An Approach to Customer Lifetime Value Modeling for Service Firms[1]

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Abstract

In this study, it is aimed to develop an approach to customer lifetime value calculation and in this context individual brand switching matrices are formed. The model is specified at service firms and airline industry is selected as the workshop sector of the study. To be able to form the individual brand switching matrices by using marketing mix elements, the components of marketing mix elements of airline industry are attempted to be identified. According to the coefficients of the utility function generated, flight route and online ticket sales and reservation, which are components of marketing mix element "Place" and brand image which is a component of marketing mix element "Promotion" contributes more to customer utility than other components.

Key Words: Customer Lifetime Value, Brand Switching Matrice, Markov, Airline Industry

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Hizmet Firmaları İçin Müşteri Yaşamboyu Değeri Modellemesine İlişkin Bir Yaklaşım

Öz

Bu çalışmada, müşteri yaşam boyu değerinin hesaplanmasına ilişkin bir yaklaşım geliştirilmeye çalışılmış ve bu bağlamda bireysel marka değiştirme matrisleri oluşturulmuştur. Model hizmet firmalarına yönelik olup havayolu sektörü çalışmanın uygulama alanı olarak seçilmiştir. Pazarlama karması kullanılarak bireysel marka değiştirme matrislerinin oluşturulabilmesi için, havayolu sektörünün pazarlama karmasını oluşturan bileşenler belirlenmeye çalışılmıştır. Çalışmada ortaya konan fayda fonksiyonuna göre, pazarlama karmasının "dağıtım" öğesinin uçuş rotası ve internet üzerinden bilet satışı bileşenleri ile "tutundurma" öğesinin marka imajı bileşeninin müşteri faydasına olan katkılarının diğer bileşenlerden fazla olduğu görülmüştür.

Anahtar Kelimeler: Müşteri Yaşamboyu Değeri, Marka Değiştirme Matrisi, Markov, Havayolu Sektörü.

Introduction

As a consequence of the change in markets, the importance of evaluating consumer behavior increases (Teichert, Shehu, & Wartburg, 2008). In this context, a better understanding of the factors that affect customers' loyalty and relationship between these factors gain importance (Chen, 2008). Also, the effect of certain factors on customer loyalty and profitability differs from one customer to the other. Hence, the degree of customer loyalty and profitability should be explored at an individual level in order to optimize the return on marketing investments.

Based on the need to evaluate customers individually, customer lifetime value concept emerges. Customer lifetime value, which varies from one customer to the other, is defined as the sum of all the revenue gained from

a customer over his/her lifetime of transactions after subtracting the total costs of attracting, selling and servicing customers, by also considering the time value of money (Sohrabi & Khanlari, 2007). In this respect, the concept of customer lifetime value confronts theorists and practitioners as a strategic tool.

As a method of measurement, customer lifetime value models are composed of common components such as revenue from customer, customer's cost to the company, discount rate and customer lifetime. Customer lifetime can be defined as the time period during which the business transactions continue, meaning that consumer is kept as the customer of the brand/company. When the transactions discontinue, in other words when the customer purchases another product/brand, the lifetime value of that customer for the company drops to zero. This change in customer preferences which end up with purchasing another product/brand is called 'brand switching' and it is an essential determiner of customer lifetime value. An individual brand switching matrix is an `n x n` matrix that includes the purchasing probabilities for each of the n brands in the industry; in time t for individual customer k, depending on the brand he/she purchased lastly. This means an individual brand switching matrix contains customer's retention and acquisition probabilities, which are sine qua non for a company to calculate the lifetime value of that customer.

In general, the frequency of brand switching is more and switching possibilities are higher when the competition among substitute brands is more intense (Rajkumar & Chaarlas, 2011). Therefore, in order to develop effective strategies that enhance brand loyalty, it is essential to explore the underlying structure of brand switching and understand the reasons why customers prefer rival brands (Lim & Hwang, 2009). This is especially the case in service markets because in contrast to durable goods, services are consumed immediately and satisfaction/dissatisfaction generally takes place in a shorter period, ending up with a brand switching or retention in the next purchase. Also, the quality

of services is mostly dependent on personnel, physical evidences and processes, which make up the three additional marketing mix elements to the classic 4P's of marketing. For these reasons, it could be more beneficial to investigate brand switching in service industries aside from durable goods.

According to the literature, factors that affect brand switching are circumstance, marketing mix elements and consumers' personal characteristics (Luo, 2006). The study conducted by Morgan and Dev (1994) identified three factors that affect brand switching: circumstance, marketing mix elements which are under the control of the company and personal characteristics of consumers. Also, it is concluded in the study that circumstantial characteristics have a significant effect on brand switching because consumers evaluate products by considering their past experiences related to the product (Morgan & Dev, 1994).

Based on the facts explained above, this study is conducted in an attempt to fill in a significant gap in the literature; a brand switching model specific for service firms based on both the past experience and investments on service marketing mix elements, commonly known as the 7P's: product, price, place, promotion, personnel, physical evidence and process.

Contributions of the Study

The first contribution of the present study is the development of a brand switching model specified at service firms. Based on the fact that the service industry is quite different from the sales of goods in the marketing extent, a brand switching model for service brands is put forth in the study. The model includes service-specific variables related to contact staff, service processes and physical evidences and it attempts to measure them.

The second contribution of the study is that the brand switching model both comprises the past experience of the consumers and the service marketing mix (generally called 7P's) at the same time. Each marketing

mix element's effect on brand switching probability of consumers can easily be observed and calculated quantitatively, meaning that optimal allocation of marketing budget can be determined to maximize the retention or acquisition probability of customers, based on the perceived importance and the effect of each component, represented by β coefficients in the model. Also, the effect of past experience on brand switching probability can be calculated likewise. Based on the magnitude of the effect of past experience with the product, a chance to test the service may be offered to customers to provide a good, planned and systematic experience. In addition, the probabilities for a consumer to retain at a brand or switch to another one could be known, meaning that consumers who are more suitable for marketing investments could be identified at an individual level. As a consequence, the model helps to understand the insights of customers' brand switching behavior better and gives the marketing professionals the chance to make their marketing efforts more effective and efficient.

Another contribution of the study is the attempt to identify the marketing mix elements of the airline industry with a service marketing approach by including all the critical aspects of the service. For this purpose, a comprehensive qualitative study is conducted by carrying out in-depth interviews with the marketing executives of leading airline brands.

