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Determinants of passenger loyalty for high speed rail system in Turkey

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Abstract

Satisfaction and loyalty of passengers is important for a public transportation system provider especially if a competition exists between service providers. The factors affecting passenger satisfaction and loyalty must be determined by managers, operators, and decision makers. In this study, 900 passengers using High Speed Rail System between two cities (Ankara and Eskişehir) in Turkey were asked to rate their perceptions about the service they get. Their ratings are analyzed in terms of effects of factors on satisfaction and loyalty. The factors taken into consideration are service quality dimensions (which have ten sub-criteria), trust, perceived value, involvement, image, satisfaction and loyalty. Structural equation modeling is used to examine the direct and indirect relationships between these factors. Image is found effective on almost all factors analyzed: Perceived value, Trust, Satisfaction, Involvement and Loyalty. According to results, two important dimensions of service quality among ten dimensions came forward as most effective on satisfaction: Reliability and Interaction quality of personnel, which is found effective also on trust, satisfaction and involvement. On loyalty, the effective factors are found as perceived value, involvement, satisfaction and image.

Keywords: *High speed rail system, public transportation, loyalty, service quality dimensions, image, satisfaction, trust, perceived value.*

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Türkiyedeki yüksek hızlı tren sisteminde yolcu sadakatinin belirleyicileri

Öz

Yolcuların memnuniyeti ve sadakati, bir toplu taşıma sistemi sağlayıcısı için, özellikle hizmet sağlayıcılar arasında bir rekabet varsa önemlidir. Yolcu memnuniyetini ve sadakatini etkileyen faktörler yöneticiler, operatörler ve karar vericiler tarafından belirlenmelidir. Bu çalışmada, Türkiye'de iki şehir (Ankara ve Eskişehir) arasında Yüksek Hızlı Raylı Sistem kullanan 900 yolcudan aldıkları hizmetle ilgili algılarını derecelendirmeleri istenmiş, faktörlerin memnuniyet ve sadakat üzerindeki etkileri açısından derecelendirmeleri incelenmiştir. Dikkate alınan faktörler; alt kriterleriyle birlikte hizmet kalitesi boyutları, güven, algılanan değer, katılım, imaj, memnuniyet ve sadakattir. Bu faktörler arasındaki doğrudan ve dolaylı ilişkileri incelemek için Yapısal Eşitlik Modeli kullanılmıştır. İmaj, analiz edilen hemen hemen tüm faktörlerde (algılanan değer, güven, memnuniyet, katılım ve sadakat) etkili bulunmuştur. Sonuçlara göre, memnuniyet üzerinde hizmet kalitesinin iki önemli boyutu öne çıkmıştır: Personelin Etkileşim Kalitesi ve Güvenilirlik. Bu iki kriter aynı zamanda güven, memnuniyet ve katılım üzerinde de etkili bulunmuştur. Sadakat üzerinde etkili faktörler, algılanan değer, katılım, memnuniyet ve imaj olarak bulunmuştur.

Anahtar kelimeler: *Yüksek hızlı tren, toplu taşıma sistemleri, sadakat, hizmet kalitesi, itibar, güven, algılanan değeri.*

1. Introduction

Passengers' evaluations, feelings and obligations for the company they get service, brings out so many aspects to examine. For this examination, researchers developed so many techniques through the history of quality concept. Starting from quality of goods, it became possible to measure the intangible properties of services. Transportation, which is one of the most important service people need, must provide an optimum satisfaction to a wide range of users and their wide range of expectations. When it becomes the subject of competition, any firm, that provides transportation service, must know the attitudes and properties of its customers to provide satisfaction and get loyalty in return.

Since the end of the 1980's, questionnaires evaluating the transportation environment from the passengers' point of view have been used [1]. This is crucial to minimize the gap between the service provided by the company and service experienced by customers. In most of the studies [2-16] that focus on satisfaction and loyalty the main factors investigated mostly can be addressed as service quality and its dimensions, trust, perceived value, involvement and image.

Satisfaction is defined as customers' willingness and attitude to buy the product/service [17] and it depends on comparison of the offered product/service and expectations. If the offered product/service meets expectations, the customer will be satisfied, or vice versa [18]. To provide satisfaction in transportation services, it is important to determine the different expectations of passengers and ameliorate the services in these

aspects [19]. A study by Sarı et al. [20] was conducted to determine the satisfaction levels of passengers using (High Speed Rail System) HSRS and their perceptions about the transportation strategies implemented by the authorities. Cleanliness of seats and helpfulness of personnel were found to be the most satisfied attributes according to the ANOVA and t tests. A customer's willingness to continue his/her relationship with a firm or brand is named as loyalty [21]. Being a customer of a product or service may be defined as either preferring the same product, service, or company [22] or being engaged to a brand or firm [23]. Transportation operators' main purpose is increasing their mode share in all travel. To achieve this purpose, firstly, the number of loyal customers should be increased. If customer satisfaction increases, so does customer loyalty, meaning that satisfied customers are more likely to continue using a service, and recommend the service to others [15]. Being a loyal customer is a dynamic process and satisfaction is one of the conditions of this process. A satisfied customer will turn into a loyal customer after a continuous and satisfied consumption experience is obtained [13]. Satisfaction and loyalty are the key factors for a sustainable firm, thus, determination of the factors effecting satisfaction and loyalty is especially important.

