic product purchasing frequency, it is determined that 55.2% of the students do it frequently, while 43.7% do it sometimes and 1.1% never buy cosmetic products.While 66.3% of the students prefer the same brand during cosmetic product purchasing process, 33.7% do not have a preference for a specific brand. In terms of health problems that could have an effect on cosmetic product purchasing process, 7.0% of the students state that they are careful in choosing cosmetic products due to their health problems, while 93% state that they choose cosmetic products without being under such a pressure. It is also seen that 10% of the students have membership to environmental protection clubs whereas 90% are not members to such clubs. On the other hand, only 2.3% of the students have membership to animal protection societies whereas 97.7% are not members to such societies. Table 2 shows frequency and percentages reflecting the overall opinions of 442 students about the labels of cosmetic products.

Table 2. Overall Opinions of the Students about the Labels of Cosmetic Products

Overall opinions about the labels of cosmetic products		**Frekans**	**Percent**
Q1. Information is easily legible.	Yes	303	68.6
	No	139	31.4
	Total	442	100.0
Q2. Information is easily comprehensible.	Yes	252	57.0
	No	190	43.0
	Total	442	100.0
Q3. The meaning of the symbols is familiar.	Yes	166	37.6
	No	276	62.4
	Total	442	100.0
Q4. There are informative applications for the meaning of the symbols used on labels.	Yes	184	41.6
	No	258	58.4
	Total	442	100.0
Q5. The brand logo is easily distinguishable.	Yes	405	91.6
	No	37	8.4
	Total	442	100.0
Q6. Information, symbols and colours used in the logo are distinct.	Yes	382	86.4
	No	60	13.6
	Total	442	100.0

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Table 2 shows that 68.6% of the students state that they can read the information on labels easily whereas 31.4% state that they can't. 57% of the participant students say that label information is easily comprehensible, but 43% say that it isn't. Similarly, 37.6% of the students reveal that they know the meaning of the symbols used on labels while 62.4% say that they don't know those symbols. While 41.6% of the students say that there are informative applications for the meaning of the symbols used on labels, 58.4% state that there aren't such applications. Moreover, 91.6% of the students say that the brand logo is easily distinguishable on the label, whereas only 8.4% do not agree with it. On the other hand, 86.4% of the students say that information, symbols and colours used in the logo are distinct, but 13.6% assess this expression negatively. Table 3 shows the highest probability coefficient predictions and other outcomes obtained as a result of logistic regression analysis using forward variable selection method to determine whether label is effective on cosmetic product purchasing process of customers and which characteristics university students who look at labels to be informed about products have.

Table 3. Analysis Results of Forward Variable Selection Method

Variable	β_k	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(β_k)**
Conctant	-1.441	0.232	38.579	1	0.000	0.237
X_1 (1-Female)	-0.570	0.149	14.538	1	0.000	0.566
X_4 (1-Yes)	0.438	0.173	6.395	1	0.011	1.549
X_8 (1-Always)	-0.946	0.303	9.784	1	0.002	0.388
X_8 (2-Sometimes)	-0.557	0.249	4.995	1	0.025	0.573

According to Table 3, it is seen that the factors effective in the university students' use of label in cosmetic product purchasing process are gender (1-Female), preference of the same brand (1-Yes) and frequency of reading labels (1-Always, 2-Sometimes). Therefore, the equation to be used in classification is given below as:

$$Y = -1.441 - 0.570X_1 + 0.438X_2 - 0.946X_3 - 0.557X_4 \quad (5)$$

In multiple linear regression, interpretation of regression coefficients is clear. Regression coefficients express the amount of the change a unit change in an independent variable cause in the dependent variable on the condition that the values of the other independent variables are constant. On the other hand, interpretation of coefficient predictions in logistic regression isn't like the one in multiple linear regression. Interpretation is done using odds, which is the ratio of the probability of label being effective on cosmetic product purchasing process to the probability of it not being effective. These values are those in column Exp(β_k). According to the Exp(β_k) value in Table 3, the most important variable in label not being effective on

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cosmetic product purchasing process is **Preference of the same brand** (1-Yes). The other variables being constant, a unit increase in **Preference of the same brand** (1-Yes) variable will increase the probability of label being effective on cosmetic product purchasing process 1.549 times. Interpretations about the other variables are done similarly. In multiple linear regression, as a general significance test for coefficients, a similar test to F test is developed for logistic regression analysis. L_0 being the probability value of the model composed only of a constant term and L_1 being the probability value of the obtained model, the scale defined as $C= -2 \log (L_0 / L_1)= -2(\log L_0 - \log L_1)$ shows chi-square distribution with (k-1) degree of freedom. For significance of the equation, C= 335.013. The equation is found significant since chi-square table value with $\alpha = 0.05$ and 3 degree of freedom is higher than 7.814. Table 4 shows the classification for this equation.