Literature

There are many models for the calculation and application of the customer lifetime value in the literature. One of them is the model developed by Berger and Nasr (1998). In the study conducted by Berger and Nasr (1998), the calculation of customer lifetime value is considered in four different states, in each case the formula is revised under different assumptions. Berger and Nasr's (1998) model has the basic components like profit contribution of the customer, the customer's marketing costs, the number of sales, retention rate, discount rate. However, in the first model a) sales take place once in a year, b) annual customer retention expenditure and

rate is constant, c) the annual revenue from each customer is assumed to be constant; whereas in the second model sales take place over a period of one year or less, in the third and fourth model, the revenue from each customer and each customer's marketing costs during the customer's relationship with the company is not fixed and under these assumptions the model is made more realistic (Berger & Nasr, 1998).

In the model developed by Gupta and Lehmann (2003), customer lifetime value is calculated under the assumption that how long the customer's relationship with the company will continue is known and the cash flows from the customer's relationship with the company is discounted to the present. The basic components of the model are the amount of the client's contribution (margin), retention rate and the discount rate (Gupta & Lehmann, 2003). The model is very practical and suitable for use of the business world. If a manager knows retention and growth rates of the company, it's easy and fast to have an idea about the lifetime value of customers (Onur, 2005).

The customer lifetime value model developed by Bauer et al (2003) includes components such as cost, revenue and retention rate. Based on the definitions of customer lifetime value, to be an appropriate one, the value of non-monetary contributions such as know-how, collaboration and innovation value are also included to the model directly. Know-how value is considered as monetary contribution of know-how minus the cost of it, similar to the structure of the monetary resources. The value of cooperation and innovation is composed of know-how transfer and product / process innovations (Bauer, Hammerschmidt, & Braehler, 2003).

Loss of customers in sectors with intense competition is one of the most important issues. Losing customers is one of the critical issues of modeling the lifetime value, because it affects the length of the service period and the occurrence of future profits. A customer may have low lifetime value despite its high monetary contribution to the firm, because of his/her high probability to leave. For this reason, Hwang et al (2004)

consider the customer's possibility of leaving the company and the model includes this to the calculation of customer lifetime value (Hwang, Jung, & Suh, 2004).

Based on the idea that customers can always leave and return to companies, a model generated by Venkatesan and Kumar (2004) also takes into account the cost of established relationships with customers through the company's channels and the number of relationship in each channel. Customer lifetime value is calculated by the model under the assumption that contribution margin, purchase frequency and variable costs are known (Venkatesan & Kumar, 2004).

Managers can understand each customer's past activities of buying and spending by looking at the nature of the data. Similarly, using NBD/Pareto model, probability that the customer's relationship with the company will continue in the future P(Alive) can be predicted. This provides the following decision rule: If the sum of the expected future margins of a marketing attempt for a planned period is lower than its cost, the activity must be stopped (eg cancellation of the planned submission to the customer, such as catalogs). The expected future contribution margin is calculated by Reinartz and Kumar (2004) model (Kumar, Ramani, & Bohling, 2004).

Also, a model is developed in a practical study made at a gas station by Gloy et al (1997), with components such as the probability of obtaining the customer, investment to be made when the customer is acquired, fixed and variable costs of customer acquisition, hourly wage of the sales staff who communicate with customers, fixed and variable costs related to the customer loyalty programs (Gloy, Akridge, & Preckel, 1997).

According to Hoekstra and Huizingh (1999), a comprehensive customer lifetime value calculation model should be conceptually related to both past and future and should comprise communication information including both the supplier's and the customer's perceptions of the customer life cycle in the past and the future. In this context, the model

developed by researchers is composed of components such as customer quality, customer potential, supplier quality and supplier potential in the past and future (Hoekstra & Huizingh, 1999).

Considering Collings and Baxter (2005), customer lifetime value, expressed as a term, is based on future and calculates the present value of cash flows from a long term customer relationship with the client. Collings and Baxter's (2005) calculation model is formed to take account of such concepts like customer retention rate and customer groups. Using the model, the segments that are more profitable for the firm can be determined based on the evaluation of profitability of each customer segment (Collings & Baxter, 2005).

The basic purpose of the model developed by Donkers et al (2003) is to evaluate the customer's future profit with a constant discount rate in the multi-service sectors. Customer profitability depends on the number of services purchased, the amount of service consumption and these services' profit margins. In the model, each customer's future buying behavior, consumption and profit margin should be estimated in order to calculate the customer's future profit (Donkers, Verhoef, & Jong, 2003).

In the model developed by Kumar et al (2004), the customers are grouped and by considering the number of customers in groups, average customer lifetime value for each customer is formed through calculations. These calculations are based on three different scenarios that are formulated under different assumptions. In each scenario, assumptions of stableness regarding components such as customer retention rate, discount rate, cost of customer acquisition, average total contribution of each customer, cost of marketing to each customer are stretched to have a model more appropriate to real life (Kumar, Ramani, & Bohling, 2004).

The customer lifetime value model existing in the report prepared for Cincom Company and developed by Torcy et al (2005) comes with a different perspective and in addition to components such as cost and

revenue, the number of customer referrals are included (Torcy, Taylor, Delhaye, Schickel, & Fulcher, 2005).

Together with all these models of customer lifetime value in the literature, a model is developed by Rust et al (2004) and applied to different sectors. In this model, the lifetime value consists of variables such as customer purchase frequency, average purchase amount, contribution margin and also brand switching (Rust, Lemon, & Zeithaml, 2004). The most important aspect of the customer lifetime value model laid down by Rust et al (2004) is that it models brand switching, taking the customers' attitudes and preferences into account and thus reflects the impact that competition can have on the market to the calculation of customer lifetime value. Brand switching matrices can be created using the logit model with the longitudinal or cross-sectional data. With this model, companies can include the factors affecting brand switching, their effect level and company's performance on these factors to customer lifetime value calculation. This study is grounded on the customer lifetime value model developed by Rust et al (2004). However, the revised model sat on a different conceptual framework, a model that clearly reveals the impact of marketing activities and strategic decisions regarding the components of the marketing mix on customer lifetime value is attempted to be constructed.

The primary CLV models in the literature and their major components are summarized in Table 1 below.