Service Quality, one of the effective factors, is defined as the difference between the expectations and the perceptions of the users of a system by Zeithaml et al. [19]. In a study by Karadeniz and Ünver [24], efficiency, reliability and cleanliness are determined as the most effective factors on satisfaction and service perception. According to the results of the study by Feng et al. [13], it is determined that all the dimensions of service quality (economy, speed and punctuality, convenience, comfort, and security) have positive effects on satisfaction. In a recent study by Yılmaz and Arı [16], service quality is considered in the structural model as technical (what is delivered as service) quality and functional (how the service is delivered to customers) quality, which is suggested by Grönroos [25] who preferred to handle quality as a function of a range of resources and activities.

Another factor, the trust concept was firstly used to analyze personal relationships in social psychology studies. By the 1990's, it became popular after the realization that it is one of the basic relationships between the consumer and the manufacturer [26]. By forming a valuable relationship between customer and provider, trust provides continuity of the relationship and becomes a determinant of brand loyalty [27]. The results of a study conducted by Harris and Goode [2] on online services show that trust have a positive impact on loyalty. Another study about the relationship between the trust and loyalty was made by Mikulic et al. [28], and the same positive effect was obtained for airline passengers' loyalty.

Perceived value is defined as the perception resulting from the comparison between what is received (benefits provided by the service) and what is given, the costs or sacrifice in acquiring and utilizing a service) for the customer [29]. It involves evaluations of the products/services made by customers according to the quality of the products or services. Three basic factors affect the perceived value of customers: quality of the product, the price paid for it, and tangible and intangible characteristics of the product [9]. Park et al [3] and Hapsari et al [30] examined the effects of service quality on perceived value and perceived value on satisfaction. Results of these studies show that service quality has a significantly positive effect on perceived value and perceived value has a significantly positive effect on satisfaction.

Involvement represents an individual's motivation based on natural needs, judgement, and interests in an object [31]. It is defined as "personal meaning of the product" or "relationship between consumer and the product" [32]. In their study, Lai and Chen [10] define Involvement as the level of interest in or importance of public transit to a passenger. Their results show that passengers with higher public transit involvement are those who have higher needs, values, and interest regarding to public transit. Bennett et al. [5] found that involvement is an important antecedent of brand loyalty. Involvement proved to be a complete mediator between satisfaction and repurchase loyalty [7].
The last factor that is known effective on satisfaction and loyalty is Image. It is the total subjective evaluation of the customer about a brand [33]. In other words, image is the picture of the product or a firm in a customer's mind formed by all the associations or remembrance. Experiencing the product or the service is not necessary for the customer to form an image. Image is formed by advertisements, the general impression of a society and all the perceptions gained from all sources [34]. According to Aydın and Özer [35], image stems from a consumer's consumption experiences, and service quality is a function of these consumption experiences.

Turkey's first HSRS started operating between Ankara and Eskişehir on 13th of March 2009. This section of high-speed rail system, with a length of 245 km, has 4 stops and duration of 1 hr. 25 min. and is the first stage of the Ankara-Istanbul line [36]. Between these cities, trip with intercity bus system takes 3 hours with almost at the same fare amount and has a more frequent schedule compared to rail system. Since it provides more efficient and modern transportation opportunity, the factors affecting the satisfaction and loyalty of HSRS users will provide useful data for managers to optimize the usage of restricted sources, keep loyal customers in the system and attract new ones. As Sirohi et al. [37] state, understanding current customers' loyalty intentions and their determinants is an important basis for the identification of optimal retailer actions. Additionally, as a study conducted in Turkey, Kırbaş in his study [38], investigated satisfaction of the users of the light rail transit (LRT) system in Samsun, Turkey. To evaluate users satisfaction, the five-likert survey method is used. Seemingly LRT users are broadly not satisfied with the vehicle occupancy rates.