Table 4. Classification Results According to Forward Variable Selection (Forward LR) Technique

		Predicted	
Observed	**1** (Label information is effective on purchasing process of cosmetic products.)	**2** (Label information is not effective on purchasing process of cosmetic products.)	**Percentage Correct**
1	370	6	98.4
2	59	7	10.6
		Overall	85.3

The classification rate of the equation (5) obtained according to the results of Table 3 is %85.3, which is rather high. Therefore, this rate is indicative of the fact that the equation is significant. Table 5 shows the frequency distribution of how often the university students read information on labels on cosmetic product purchasing process.

Table 5. Frequency Distribution of How Often the Students Read Information on Labels

		Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**
Always	**Frequency**	373	367	151	87	148	94	161	303
	%	84.4	83.0	34.2	19.7	33.5	21.3	36.4	68.6
Somtimes	**Frequency**	58	65	210	195	210	184	171	106
	%	13.1	14.7	47.5	44.1	47.5	41.6	38.7	24.0
Never	**Frequency**	11	10	81	160	84	164	110	33

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	%	2.5	2.3	18.3	36.2	19.0	37.1	24.9	7.5
		Q9	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**Q15**	**Q16**
Always	**Frequency**	342	231	49	200	165	228	99	249
	%	77.4	52.3	11.1	45.2	37.3	51.6	22.4	56.3
Somtimes	**Frequency**	72	123	95	148	199	158	122	132
	%	16.3	27.8	21.5	33.5	45.0	35.7	27.6	29.9
Never	**Frequency**	28	88	298	94	78	56	221	61
	%	6.3	19.9	67.4	21.3	17.6	12.7	50.0	13.8
		Q17	**Q18**	**Q19**	**Q20**	**Q21**	**Q22**		
Always	**Frequency**	178	188	279	358	237	91		
	%	40.3	42.5	63.1	81.0	53.6	20.6		
Somtimes	**Frequency**	166	191	126	70	163	221		
	%	37.6	43.2	28.5	15.8	36.9	50.0		
Never	**Frequency**	**98**	63	37	14	42	130		
	%	**22.2**	14.3	8.4	3.2	9.5	29.4		

As seen in Table 5 for how often the students read the information on labels during cosmetic product purchasing process, the students “always” read the product name (%84.4), brand (% 83.0), price (% 81.0) , expire date (% 77.4), production date (% 68.6) and probable side effects due to using the product (% 63.1). Furthermore, the students “sometimes” read the information about recycling of package disposal (% 50.0). On the other hand, the students “never” read information about the batch no of the product (% 67.4) and “never” pay attention to information/symbols about whether animal tests have been conducted for the product (% 50.0). The data obtained from the questionnaire are first subject to chi-square significance test, during which the variables with interval validity are analysed in logistic regression model. Table 6 shows the chi-square test results conducted to determine the relation between the dependent and independent variables in this study, in which the dependent variable is the effect of label on cosmetic product purchasing process.

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Table 6. Pearson Chi-Square Table for Frequency of Reading Information on Label

Frequency of Reading the Information on Label	Pearson Chi-square	p
Q1.Product name	11.874	0.003*
Q2. Brand	18.610	0.000*
Q3. Manufacturer	14.950	0.001*
Q4. Origin	0.001	0.999
Q5. Ingredients	9.453	0.009*
Q6. Amount of the ingredients	2.492	0.288
Q7. Net weight	15.424	0.000*
Q8. Production date	12.816	0.002*
Q9. Expire date	19.197	0.000*
Q10. Shelf life	10.119	0.006*
Q11. Batch no	0.560	0.756
Q12. Functions	2.621	0.270
Q13. Warning/symbols for inflammable products	1.765	0.414
Q14. Information/symbols about whether it is a natural/organic product	10.257	0.006*
Q15. Information/symbols about whether animal tests have been conducted	2.124	0.346
Q16. Information/symbols about whether it includes hazardous substances to health	12.635	0.002*
Q17. Information about product use/preparation	9.330	0.009*
Q18. Information about quality assurance/whether it has standards	13.855	0.001*
Q19. Information about probable side effects	12.997	0.002*
Q20. Price	30.026	0.000*
Q21. Information about storage	4.258	0.119
Q22. Information about recycling of package disposal	2.369	0.306