Table 1. Primary CLV Models and Their Major Components

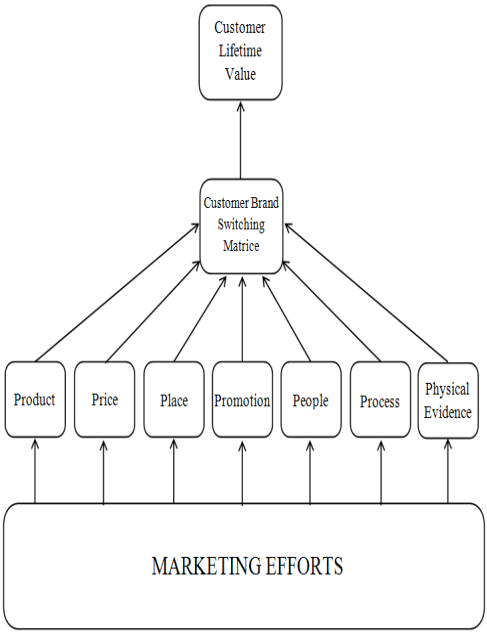
CLV Models	Major Components of Models
Berger and Nasr (1998)	profit contribution of the customer the customer's marketing costs the amount of sales retention rate discount rate
Gupta and Lehmann (2003)	amount of the client's contribution (margin) retention rate discount rate
Bauer et al (2003)	cost revenue retention rate
Hwang et al (2004)	service period ındex of customer i total service period of customer i interest rate expected service period of customer i past profit contribution of customer i at period ti future profit contribution of customer i at period t potential benefit from customer i at period t
Venkatesan and Kumar (2004)	predicted contribution margin from customer i discount rate for money unit marketing cost for customer i in channel m in year l number of contacts to customer i in channel m in year l predicted purchase frequency for customer i number of years to forecast predicted number of purchases made by customer i until the end of the planning period
Kumar, Ramani, & Bohling (2004)	gross contribution from customer i in purchase occasion t unit marketing cost, for customer i in channel m in time period l number of contacts to customer i in channel m in time period l predicted purchase frequency for customer i the discount rate for money the number of periods to forecast the number of purchases made by customer i until the end of the planning period
Gloy et al (1997)	probability of obtaining the customer investment to be made when the customer is acquired fixed and variable costs of customer acquisition hourly wage of the sales staff who communicate with customers fixed and variable costs related to the customer loyalty programs
Hoekstra and Huizingh (1999)	customer quality customer potential supplier quality and supplier potential in the past and future
Collings and Baxter (2005)	customer retention rate customer groups
Kumar et al (2004)	customer retention rate, discount rate, cost of customer acquisition, average total contribution of each customer, cost of marketing to each customer
Torcy et al (2005)	cost revenue the number of customer referrals
Rust et al (2004)	customer purchase frequency average purchase amount contribution margin brand switching

Conceptual Framework

In the model developed by Rust et al (2004), marketing efforts are considered as marketing investments. Return on these investments is calculated step by step starting from the change in customer equity drivers. Marketing efforts enhance value, brand and relationship equities, firstly affecting their drivers. In this sense, resulting change in a positive direction in terms of customer utility are reflected to brand switching matrices positively as higher customer acquisition and retention rates. These higher rates provide increased customer lifetime. In this context, the crux of estimating customer capital individually for each customer using the model is the creation of brand switching matrices (Rust, Lemon, & Zeithaml, 2004).

In this study, an approach different from Rust et al (2004) model is exhibited and brand switching matrices are attempted to be calculated on the basis of customer utility by using sub-elements of the marketing mix components, generally called the 7P's for service industries, instead of customer equity drivers. According to the approach adopted in the study, marketing activities and decisions carried out by firms' effect the components of the marketing mix, resulting in a change in customers' attitudes and perceptions toward the brand and their preferences. These changes benefit the customers and the company's total customer acquisition and retention rates change, the effect of which is reflected in individual brand switching matrices. The changes that take place in the possibilities of future purchasing in switching matrices affect the customer lifetime value. The conceptual framework of the study is given in Figure 1:

Figure 1: Conceptual Framework



The main purpose of marketing activities and decisions is to keep existing customers of the company and to attract potential customers to the brand. In this context, the aim of the tools used for marketing strategies is to increase the perceived benefits of customers by modifying the components of the marketing mix, so that retention and acquisition rates change in favor of the brand and company. As a result, with the increase in the possibility to continue to purchase the brand and switch to the company, the lifetime value of these customers increase.

Considering the airline industry in which the empirical part of the study is conducted, customers always have the possibility and the right to return back any time to the brand which they stopped to purchase. Also in this sector written agreements that prohibit customers to change their brand are not used and there are no penalties of brand switching for customers. Additionally the airline industry is one which uses information technologies to inform and attract customers intensively. With all these

features, the sector corresponds to the accepted assumptions of both the model developed by Rust et al (2004) and the one revised in this study so; the model is fully suitable for the airline industry.

Methodology

The study consists of two main steps. The first step aims to identify the components of the airline sector's marketing mix, which are also the independent variables of the model. The second step, attempts to establish the brand switching matrices of customers, which is the major element of customer lifetime value model developed by Rust et al (2004).

Step 1 - Qualitative Research for Variable Identification

To begin, the components of the marketing mix are identified specifically for the airline industry. They are then included to the model as independent variables in the matrix formation step.

Data Collection

In an attempt to specify the components of the airline industry, structured in-depth interviews with the top marketing executives of five leading international airline companies in Turkey are conducted. All the interviews are carried out face to face and the answers of the interviewees are written by the researcher. The interviews are realized between the dates 10.01.2012-14.03.2012 in the offices of the interviewees. The duration of the interviews is 45 minutes to an hour. Due to the fact that the interviewees are marketing professionals working in the airline industry for many years, the components of each of the seven marketing mix elements are asked directly. The questions asked to interviewees are as follows:

1. According to you, what are the components that marketing mix element "product" is composed of?
2. According to you, what are the components that marketing mix element "price" is composed of?

3. According to you, what are the components that marketing mix element "place" is composed of?
4. According to you, what are the components that marketing mix element "promotion" is composed of?
5. According to you, what are the components that marketing mix element "people" is composed of?
6. According to you, what are the components that marketing mix element "process" is composed of?
7. According to you, what are the components that marketing mix element "physical evidences" is composed of?