In literature, the effect of service quality dimensions on satisfaction and loyalty is taken into consideration mostly in compact forms. In this study, service quality is involved in the model in terms of its dimensions which are adapted from TRB - Report 47 [39] and constructed to involve all the trip phases: trip planning, fare type and level, accessibility, service, station environment, security, and vehicle environment as stated in TRB - Report 47 [39]. Their definitions are as follows: Information (easiness and reliability of information that the passengers can get about the service), Disabled (amenities provided for disabled passengers), StaAccess (easiness of accessibility to stations and other transportation modes), Effectiveness (availability and frequency of service hours), StationE (lighting and cleanliness of stations, availability of information boards and announcements), Security (emergency precautions at stations and vehicles), Comfort (lighting and air quality of vehicles, availability of information boards and comfort of seats), Reliability (providing the service as promised in terms of speed and duration), Interaction quality of Personnel (general attitude, kindness of personnel, ease of contact and getting help), Accessibility to service-ServAccess (availability of trip departure times and daily period of service), and Seat Direction (availability of reversible seat according to movement direction). In a recent study by authors (Akyıldız Alcura et al., 2016) the reverse seat configuration of the vehicles was found as

the most complained feature by passengers of HSRS users of Ankara-Eskişehir line [40]. Due to this reason, the authors needed to take the seat direction configuration into consideration as a single factor even it was not loaded to any factor. This paper is organized in four sections. In the following section, general information about the study area, data and establishment of the model are presented. The model is presented in the third section. Finally, the results and the conclusions are provided in the fourth section.

2. Methodology and the proposed model

A face-to-face questionnaire survey was conducted to a random sample of 900 HSRS passengers between Ankara and Eskişehir to collect data in the period from the middle of March to the end of April 2015. The passengers were sampled by using stratified sample scheme according to the scheduled trip hours. The fulfillment of the service quality attributes was rated using Likert scale between "5" (completely satisfied) and "1" (completely dissatisfied). Also, 5-point Likert scale ranging from strongly agree (5) to strongly disagree (1) is used for the other items in the questionnaire. All the questionnaires were responded by HSRS users during the journey on board. Half of the respondents were interviewed in Ankara to Eskişehir direction and the other half in Eskişehir to Ankara. 72% of the passengers were interviewed in weekdays, 28% in weekends. The demographic characteristics of the sample are presented in Table 1.

Table 1: Sample characteristics.

Demographic Information		*Number*	*%*
1. Gender	Female	394	43.8
	Male	506	56.2
2. Age	18-24	309	34.3
	25-35	359	39.9
	36-45	124	13.8
	46-55	51	5.7
	56-65	22	2.4
	>65	4	.4
	No answer	31	3.4
3. Qualification	Primary school graduate	9	1.0
	Secondary school graduate	16	1.8
	High school graduate	245	27.2
	Associate/Bachelor's Degree	461	51.2
	Post graduate/Doctoral Degree	165	18.3
	No answer	4	.4
4. Marital Status	Single	550	61.1
	Married	320	35.6
	Divorced/Widowed	22	2.4
	No answer	8	.9

In this study, Structural Equation Modeling (SEM) is preferred. Structural equation modeling (SEM) is a multivariate statistical method that integrates a factor analytic model into a path analysis to analyze structural relationships by taking measurement properties of variables into account. SEM comprises two parts, a measurement and a structural model, estimated simultaneously. The measurement model specifies the relationships between observed variables, also called measured variables, manifest variables, items, measures, or indicators, and latent variables that are predefined

constructs unobserved/unmeasured directly but reflected indirectly through their indicators. The other part of the model is the structural model that specifies the relationship between the latent variables. Confirmatory Factor Analysis (CFA) model is a special case of SEM where only the measurement model part specifications are needed without distinction between endogenous and exogenous formation of latent variables *[41]*. The hypotheses used in this study with their labels and statements are given in Table 2 as a result of extensive literature review.

Table 2: Hypothesis used in this study.

Hypothesis	*Statement*
H1-H11	Effectiveness, Security, Passenger Information, Interaction Quality of Personnel, Reliability, Service for disabled passengers, Comfort, Station environment, Station accessibility, Service accessibility, Seat direction have a positive effect on perceived value *[10, 3, 2, 6, 4, 30, 14, 42]*
H12-H21	Effectiveness, Security, Passenger Information, Interaction Quality of Personnel, Reliability, Service for disabled passengers, Comfort, Station environment, Station accessibility, Service accessibility have a positive effect on perceived value *[2, 35]*
H22-H32	Effectiveness, Security, Passenger Information, Interaction Quality of Personnel, Reliability, Service for disabled passengers, Comfort, Station environment, Station accessibility, Service accessibility, Seat direction have a positive effect on satisfaction. *[8, 10, 3, 2, 6, 4, 14, 13, 15, 16, 11,* 14]
H33-H42	Effectiveness, Security, Passenger Information, Interaction Quality of Personnel, Reliability, Service for disabled passengers, Comfort, Station environment, Station accessibility, Service accessibility have a positive effect on image. *[3, 35, 8]*
H43-H44	Trust has a positive effect on satisfaction and involvement *[9, 2]*
H45-H46	Perceived value has a positive effect on trust and involvement *[2, 10, 41]*
H47-H50	Image has a positive effect on perceived value, trust, satisfaction, and involvement *[8, 9, 6, 16]*
H51	Involvement has a positive effect on loyalty. *[5, 7]*
H52-H53	Satisfaction has a positive effect on loyalty and involvement *[8, 13, 15, 16, 10 7, 42]*

2.1 Determination of factors used for SEM

In this study, the dimensions of service quality were determined first. A measurement model of Service Quality Dimensions was established, and the model was assessed in three steps: Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) and reliability assessment.