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According to chi-square significance test results in Table 6, the difference in "product name" (p=0.003*), "brand" (p=0.000*), "manufacturer" (p=0.001*), "ingredients" (0.009*), "net weight" (p=0.000*), "production date" (p=0.002*), "expire date" (p=0.000*), "shelf life" (p=0.006*), "information/symbols about whether it is a natural/organic product" (p=0.006*), "information/ symbols about whether it includes hazardous substances to health" (p=0.002*), "information about product use/preparation"(p=0.009*), "information about quality assurance/whether it has standards" (p=0.001*), "information about probable side effects" (p=0.002*) and "price" (p=0.000*) are significant. In other words, the differences between the independent variables and the information read on the label during cosmetic product purchasing process and the effect of label are found to be statistically significant. On the other hand, it is remarkable that the differences between the university students' opinions about information/symbols for whether animal tests are conducted for the products, storage conditions, recycling of package disposal and origin of the product and the effect of label are not found to be statistically significant. This shows sensitivity of the students to the variables listed.

Using the variables found to be significant according to chi-square significance test in Table 6 to determine whether label is effective on cosmetic product purchasing process, logistic regression analysis is conducted.In logistic regression analysis, "enter method" is used while measuring the independent variable "the effect of label during cosmetic product purchasing process.

Table 7 shows β_k parameters and Wald statistics for these parameters, degrees of freedom, significance levels and Exp(β_k) (oods).

Table 7. Logistic Regression Analysis Results According to Enter Method

Variable	β_k	S.E.	Wald	df	Sig.	Exp(β_k)
Conctant	-0.880	0.226	15.204	1	0.000	0.415
Q1	0.807	0.231	11.874	1	0.003	0.325
Q2	1.069	0.262	18.610	1	0.000	0.894
Q3	1.123	0.209	14.950	1	0.001	0.387
Q5	1.124	0.210	9.453	1	0.009	0.674
Q7	-0.966	0.197	15.424	1	0.000	0.808
Q8	1.023	0.236	12.816	1	0.002	0.359
Q9	-0.649	0.268	19.197	1	0.000	0.940
Q10	-0.840	0.217	10.119	1	0.006	0.362
Q14	-0.075	0.215	10.257	1	0.006	0.730
Q16	0.311	0.203	12.635	1	0.002	0.747
Q17	0.440	0.241	9.330	1	0.009	0.643
Q18	0.397	0.266	13.855	1	0.001	1.488
Q19	1.016	0.269	12.997	1	0.002	0.410
Q20	1.127	0.294	30.026	1	0.000	0.959

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Table 7 shows that all the independent variables are significant in the effect of label on students' purchasing process of cosmetic products ($p<0.05$).

The values of Exp(β_k) in Tablo 7 shows odds rates. Since probability rate is the ratio of the probability of an event's occurring to not occurring, Exp(β_k) denotes how many times more or which percentage more Y variable has the probability of being observed with the effect of X_k variable (Menard, 1995). In other words, odds rate shows the probability of observing two cases are how many times more or how many times less probable than one another.

The results show that since (β_k) coefficients for Q7, Q9, Q10, Q14 independent variables are negative, odds rate is interpreted as decreasing due to the negative relation. The probability of label to be effective on cosmetic product purchasing process for a new student in terms of Q7 variable is 0.808 times less probable than not to be effective, whereas Q20 variable increases the probability of a label to be effective on cosmetic product purchasing process for a new individual 0.959 times. Therefore, the equation for classification is as below:

$$Y = -0.880 + 0.807Q_1 + 1.069Q_2 + 1.123Q_3 + 1.124Q_5 - 0.966Q_7 + 1.023Q_8 - 0.649Q_9$$

$$-0.840Q_{10} - 0.075Q_{14} + 0.311Q_{16} + 0.440Q_{17} + 0.397Q_{18} + 1.016Q_{19} + 1.127Q_{20} \quad (6)$$

Validity of the model has been tested using Hosmer Lemeshow test.
H_0: The prediction equation is significant.
H_1: The prediction equation is not significant.
As a result of Hosmer Lemeshow test, chi-square value is computed X^2 ($p=0.265$)= 9.995 and since ($p>0.05$) is obtained, H_0 hypothesis is accepted.
Analysing Table 8, which shows the classification success of the logistic model to find the effect of label on the students' cosmetic product purchasing process, it is seen that the rate of accurate classification/accrediting of the observations in Logistic Regression model is 86.2%. ın other words, the model predicts 86.2% of 442 students accurately.As a result of this analysis, 57 students, who consider label in the purchasing process of cosmetic products, are not classified accurately and so are accredited to the other group, while a wrong classification is done by accrediting 4 students who don't consider label in the purchasing process of cosmetic products to the group of the students who are affected by label. In other words, 98.9% of the students who decide upon the effect of label during the purchasing process of cosmetic products and 13.6% of those who don't consider label in the purchasing process of cosmetic products are predicted accurately.