Analysis and Findings

To begin with the interview documents are reviewed and important points mentioned about the components are highlighted for each interview. Then these highlighted points for each marketing mix element are gathered together and revised to conceptualize the airline industry's marketing mix. In consequence, 24 components that comprise the airline industry's marketing mix are identified.

The actual product of the airline industry, the flight service cannot be thought apart from some characteristics which form the components of product element in the marketing mix. The interviews show that according to interviewees, the most important components comprising the airline industry's product element are flight safety, trust to brand and the quality of catering services because these three are mentioned by all five interviewees. For instance, one of the interviewees says: "*Airline industry is constructed on flight safety and brand trust; we cannot distinguish the service from these*". And another interviewee says: "*The part of our service that is most apparent to customers is catering so catering directly affects how the product is perceived"*. Also flight delay is mentioned by four of the interviewees as an important aspect of the flight service. Additionally, the overall quality of flight service is mentioned to be an important product mix by the interviewees. For

example, one of the interviewees says: "*Overall quality could be used as a comprehensive indicator of augmented product"*.

The interviewees agree with the idea of the price of the service should be considered to form the marketing mix element "price" and all the adjustments and other practices can be regarded as components of other marketing mix elements.

According to the interviewees, flight routes are the main component of the marketing mix element "place". In order to emphasize the importance of this component in brand choice, one of the interviewees says: *"If a company does not have a scheduled flight to a location a customer needs to fly to, then there is no way that customer would choose this company"*. Additionally, the interviews show that flight ticket sales both online and at sales points are crucial for brand selection in the airline industry and should also be taken as components of the marketing mix element "place". The interviewees subscribe to this idea and for instance one of them believes: *"An airline company should have an efficient system to deliver the flight tickets to where is most suitable for the customer because no flight operation can start for a customer without their tickets"*.

Concerning the components of the marketing mix element "promotion", four components are mentioned by all the interviewees; price discounts, advertisement, image and frequent-flyer programs. For instance, one of the interviewees explains: *"As airline companies, in order to be able to compete head to head with our rivals, it's essential that we regularly conduct practices of price discounts, frequent-flyer programs and advertising and we also should focus on our brand's image. These promotion tools are used by all firms from time to time, always in a proper manner with the perceived image of the brand, which is the most important component of the marketing mix element-promotion according to me"*. In addition, three of the interviewees pointed out that they believe informing customers and offering something to make them feel themselves special are crucial for promotion and should be taken as components of this marketing mix element. Related to this idea, one of the interviewees says: *"Informing customers about latest news like*

price discounts, campaigns and also flight details arouse customers' attraction". Another interviewee says: *''For our company to be the number one choice we aim to offer the customer something unique, we want them to feel special."*

The interviews show that the most important skill of the personnel working for the airline companies is the ability to solve problems. Problem solving is mentioned by all the interviewees. For instance, one of the interviewees states: *"The most important skill that people in the airline industry must have is the ability to solve problems because sometimes unsolved problems make our customers feel uncomfortable and in danger. In fact some unsolved problems that seem unimportant may cause serious danger".* Also, interviewees agree upon the idea that other characteristics required of people working in this industry are favor and kindness. One of the interviewees claims: "*Many people experience the fear of flying even though they do not seem so or at least they feel a bit anxious. For this reason, it is vital for the contact person in the airline industry to be helpful/approachable and kind to make our customers feel safe and relaxed."*

Regarding the components to be classified under the marketing mix element "process", interviewees mention two major processes held out by all the airline companies in the world that are vital. The first one is passenger acceptance and check-in and the second one is baggage delivery and transfer processes. For instance, one of the interviewees emphasizes the importance of these processes by saying: *"Problems that customers most frequently face in our industry are related to passenger acceptance and customers' baggage. Especially, check-in failure and loss of baggage in connecting flights are very common and cause customers serious annoyance.* Also, three of the interviewees state that call centers are also important as an alternative way of communicating with customers. For example, one of them expresses that call center processes and whether customers hold on for a long time or not affect customers' perception of the company dramatically.

The reason that aircraft comfort and design of service environment including uniforms of personnel are stated by all of the interviewees, is because these two factors can be considered as the main components of the marketing mix element "physical evidence". In order to underline this, one of the interviewee says: *"As the competition and number of brand alternatives increase, customers seek more comfortable aircrafts for their flights"*. Another one says: *"The service environment and uniforms of personnel are important indicators of institutionalism of the company from the point of customers' views.* Hygiene is also mentioned by three interviewees and therefore can be taken as the third component.

The components of the marketing mix for airline industry identified in the qualitative part of the study are as follows:

Product Group (coded as *PRD*):

PRD_1 : Overall Quality
PRD_2 : Flight Safety
PRD_3 : Trust to Brand
PRD_4 : The Quality of Catering Services
PRD_5 : Flight Delays

Price Group (coded as *PRC*):

PRC_1 : Price

Place Group (coded as *PLC*):

PLC_1 : Flight Routes
PLC_2 : Online Ticket Sales and Reservation
PLC_3 : Ticket Sales Points

Promotion Group (coded as *PRM*):

PRM_1 : Price Discounts
PRM_2 : Frequent-flyer Programs
PRM_3 : Brand Image
PRM_4 : Advertisement
PRM_5 : Informing Customers
PRM_6 : Providing Customers Feel Special

People Group (coded as *PEO*):

PEO_1 : Favor

PEO_2 : Ability to Solve Problems

PEO_3 : Kindness

Process Group (coded as *PRCS*):

$PRCS_1$: Passenger Acceptance and Check-in Processes

$PRCS_2$: Baggage Delivery and Transfer Processes

$PRCS_3$: Call Center Processes

Physical Evidences Group (coded as *PHY*):

PHY_1 : Aircraft Comfort

PHY_2 : Hygiene

PHY_3 : Uniforms of Personnel and Design of Service Environment

Step 2 – Survey for Formation of Brand Switching Matrix

The components identified in the first qualitative step are included in the model in the 2nd step as independent variables, each of which affect the perceived utility of the brand and they all together determine the overall utility. In addition to these variables, brand inertia is incorporated into the model, like the model of Rust et al (2004). The brand inertia is accepted to be a useful predictor in multinomial logit choice models (Guadagni & Little, 1983). The brand inertia is a dummy variable, which is equal to "1" if the last purchased brand is the same as the brand to be purchased next time and equals to "0" otherwise. This variable is coded as *LAST*. The independent variable of choice model is the probabilities of the brands to be chosen for the next purchase.