For the first step of the validation studies, EFA was implemented with Varimax rotation and Principal Components extraction. Out of the 61 attributes, 19 were excluded because they disrupted the conceptual meaning of the factors, did not load on the relevant factor or had high factor complexity. For the 42 remaining attributes, 10 factors were determined. By including the reverse seat configuration, 11 factors explaining 70.292% of total variance were determined. For the model with 43 variables and 11 factors, the KMO measure of sampling adequacy was found as .926 and the null hypothesis for Bartlett's test of Sphericity was rejected (Chi-square=21983.659, d.f.=903, $p<.01$). With these results, the data were found to be appropriate for factor analysis (Table 3).

CFA was used to confirm if the latent variables were measured by relevant indicators or not. To validate the structure of the 11 factor model, the covariance matrix was analyzed using LISREL 8.80 and CFA was performed by using maximum likelihood estimation. For the measurement model of 11 service quality dimensions, showing a good fit between the model and the data, all the coefficients were found to be statistically significant. Also, standardized coefficients were greater than the offered value of .50 and most of them were found to be greater than the ideal value of .7 (*[43, 44]*). R^2 values of the questions vary between .35 and .94, and most of them are greater than .50 which proves at least half of the variance of an indicator is explained by the relevant factor. It can be said that the indicators are reliable measures of the factors. Since all the coefficients were found to be statistically significant and positive (theoretically appropriate), convergent validity of the measurements was confirmed according to CFA. Goodness of fit values were improved after elimination of questions (STA1, C1 and SRA1). The measurement model of 11 factors with 40 indicator variables has a good model fit with values χ^2=2488.19, Degrees of Freedom (d.f.)=685, (Calculated Probability: P-Value) (p)=.00, Standardized Root Mean Square Residual (SRMR)=.043, Root Mean Square Error of Approximation (RMSEA)=.054, Normed Fit Index (NFI)=.97, Non-Normed Fit Index (NNFI)=.97, and Comparative Fit Index (CFI)=.98. After validity analysis, reliability studies were conducted for each construct and Cronbach Alpha internal consistency reliability coefficients were calculated. The values fall in the range .760-.94 and corrected item total correlation values of the indicators vary between .58 and .89. When any indicator was deleted from the item set of a factor, the alpha coefficients decreased between .10 and .01. It was decided not to eliminate any indicator to increase the reliability which was found to be acceptable for all factors. Cronbach alpha was not calculated for "Seat direction" factor since it has a single indicator.

For all the factors included in the proposed model, EFA was re-performed with Principal Components extraction and Varimax rotation. By EFA analysis applied to 86 indicators, a structure of 17 factors was determined. KMO and Bartlett's tests were conducted to test adequacy and suitability of implementing factor analysis to the sample and the KMO value was found as .959 which is defined as superb. By Bartlett's test, the hypothesis that the correlation matrix is an identity matrix was rejected (p<.01). Factor analysis was found to be appropriate. When the 17 factors were analyzed, they were found to be conceptually meaningful and acceptable according to factors handled in the literature. The factors with their indicators, and the Varimax rotation factor loadings of the indicators on the relevant factor are shown in Table 3.

Table 3. Factors with indicators, descriptive statistics of the indicators, factor loadings (EFA), and CFA estimates of the measurement model.

Factor	*Attribute (Indicator)*	*Mean*	*Standard Deviation*	*Factor Loading (EFA)*	*Standardized Factor Loading (CFA)*	*Standard Error*	*t value*	R^2
Information given to passengers	I1: Accessibility to information about HSRS trip	3.98	.91	.64	.63	.03	21.00**	.40
	I2: Availability of correct and up-to-date information about HSRS	4.09	.92	.64	.65	.03	21.67**	.42
	I3: Ease of using the web site of HSRS	3.78	1.14	.76	.72	.04	18.00**	.52

Table 3. (Continued).