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Table 8. Classification Results According to Enter Method

	Predicted		
Observed	**1** (Label information is effective on purchasing process of cosmetic products.)	**2** (Label information is not effective on purchasing process of cosmetic products.)	**Percentage Correct**
1	372	4	98.9
2	57	9	13.6
		OVERALL	86.2

CONCLUSIONS AND RECOMMENDATIONS

Brands efforts to distinguish themselves from their rivals to gain competitive advantage are reflected intensely to both manufacturing and selling processes. Especially customers being more conscious and aware and their efforts to purchase the product/brand that will give them the most benefit make brands focus more on product development efforts and force them to inform customers in various ways about such efforts. Label is used by brands to inform customers about a product. Due to this task of label, it should be easily distinguishable and comprehensible and it should be able to give the customer the product information thoroughly. By using label accurately and efficiently in numerous products like food, health, textile and cosmetics, as well as increasing the benefit customers can get from that product, a reliable communication process will also be ensured for the business. Cosmetic products are currently used extensively by a lot of people for personal hygiene and care. Such an intensive demand for cosmetic products and the probability of involving hazardous ingredient substances for health require more careful choice in such products.

In this study, regression analysis is used to determine whether label is effective on cosmetic product purchasing process of 442 students at Dumlupınar University and the effect of the information on the labels of such products on the product purchasing process. Logistic regression analysis- which is used as a discrimination model in accrediting observations to groups in cases in which the dependent variable has two levels and there are categorical variable(s) among independent variables and which has recently found a wide application area as alternative to discriminant analysis- is also reviewed briefly in this study.

In the study, at first, whether label is effective on cosmetic product purchasing process is predicted using logistic regression analysis. For this purpose, it is first determined through the biggest probability coefficient predictions and forward variable selection technique that the variables effective in the fact that label is effective on cosmetic product purchasing process

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are gender (1-Female), preference of the same brand (1-Yes) and frequency of reading the information on label (1-Always, 2-Sometimes). The accurate classification rate according to logistic regression analysis is determined 85.3%. Accordingly, it is understood that customers give importance to the information on labels during purchasing process of cosmetic products and so label is effective on purchasing behaviour.

According to the chi-square test result, it is also seen that the equation is significant. Therefore, it is accepted that equation (5) for logistic regression is the most appropriate discrimination equation.

Also, evaluating the frequency of students' reading the information on labels during cosmetic product purchasing process, it is determined that students "always" read the information about "the product name" (%84.4). On the other hand, students "never" read the information on the label about batch no (% 67.4).

As a result of regression analysis conducted to determine whether the information on cosmetic labels is effective on cosmetic product purchasing process, equation (6) is predicted. According to this equation, it is determined using "enter method" that the variables in the fact that label is effective on cosmetic product purchasing process are product name, brand, manufacturer, ingredients, net weight, production date, expire date, shelf life, information/symbols about whether it is natural/organic, information/symbols about whether it involves hazardous ingredient substances to health, information about product use/preparation, information about whether it has quality assurance/standards, information about probable side effects it might cause and price. The result of this equation shows upon which information on the label students decide to buy cosmetic products. Therefore, designing the information on labels of cosmetic products more legibly and comprehensibly will contribute to gaining more benefit from those products for customers through getting more and clear information and thus increasing the effect of label on customers' purchasing process.

Logistic regression analysis gives 86.2% for accurate classification rate. The result of Hosmer Lemeshow test shows that the equation is significant. Therefore, equation (6) for logistic regression is found to be the most appropriate classification equation.

As in various areas, sheer competition among cosmetic brands required them to form and develop a solid relation with their customers; otherwise, customers' shifting to a rival brand is inevitable. Label is one of the ways to form communication with customers and to inform them about the product/brand. In this study, determining the effect of label on students' purchasing process of cosmetic products and the effect of every piece of information on the label on purchasing process separately will presents guiding hints for cosmetic product brands to design labels.

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FUTURE RESEARCH

A wider evaluation with a bigger sample and different universities in future studies might reveal more detailed results. It will also compared whether label is effective on cosmetic product purchasing process between students of state and special universities.

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