Data and Sampling

According to the conceptual framework of the research, the attitudes and perceptions of consumers dominate their brand choices and shape their brand switching matrices. Therefore, the attitudes and perceptions of consumers regarding the four major international airline companies operating in Turkey are investigated using survey method. The main

population of the study is the actual and potential consumers of air transport services in the airline industry. In this context, the questionnaire is conducted to actual and potential consumers who are more than 18 years old and who have flown at least one time in the recent year of the study, regardless of his/her education level, occupation or other demographic features. The prerequisite for the participants of the survey to have flown at least one time in the recent year of the study aims to include the customers whose perceptions and memory are fresh. Also, it is not stipulated to the participants to have purchased from all of the four airline companies included in the survey, because of the fact that attitudes and perceptions rather than actual experiences are used for individual brand switching matrix formation.

In the study, the attitudes and perceptions of consumers in the sample are measured using a 5-point Likert-type scale. In the scale, "5" represents the most positive and "1" represents the most negative view. The questionnaire consists of a total of 28 items, one for the last brand purchased, one for their intention of the next purchase and the rest for each of the marketing mix components. It is requested from the participants of the survey to evaluate each of the four brands regarding each item in the survey and mention their last purchased brand and purchase intentions as probabilities for their next purchase. The questionnaires are requested to be filled out face to face by customers, who are actually waiting for their flights in leading international airports of Turkey.

First of all, 50 survey forms are completed as a pilot study in order to check whether the survey items are well-understood by the participants or not and then the full model is tested. After the necessary adjustments are made to the survey form, 137 survey forms are filled in total using the convenience sampling method and 133 of them were eligible for the study.

Mathematical Model

According to the model of the study, individual brand switching matrices are derived from the utility gained by each individual customer from

the brands. Because of this, in order to obtain the individual brand switching matrices, individual utility matrices should be formed. Utility is composed of the perceptions and attitudes regarding the marketing mix components and the brand inertia. According to this framework, customer utility can be formulized as:

Utility = Brand inertia + Perceptions of the marketing mix components

= Brand inertia + Product components + Price components + Place components + Promotion components + People components + Process components + Physical Evidences components

The utility of brand k for the individual customer i, who purchased brand j in his/her last purchase is formulized as:

(Eq.1) $U_{ijk} = \beta_{0k}LAST_{ijk} + \beta_{1k}PRD_{ik} + \beta_{2k}PRC_{ik} + \beta_{3k}PLC_{ik} + \beta_{4k}PRM_{ik} + \beta_{5k}PEO_{ik} + \beta_{6k}PRCS_{ik} + B_{7k}PHY_{ik}$

The variables establishing this formula are defined as follows:

β_{0k} = Logit regression coefficient of brand inertia

β_{1k} = 1 x n column matrix (n=number of brands) composed of logit regression coefficients of product components

β_{2k} = 1 x n column matrix (n=number of brands) composed of logit regression coefficients of price components

β_{3k} = 1 x n column matrix (n=number of brands) composed of logit regression coefficients of place components

β_{4k} = 1 x n column matrix (n=number of brands) composed of logit regression coefficients of promotion components

β_{5k} = 1 x n column matrix (n=number of brands) composed of logit regression coefficients of people components

β_{6k} = 1 x n column matrix (n=number of brands) composed of logit regression coefficients of process components

β_{7k} = 1 x n column matrix (n=number of brands) composed of logit regression coefficients of physical evidence components

$LAST_{ijk}$ = dummy variable (equals to1 if $j = k$, equals to 0 otherwise)

Analysis

Principal Component Regression

In order to test the reliability of the data used in this study, Cronbach's alpha value was calculated. Cronbach's alpha value of the data was found to be 0.901 and this value is within acceptable limits. In addition, Kaiser-Meyer-Olkin sampling fitness value was calculated as 0.908 which is also within the acceptable limits showing that data is appropriate for statistical analysis.

First of all, in order to reduce to the number of independent variables and to combine them in transformed factors, varimax rotated principal components analysis is carried out. By means of principal component analysis, variables of the model are transformed into new artificial variables on a new coordinate system, called factors. The main purpose of the principal component analysis is to eliminate the multi-collinearity among the independent variables. As a consequence of the analysis, factors which explain maximum amount of variation and do not have multi-collinearity are acquired (Hatcher, 1994). The variables included into principal component analysis are all the marketing mix components and the brand inertia variable.

The eigenvalue cutoff 0.5 is used in the study for the principal component analysis and the factors which have eigenvalues greater than 0.5 are included to the rest of the analysis, as practiced by Rust et al (2004). In common, 1.0 eigenvalue cutoff (Kaiser, 1960) is used, but 1.0 cutoff is one of the many alternatives and the cutoff points should be chosen according to meaningfulness and managerial usefulness (Rust, Lemon, & Zeithaml, 2004). Accordingly, 14 factors are included in the model and they explain 84.93 % of the total variance. The eigenvalues of the factors and variances explained are shown in Table 2.

Table 2. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8,612	34,448	34,448	8,612	34,448	34,448	2,593	10,371	10,371
2	1,995	7,979	42,427	1,995	7,979	42,427	1,987	7,946	18,317
3	1,524	6,095	48,522	1,524	6,095	48,522	1,980	7,921	26,239
4	1,283	5,132	53,654	1,283	5,132	53,654	1,971	7,886	34,125
5	1,123	4,490	58,144	1,123	4,490	58,144	1,667	6,666	40,791
6	,981	3,926	62,070	,981	3,926	62,070	1,538	6,151	46,942
7	,853	3,411	65,480	,853	3,411	65,480	1,421	5,685	52,627
8	,828	3,311	68,791	,828	3,311	68,791	1,343	5,372	57,999
9	,756	3,025	71,816	,756	3,025	71,816	1,207	4,830	62,828
10	,736	2,946	74,762	,736	2,946	74,762	1,166	4,662	67,491
11	,697	2,788	77,550	,697	2,788	77,550	1,116	4,463	71,954
12	,661	2,645	80,195	,661	2,645	80,195	1,102	4,409	76,362
13	,606	2,422	82,617	,606	2,422	82,617	1,087	4,347	80,709
14	,578	2,313	84,930	,578	2,313	84,930	1,055	4,221	84,930
15	,489	1,955	86,885						
16	,438	1,752	88,637						
17	,415	1,661	90,298						
18	,382	1,526	91,824						
19	,335	1,341	93,165						
20	,323	1,293	94,458						
21	,320	1,278	95,736						
22	,298	1,190	96,926						
23	,276	1,103	98,029						
24	,258	1,032	99,062						
25	,235	,938	100,000						