	I4: Adequacy of information on the HSRS web site	3.77	1.07	.78	.79	.03	26.33**	.63
	I5: Using the web site securely	4.13	.89	.72	.72	.03	24.00**	.52
Service for disabled passengers	D1: Availability of wheelchair ramps for disabled passengers	3.63	1.10	.80	.82	.03	27.33**	.68
	D2: Availability of pavements for disabled passengers	3.48	1.15	.83	.89	.03	29.67**	.80
	D3: Availability of seats for disabled passengers	3.52	1.09	.78	.79	.03	26.33**	.63
	D4: Availability of personnel to help disabled passengers	3.58	1.07	.65	.68	.03	22.67**	.46
Access to stations	STA2: Ease of accessibility to the station with other transportation modes	3.48	1.23	.60	.78	.04	19.50**	.62
	STA3: Availability/frequency of other transportation modes	3.43	1.14	.77	.91	.04	22.75**	.83
Effectiveness	E1: Availability of service hours on weekdays	3.27	1.26	.76	.83	.03	27.67**	.70
	E2: Frequency of service hours on weekdays	3.11	1.27	.83	.90	.03	30.00**	.80
	E3: Availability of service hours on weekends	3.11	1.29	.82	.81	.04	20.25**	.66
	E4: Frequency of service hours on weekends	2.99	1.28	.84	.80	.04	20.00**	.64
	E5: Frequency of service hours generally	3.09	1.27	.81	.86	.03	28.67**	.74
Station environment	SE1: Availability of route maps and schedules at stations and stops	3.78	.98	.51	.71	.03	23.67**	.51
	SE2: Availability of announcements at stations	4.07	.91	.68	.73	.03	24.33**	.54
	SE3: Lighting quality at stations	3.93	.92	.71	.80	.03	26.67**	.64
	SE4: Cleanliness of stations	3.85	1.02	.51	.70	.03	23.33**	.49
Security	SEC1: Security personnel at stations	3.79	.99	.69	.73	.03	24.33**	.53
	SEC2: Emergency phones/alarms at stations	3.67	.95	.74	.80	.03	26.67**	.64
	SEC3: Availability of guidance and signs to exits at stations	3.71	.96	.72	.79	.03	26.33**	.62
	SEC4: Security to warn disruptive passengers at stations	3.52	1.11	.69	.70	.03	23.33**	.49
	SEC5: Ease of reaching personnel at stations	3.75	1.06	.48	.66	.03	22.00**	.43
	SEC6: Emergency phones/alarms in vehicles	3.90	.87	.44	.69	.03	23.00**	.48

Table 3. (Continued).

Comfort	C2: Lighting quality of vehicles	3.99	.85	.52	.74	.03	24.67**	.55
	C3: Availability of information boards and signs in vehicles	3.83	.97	.49	.73	.03	24.33**	.53
	C4: Air conditioning in vehicles	3.80	1.05	.64	.62	.03	20.67**	.39
	C5: Number and comfort of seats in vehicles	3.71	1.11	.62	.60	.04	15.00**	.34
Reliability	R1: Speed of vehicles compared to promised speeds	3.89	1.04	.75	.78	.03	26.00**	.60
	R2: Trip times compared to promised times	3.92	1.03	.84	.96	.03	32.00**	.92
	R3: Completion of trips in promised length of time	3.93	1.03	.83	.88	.03	29.33**	.78
Interaction quality of personnel	P1: General attitude of personnel on vehicles	3.95	.96	.70	.77	.03	25.67**	.59
	P2: Kindness and care of personnel on vehicles	3.97	.93	.75	.84	.03	28.00**	.70
	P3: Ease of contacting personnel on vehicles	3.72	1.03	.67	.74	.03	24.67**	.55
	P4: Getting understandable and reliable answers from personnel on vehicles	3.87	.92	.73	.82	.03	27.33**	.67
Accessibility to service	SRA2: The time of the last scheduled trip (20:40)	2.76	1.38	.81	.93	.04	23.25**	.86
	SRA3: Service period of HSRS (06:30-20:40)	2.82	1.36	.83	.96	.04	24.00**	.91
Seat Direc.	S1: Availability of reversible seats according to movement direction	2.92	1.30	.56	1.00[a]	-		-
Satisfaction	STF1: I made a good decision by choosing HSRS.	4.11	.83	.51	.77	.02	38.50**	.60
	STF2: HSRS fulfilled my expectations.	3.88	.89	.58	.79	.03	26.33**	.62
	STF3: HSRS service is better than my expectations.	3.43	1.00	.50	.71	.03	23.67**	.51
	STF4: I am satisfied about HSRS trip duration.	3.84	.98	.55	.71	.03	23.67**	.50
	STF5: I am satisfied about safety of HSRS.	3.69	1.01	.51	.65	.03	21.67**	.42
	STF6: I am satisfied about comfort of HSRS.	3.73	.99	.56	.72	.03	24.00**	.51
	STF7: I am satisfied about punctuality of HSRS.	3.86	1.06	.49	.63	.03	21.00**	.39
	STF8: I am satisfied about HSRS generally.	4.04	.81	.58	.82	.02	41.00**	.67

Table 3. (Continued).