The loadings of variables on the rotated factors are shown in Table 4. According to the loadings of variables, factors are named as shown in Table 3:

Table 3. Factor Names

No	Factor Name	No	Factor Name
F1	Staff Treatment	F8	Feeling Special
F2	The Quality of Catering Services	F9	Advertisement
F3	Brand Trust and Flight Safety	F10	Frequent-flyer Programs
F4	Call Center Services	F11	Price
F5	Passenger Acceptance Procedures	F12	Price Discounts
F6	Hygiene of Personnel and Design of Environment	F13	Delays
F7	Ticket Reservation and Sale	F14	Brand Inertia

Tablo 4. Factor Loadings
Rotated Component Matrix

Variable	Component													
	Staff Treatment	Catering Services	Brand Trust and Flight Safety	Call Center Services	Passenger Acceptance Procedures	Hygiene of Personnel and Design of Environment	Ticket Reservation and Sale	Feeling Special	Advertisement	Frequent-flyer Programs	Price	Price Discounts	Delays	Brand Inertia
LAST	,020	,140	,168	,082	,058	,086	,163	,067	,064	,062	,033	,020	,005	**,931**
PRD1	,218	**,676**	,329	,162	,019	,044	,196	,191	,033	-,021	-,070	,083	,088	,158
PRD2	,126	,176	**,876**	,050	,112	,121	,028	,037	,031	,025	,002	,136	,092	,087
PRD3	,156	,334	**,680**	,140	,119	,127	,287	,152	,005	,045	,050	,055	,132	,145
PRD4	,121	**,687**	,261	,043	,252	,216	,067	,039	,267	,046	,058	-,157	,199	,056
PRD5	,190	,186	,179	,162	,055	,116	,098	,129	,016	,000	,062	,064	**,873**	,004
PRC1	,028	,004	,023	,059	,072	,027	,037	,025	,029	-,057	**,972**	,043	,046	,028
PLC1	,069	,142	,162	,170	,092	,082	**,870**	,078	,104	,004	-,008	,031	,044	,167
PLC2	,211	,253	,097	,064	,468	,133	**,515**	,086	-,089	-,109	,248	,013	,228	,041
PLC3	,271	,355	-,029	**,569**	,298	,051	,165	,269	-,025	-,225	,048	,170	,003	,086
PRM1	,027	,000	,158	-,005	,059	,074	,029	-,001	,121	,101	,045	**,933**	,050	,018
PRM2	,083	,007	,034	-,030	-,030	-,029	-,022	,124	,160	**,925**	-,066	,104	-,002	,058
PRM3	,280	**,457**	,411	,143	,148	,026	,237	,209	-,039	-,006	,061	,220	,130	,202
PRM4	,081	,142	-,015	-,009	,012	-,048	,041	,100	**,897**	,192	,015	,124	,000	,057
PRM5	,183	-,116	,278	,315	,072	,159	,184	**,566**	**,474**	-,125	,093	,035	,059	,029
PRM6	,134	,304	,087	-,029	,152	,093	,063	**,794**	,093	,260	,006	-,015	,135	,083
PEO1	**,695**	,216	,023	,270	,203	,262	,094	-,052	,012	,084	,061	,060	,189	,027
PEO2	**,827**	,101	,116	,060	,116	,202	,022	,149	,035	,054	-,044	-,096	,128	,041
PEO3	**,784**	,088	,177	,224	,158	,055	,091	,107	,125	,009	,066	,114	-,012	-,020
PRCS1	,230	,127	,128	,172	**,802**	,133	,142	,150	,055	,028	,014	,100	,048	,033
PRCS2	,272	,061	,165	**,547**	**,581**	,057	,000	,004	,016	-,107	,145	-,047	-,044	,075
PRCS3	,243	,046	,094	**,828**	,141	,136	,137	-,036	,027	,028	,013	-,028	,202	,067
PHY1	,077	,389	,245	**,471**	-,022	**,464**	,205	,233	,065	,243	,073	-,068	,032	-,034
PHY2	,306	,274	,110	,205	,022	**,719**	,093	,194	,005	-,149	,151	,149	-,005	,039
PHY3	,346	-,054	,167	,045	,336	**,695**	,066	-,029	-,065	,040	-,114	,024	,235	,150

In the model, X_{ijk} is the vector of the original independent variables representing the combination of the last purchased brand *j* and brand *k* to be purchased in the next transaction for each customer *i*. All X_{ijk} are transformed into rotated factors F_{ijk} via principal component regression, which are desired to be loaded by unique independent variables. F_{ijk} form the independent variables for the logit regression in the next step. As a consequence of principal component regression transaction, Eq.1 is transformed into the following equation Eq.2:

$$\text{(Eq.2)} \qquad \text{Uijk} = F_{ijk}\,\gamma + \varepsilon_i$$

which comprises the rotated factor vectors and ε_i represents the error term for each individual *i*. According to the factor analysis theory, factors are formed as the linear combinations of the variables X_{ijk}, meaning that there exists an A matrix for $F_{ijk} = AX_{ijk}$ (Rust, Lemon, & Zeithaml, 2004). Based on this, Eq.2 can be written as Eq.3 below:

$$\text{(Eq.3)} \qquad \hat{\text{U}}\text{ijk} = (X_{ijk}A^*)\,\gamma^* = X_{ijk}(A^*\gamma^*)$$

In Eq.3, A^* represents the subvector of A and γ^* subvector of γ, corresponding to the factors which meet the eigenvalue cutoff. Ûijk in Eq.3 is the estimated utility of customer *i*, meaning that $\beta^* = A^*\gamma^*$ and coefficients of variables X_{ijk} can be estimated by multiplying the coefficients of logit regression on factors by factor coefficients that link the marketing mix components to factors (Rust, Lemon, & Zeithaml, 2004).

Logit Estimation

The independent variables of the logit regression are the factor scores obtained by the principal component analysis, including the *LAST* variable representing the last purchased brand. The factor scores are standardized by dividing them to the coloumn standart deviation.