Loyalty	L1: I will use HSRS again.	4.46	.72	.86	.81	.02	40.50**	.66
	L2: I will keep using HSRS.	4.45	.72	.86	.84	.02	42.00**	.71
	L3: I recommend HSRS to others.	4.32	.82	.77	.92	.02	46.00**	.85
	L4: I state my satisfaction about HSRS.	4.09	.92	.58	.80	.03	26.67**	.64
	L5: I will use HSRS more in my future trips.	4.15	1.08	.59	.78	.03	26.00**	.61
	L6: HSRS is my first choice for a trip.	3.99	1.05	.47	.66	.03	22.00**	.43
Trust	T1: I think HSRS is a reliable operator.	3.87	.90	.69	.88	.02	44.00**	.78
	T2: I think HSRS is master of its domain.	3.77	.95	.71	.91	.02	45.50**	.82
	T3: I think HSRS is an honest operator.	3.74	.96	.74	.89	.03	29.67**	.80
	T4: I think HSRS is a responsible operator to its passengers.	3.77	.94	.76	.89	.02	44.50**	.78
	T5: I think HSRS personnel are reliable.	3.83	.86	.80	.84	.02	42.00**	.71
	T6: I think HSRS personnel are master of their domain.	3.74	.94	.80	.85	.03	28.33**	.72
	T7: I think HSRS personnel are honest.	3.78	.90	.81	.82	.02	41.00**	.68
	T8: I think HSRS personnel are responsible for the passengers.	3.75	.92	.78	.79	.03	26.33**	.63
Perceived Value	PV1: The service of HSRS is worth the payment I have made.	3.51	1.08	.75	.74	.03	24.67**	.54
	PV2: The fare of a ticket is at a reasonable level.	3.44	1.07	.77	.67	.03	22.33**	.44
	PV3: The service of HSRS is worth the effort I have made.	3.82	.90	.64	.81	.03	27.00**	.65
	PV4: HSRS fits my needs.	3.97	.79	.56	.79	.02	39.50**	.62
	PV5: The comfort of HSRS is worth the payment and effort I have made.	3.63	.96	.74	.83	.03	27.67**	.69
	PV6: The safety of HSRS is worth the payment and effort I have made.	3.73	.92	.66	.83	.03	27.67**	.69
	PV7: The consistent and planned trip with HSRS is worth the payment and effort I have made.	3.78	.91	.68	.86	.02	43.00**	.74
	PV8: HSRS met my needs more than I expected.	3.40	1.01	.51	.72	.03	24.00**	.53
	PV9: HSRS is worth the payment and effort I have made in general.	3.74	.90	.63	.87	.02	43.50**	.75

Table 3. (Continued).

Involvement	INV1: I like travelling with HSRS.	4.07	.84	.53	.85	.02	42.50**	.72
	INV2: HSRS has an important place in my trips.	4.00	.90	.67	.85	.02	42.50**	.73
	INV3: I think taking HSRS is consistent with my life style.	3.94	.88	.67	.87	.02	43.50**	.76
	INV4: I prefer taking HSRS whatever the weather conditions are.	3.89	.99	.75	.81	.03	27.00**	.66
	INV5: I prefer taking HSRS whether I have time pressure or not.	3.75	1.06	.74	.78	.03	26.00**	.60
	INV6: I prefer taking HSRS whatever the trip purpose is.	3.62	1.08	.73	.73	.03	24.33**	.54
Image	IMG1: HSRS is a steady company.	3.80	.91	.57	.88	.02	44.00**	.77
	IMG2: HSRS is a strong company.	3.85	.88	.67	.91	.02	45.50**	.83
	IMG3: HSRS is a well-established company.	3.78	.98	.71	.76	.03	25.33**	.58
	IMG4: I always prefer HSRS to any other operator.	3.44	1.07	.64	.66	.03	22.00**	.44
	IMG5: HSRS (TCDD [b]) always produces projects that are not transient.	3.68	.95	.69	.73	.03	24.33**	.53
	IMG6: HSRS (TCDD[b]) always produces projects that are useful for society.	3.83	.90	.64	.74	.03	24.67**	.55

***p<.01; [a]Fixed to 1.00 for scaling purpose; [b] TCDD is the abbreviation for Turkish Railways, general railway operator of Turkey.*

Composite Reliability (CR) values, presented in Table 4, were calculated using the standardized CFA results. The composite reliability of the factors is reported here because it is generally acknowledged that CR is a better measure of scale reliability than Cronbach's alpha since alpha tends to increase with the increase of the number of indicators and tends to decrease with non-equal factor loadings *[45]* and these ranged between .80 and .96, indicating good reliability considering that .70 is the cutoff value for being acceptable. Since all the reliabilities were at an acceptable level, with the factor loadings found to be significant and of an acceptable size, the measurement model provided good fit, and convergent validity was confirmed according to CFA. The AVE values were calculated using the standardized CFA results of the items for each factor in the model and are presented in Table 4. When Table 4 is examined, it is seen that the AVE values of all factors are larger than .50 except Comfort, with an AVE value of 0.46 which is quite close to .50, and convergent validity is shown according to this strict approach. For the single item factor Seat direction, Cronbach's alpha cannot be calculated, and CR and AVE are not meaningful criteria since the indicator's factor loading is fixed at 1.00 for scaling purposes.

Table 4. Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) values.

Factor	Cronbach's alpha	CR	AVE
Effectiveness	.93	.92	.71
Security	.87	.87	.53
Information	.83	.83	.50
Interaction Quality of Personnel	.87	.87	.63
Reliability	.91	.91	.77
Disabled	.87	.87	.64
Comfort	.76	.77	.46
StationE	.82	.83	.54
StaAcces	.83	.84	.72
ServAcces	.94	.94	.89
Trust	.96	.96	.74
Perceived Value	.94	.94	.63
Loyalty	.91	.92	.65
Involvement	.96	.92	.67
Image	.91	.90	.62
Satisfaction	.90	.90	.53

In addition to assessing item-level discriminant validity with the examination of the factor loadings and cross loading from the EFA perspective, factor-level discriminant validity was investigated using the correlations between factors obtained from CFA. In Table 5, the correlations between the factors, presented as the elements of a lower triangular matrix, ranged from .84 to .06.

Table 5. Correlations between the factors (lower diagonal) and square roots of AVE values of factors (on diagonal).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Effectiveness (1)	.84																
Security (2)	.46**	.73															
Information (3)	.39**	.46**	.70														
Interaction Quality of Personnel (4)	.38**	.61**	.45**	.79													
Reliability (5)	.40**	.39**	.34**	.48**	.88												
Disabled (6)	.39**	.60**	.40**	.40**	.29**	.80											
Comfort (7)	.49**	.82**	.53**	.64**	.46**	.48**	.68										
StationE (8)	.44**	.79**	.52**	.58**	.44**	.51**	.84**	.74									
StaAcces (9)	.43**	.43**	.28**	.27**	.29**	.42**	.43**	.44**	.85								
ServAcces (10)	.51**	.36**	.23**	.35**	.29**	.39**	.35**	.33**	.29**	.95							
Trust (11)	.38**	.42**	.38**	.48**	.40**	.31**	.44**	.42**	.28**	.25**	.86						
Perceived Value (12)	.42**	.45**	.36**	.51**	.42**	.36**	.52**	.47**	.33**	.32**	.68**	.79					
Loyalty (13)	.26**	.29**	.35**	.44**	.38**	.22**	.39**	.37**	.20**	.14**	.57**	.71**	.81				
Involvement (14)	.30**	.34**	.37**	.43**	.34**	.30**	.42**	.38**	.25**	.22**	.70**	.74**	.72**	.82			
Image (15)	.36**	.37**	.36**	.45**	.38**	.29**	.41**	.40**	.30**	.25**	.79**	.70**	.61**	.67**	.78		
Satisfaction (16)	.47**	.52**	.44**	.60**	.56**	.37**	.59**	.55**	.35**	.33**	.67**	.79**	.72**	.70**	.68**	.73	
Seat Direction (17)	.17**	.19**	.06n.s.	.27**	.14**	.13**	.17**	.18**	.10**	.24**	.16**	.22**	.15**	.15**	.14**	.20**	n.a.

***p<.01; n.s.nonsignificant; n.a.:not applicable*

To establish the structural model, all the hypotheses were set in the model. After that, the goodness of fit values of the model of 17 factors with the hypothesized relationships were determined. In the structural equation model (SEM) $\chi 2$=9877.66, d.f.= 3206, p=.00, RMSEA=.048, SRMR=.047, NNFI=.98 and CFI=.98 were found and the model provided a good fit. The standardized path coefficients, standard errors and t values of the structural model of 17 factors measured by 83 indicators are shown in Table 6.

Table 6. Results of the proposed model.

Hypothesis	*Standardized path coefficient*	*Standard error*	*t-value*	*Hypothesis*	*Standardized path coefficient*	*Standard error*	*t-value*
H1	.06	.03	1.65	H28	.06	.08	.84
H2	-.07	.07	-1.06	H29	.04	.06	.73
H3	-.02	.04	-.59	H30	-.01	.02	-.27
H4	.09	.04	**2.17***	H31	-.03	.01	-1.17
H5	.05	.03	1.59	H32	-.01	.01	-.38
H6	.06	.03	1.60	H33	.11	.03	**2.41***
H7	.25	.12	**2.74****	H34	-.03	.08	-.38
H8	-.05	.09	-.73	H35	.11	.04	**2.61****
H9	.01	.03	.36	H36	.23	.05	**4.67****
H10	.03	.02	.87	H37	.14	.03	**3.59****
H11	.07	.02	**2.88****	H38	.02	.03	.34
H12	.05	.02	1.49	H39	.02	.13	.15
H13	.04	.06	.68	H40	.06	.10	.62
H14	.03	.03	1.02	H41	.10	.03	**2.43***
H15	.08	.03	**2.20***	H42	.00	.02	-.03
H16	.04	.02	1.41	H43	.07	.04	1.89
H17	.01	.02	.42	H44	.28	.05	**6.28****
H18	.07	.09	.85	H45	.48	.03	**12.40****
H19	-.05	.07	-.76	H46	.35	.05	**7.17****
H20	-.02	.02	-.67	H47	.54	.04	**14.50****
H21	-.02	.02	-.62	H48	.70	.04	**18.92****
H22	.05	.02	1.76	H49	.13	.04	**2.94****
H23	-.02	.05	-.37	H50	.11	.05	**2.15***
H24	.03	.02	1.13	H51	.43	.03	**11.01****
H25	.12	.02	**3.40****	H52	.43	.04	**11.04****
H26	.17	.02	**6.34****	H53	.15	.06	**3.16****
H27	-.02	.02	-.64				
Squared Multiple Correlation (SMC) Coefficients							
Trust	.67						
Perceived value	.59						
Loyalty	.62						
Involvement	.63						
Image	.29						
Satisfaction	.76						