The dependent variable of the multinomial logit regression is normally binomial and consists of ones and zeros; it takes the value "1" if the

brand is purchased and "0" otherwise. Observations from a longitudinal panel or follow-up survey should be made for the next purchases in order to be able to use the dependent variable as a binomial one. Instead, when the intention for the next purchase is used as the representative for the next purchase, the dependent variable shall be in proportions, which is equal to purchase intention probabilities (pij) declared by the customers (Rust, Lemon, & Zeithaml, 2004). This does not create any problems because by using a logit software such as LIMDEP, logit regression can be conducted even when the pij vector consists of proportions, not only zeros and ones. The logit regression coefficients of factors are given in Table 5.

Table 5. Logit Regression Coefficients

Variable	Coefficient	Standard Error	p
F1	.09800193	.02002987	.0000
F2	.49636739	.01379384	.0000
F3	.36726789	.01943577	.0000
F4	.38613624	.02443320	.0000
F5	.33295826	.02042753	.0000
F6	.02045583	01933354	.0000
F7	.71668498	.02009134	.0000
F8	.25595852	.01990180	.0000
F9	.18583359	.02275580	.0000
F10	-.14997897	.02310686	.0000
F11	.42555250	.01737114	.0000
F12	.16628490	.01803425	.0000
F13	.21683231	.01705772	.0000
F14	.49658354	.00894628	.0000

The "p" values listed in Table 5 clearly shows that all the logit regression coefficients of factors are statistically significant. Among all the factors,

only one of them, F10 which is named as "Frequent-flyer Program" has a negative coefficient. That means frequent-flyer programs (F10) has a negative effect on customer utility. When the other coefficients are reviewed, it can be seen that ticket reservation and sale factor (F7) has the greatest impact on customer utility.

In order to understand the individual effects of marketing mix variables to customer utility, the coefficients of all independent variables are calculated as explained above and they are given in Table 6.

Table 6. Utility Function Coefficients

Variable	β Coefficient	Variable	β Coefficient
LAST	0,71521056	PRM_4	0,27583847
PRD_1	0,63533793	PRM_5	0,55291414
PRD_2	0,45254461	PRM_6	0,43167936
PRD_3	0,70263166	PEO_1	0,37714051
PRD_4	0,55221312	PEO_2	0,22380597
PRD_5	0,49332804	PEO_3	0,35882842
PRC_1	0,50609758	$PRCS_1$	0,51970624
PLC_1	0,81747692	$PRCS_2$	0,47853317
PLC_2	0,76569380	$PRCS_3$	0,47162514
PLC_3	0,64191572	PHY_1	0,49831012
PRM_1	0,26612159	PHY_2	0,43998491
PRM_2	-0,06941912	PHY_3	0,25213018
PRM_3	0,73034017		

Among all the marketing mix variables, Flight Routes (PLC_1) has the greatest relative positive impact on customer utility, followed by Online Ticket Sales and Reservation (PLC_2) and Brand Image (PRM_3). As mentioned above, Frequent-flyer Program (F10) factor has a negative effect on custumor utility and as seen in Table 4, the only variable loading to that factor is called Frequent-flyer Programs (PRM_2). Consequently, this variable has a negative effect, thus increases in that variable will be followed by decreases in customer utility.

Individual Utility Matrices Formation

Individual utility matrices are formed based on the conceptual framework of the study and by using Eq.1. The coefficient of *LAST* variable (β_{0k}) is multiplied by the identity matrix which has 1's on the main diagonal and 0's elsewhere because in each row one of the four brands is assumed to be the last purchased brand. The result is added to the result of the marketing mix components coefficients (β_k) vector and individual's assessments of each brand for each variable (X_{ijk}) multiplication. Before the multiplication, the z value is used to standardize individual's assessments (X_{ijk}), in order to have values with the same mean and variation. The z value is calculated by subtracting the mean from the value itself and dividing the result by standard deviation. The individual utility matrices of all participants are calculated separately by following the same procedure. The individual utility matrix of the first participant is given as a sample in Figure 2.

Figure 2. Individual Utility Matrix of 1st Participant

$U_1 =$

	Brand A	Brand B	Brand C	Brand D
Brand A	2,3481	-1,4909	-4,6248	-1,8124
Brand B	1,6329	-0,7757	-4,6248	-1,8124
Brand C	1,6329	-1,4909	-3,9096	-1,8124
Brand D	1,6329	-1,4909	-4,6248	-1,0972

As it is assumed that the last purchased brand is different in each row, different utility values are obtained. The rows represent the last purchased brand assumption and columns represent the next purchase. For instance, the utility gained by the 1st participant by purchasing Brand A in the next purchase when he/she purchases Brand B for the final time is 1,6329.

Individual Brand Switching Matrices Formation

After forming the utility matrices of all individuals, they are transformed into individual brand switching matrices using Eq.4 below (Rust, Lemon, & Zeithaml, 2004):

(Eq.4) Pijk* = Pr [customer i purchases brand *k** | j is the last purchased brand]

$$= \exp\left(U_{ijk*}\right) / \sum_{k} \exp\left(U_{ijk}\right)$$

For instance, the exponential sums of the 1st participant's utility values based on each brand are given in Figure 3 below:

Figure 3. Exponential Summation

$$e^{2,3481} + e^{-1,4909} + e^{-4,6248} + e^{-1,8124} = 10,8639$$

$$e^{1,6329} + e^{-0,7757} + e^{-4,6248} + e^{-1,8124} = 5,7521$$

$$e^{1,6329} + e^{-1,4909} + e^{-3,9096} + e^{-1,8124} = 5,5272$$

$$e^{1,6329} + e^{-1,4909} + e^{-4,6248} + e^{-1,0972} = 5,6875$$

According to Eq.4, each exponential value in each row is divided by the exponential sum of its row in order to transform the individual utility matrices to individual brand switching matrices (*M*). The transformation process of the 1st participant is given as an example in Figure 4.

Figure 4. Transformation Process of 1st Participant

$$M_1 = \begin{vmatrix} e^{2,3481}/10,8639 & e^{-1,4909}/10,8639 & e^{-4,6248}/10,8639 & e^{-1,8124}/10,8639 \\ e^{1,6329}/5,7521 & e^{-0,7757}/5,7521 & e^{-4,6248}/5,7521 & e^{-1,8124}/5,7521 \\ e^{1,6329}/5,5272 & e^{-1,4909}/5,5272 & e^{-3,9096}/5,5272 & e^{-1,8124}/5,5272 \\ e^{1,6329}/5,6875 & e^{-1,4909}/5,6875 & e^{-4,6248}/5,6875 & e^{-1,0972}/5,6875 \end{vmatrix}$$

As a consequence of the calculation shown in Figure 3, the individual brand switching matrix of 1st participant is formed and shown in Figure 5.

Figure 5. Individual Brand Switching Matrix of 1st Participant

	Brand A	Brand B	Brand C	Brand D
Brand A	0,9633	0,0207	0,0009	0,0150
Brand B	0,8899	0,0800	0,0017	0,0284
Brand C	0,9261	0,0407	0,0036	0,0295
Brand D	0,9000	0,0396	0,0017	0,0587

As seen in Figure 5, the probability of the 1st participant switching to Brand A when he/she purchases Brand B for the last time is approximately 89 %. The individual brand switching matrices of all participants are calculated separately by following the same way.

Conclusion

Through the model developed in this study, the effects of last purchased brand and marketing activities of service firms to the customer preferences is attempted to be explained. These effects on preferences are reflected in individual brand switching matrices, which include both customer retention and acquisition rates. Majority of the models presented in the literature (e.g. Berger & Nasr, 1998; Gupta & Lehmann, 2003; Bauer et al, 2003; Collings & Baxter, 2005; Kumar et al, 2004) only covers the retention rate of customers. In other words, these models deal with actual customers of the company and ignore the likelihood of obtaining new ones. Apart from these models mentioned, the model developed by Gloy et al (1997) is the only one which includes a component called "probability of obtaining the customer", which covers the acquisition of new customers.

Marketing extent of service firms differ significantly from the marketing extent of the firms that sell durable goods. This is why a specific model for service firms is attempted to be established in the study. That significant difference mainly becomes apparent with the addition of three service marketing mix elements to the classic 4P's. As services are produced and consumed simultaneously, consumers are involved in the production.

That is the reason why the production process, staff included in the production and the physical environment plays a determinative role on how customers perceive the service. With the help of the present model, the effects of variables specific to service firms; such as problem solving abilities of contact personnel, customer acceptance processes and design of the physical environment could be explored. The model of the study is the first attempt in the literature to find out the effects of such crucial variables to customer preferences, which are mainly intangible and are hard to measure numerically. Indeed, these effects are attempted to be explored through a model established specifically for airline industries. In order to establish the model and equations, we needed to specify marketing mix elements of airline services. As the consequence of the qualitative research, marketing mix elements specific to airline services, such as flight safety, quality of catering services, flight delays, flight routes etc. are identified. Because of the fact that we could not find any research which reveals all the marketing mix elements of airline services comprehensively, the outcomes of the qualitative part of the study may constitute some valuable information for marketing professionals interested in airline services.

In addition, we aimed to calculate the relative importance of these marketing mix elements from the viewpoint of customers. The β coefficients in the equations show the degree and the direction of related marketing mix component's effect quantitatively. The magnitude of each component's effect on customers' brand choice could be seen and could be compared with the ones of the others. More clearly, β coefficients reflect the perceived importance of each marketing mix variable. Based on the variable coefficients, "flight routes (PLC_1)" variable is the most important element for customers among all. Because its contribution to customer utility is the greatest. The second greatest contribution to customer utility is made by "online ticket sales and reservation (PLC_2)" variable, which is followed by a variable called "brand image (PRM_3)".

Marketing professionals always have limited resources to invest in marketing. Being controlled by company itself, marketing mix elements

are subjects to these investments. Naturally, all companies aim to get the maximum return on their marketing investments to use their limited resources in an optimal way. By considering the β coefficients reflecting the relative importance, marketing professionals may have the chance to know which marketing mix elements are more important and worth investing and which are not. In addition, the relative importances or β coefficients can be used to allocate the marketing resources in an optimal way. Also, by using the brand switching matrices established in the study, companies may plan their marketing activities on an individual basis to retain or acquire the customer. The customers who have greater probability of being retained or acquired may deserve the marketing efforts, which result in using the limited marketing resources in a more effective way.

Apart from the one developed by Rust et al (2004) on which this study is based, the only customer lifetime value model which includes the effect of last purchased brand on customer preferences is put forth in this study. When β coefficients of the variables are reviewed, after the first three mentioned above, the forth most important and contributing variable is "last purchased brand (LAST)". Also, the coefficient of the variable is nearly as high as the coefficients of second and third most important variables. In other words, the effect of last purchased brand on customer preferences is positive and significant. This means that customers have a tendency to prefer the brand they purchased last time, compared to the others. So, companies may look for ways to encourage actual and potential customers to purchase their brand in order to increase the likelihood of acquiring the customer.

In consequence, the model could be a valuable guide for service industries, especially for airline operators. It allows them to understand the insights of customers' brand switching behavior. Additionally, using this model, marketing professionals in service firms could succeed to allocate their marketing budget to specific marketing mix components in a way to maximize the probability of acquiring new customers and retaining the ones they already have. Furthermore, all marketing efforts

could be designed to improve company's efficiency and effectiveness. Besides the marketing mix components, the effect of customers' last purchased brand on switching behavior is investigated in the model, so that according to magnitude of its effect and its relative importance, companies may attempt to offer systematic and planned experiences to their potential customers.

Limitations and Directions for Future Research

The study is carried out in the airline industry and the airline companies subject to the study only offer transportation service under their brand name. The model may be applied to other service industries in which more than one type of service is offered under a single brand. Also, different airline companies could offer additional services like tourism agencies and so on with the name of their brand. Under these circumstances, more than one type of service would affect customer perceptions and utility gained by customers in conjunction. So, the model could be improved to reflect the joint effect of more than one service to the preferences of customers and the brand switching matrices.

The model put forth in the study shows the relative importance of each marketing mix component by the β coefficients calculated. In the model, β coefficients are calculated based on the assumption that they are homogenous for the whole airline industry, meaning that one coefficient is calculated for one marketing mix component and this value represents all customers in the market. Actually, β coefficients may be changing for different market segments because the perceived importance of each marketing mix component may change based on the characteristics of different customers in different market segments. An attempt to modify the model to handle the different market segments separately may be worthy. Additionally, the model may be practiced on different cultures to point out the cultural differences in perceived importance of the marketing mix elements.

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