*p<.05; **p<.01; significant t values are in bold

3. Results

The results of the SEM are summarized in Figure 1 and Table 7. It is determined that the coefficients related to the hypothesis H4, H7, H11, H15, H25, H26, H33, H35, H36, H37, H41, H44, H45, H46, H47, H48, H49, H50, H51, H52 and H53 are statistically significant. The model is considered to be predictive as 67% of the total variance of Trust, 59% of the total variance of Perceived Value, 62% of the total variance of Loyalty, 63% of the total variance of Involvement, 29% of the total variance of Image and 76% of the total variance of Satisfaction are explained by the model implied relationships. Eliminating the insignificant paths from the proposed model, the final model shown in Figure 1 with χ^2=9934.43, d.f.= 3238, p=.00, RMSEA=.048, SRMR=.049, NNFI=.98 and CFI=.98 is provided good fit.

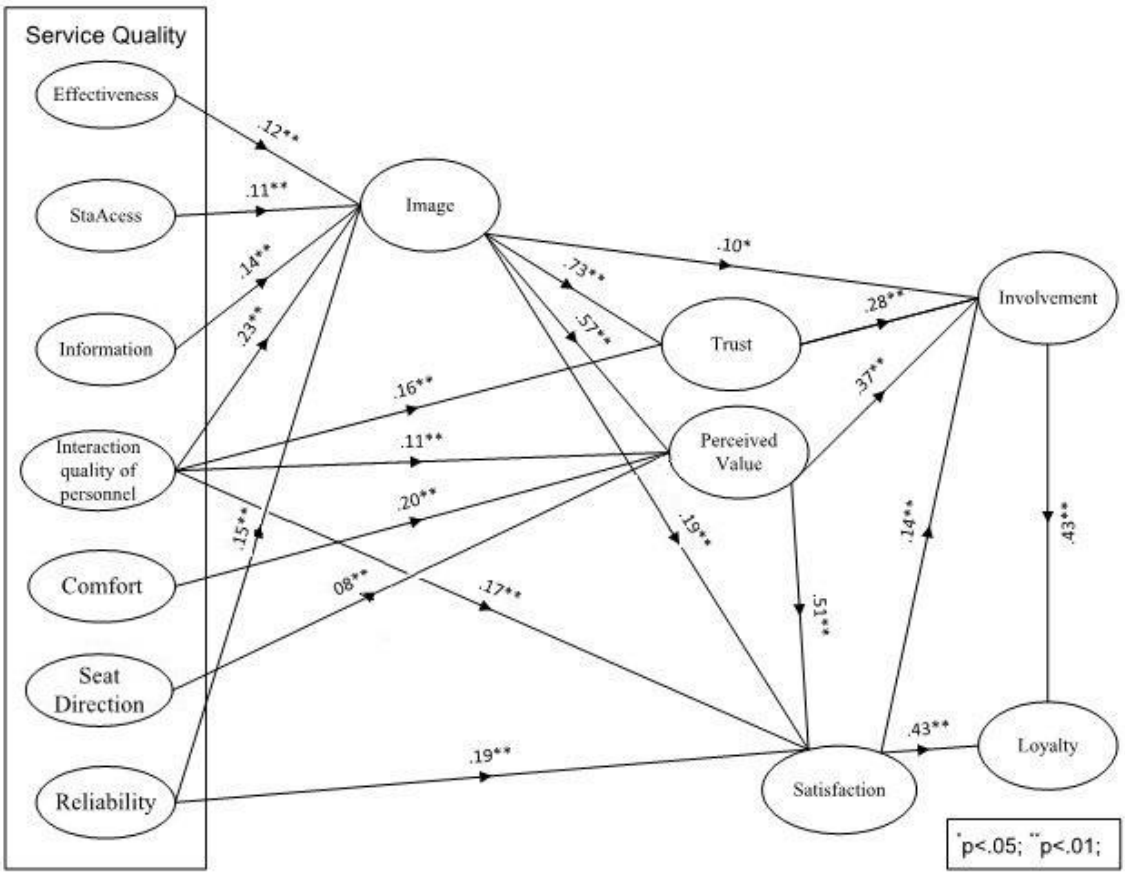

Figure 1. Final Model for HSRS passenger loyalty.

Table 7. Standardized direct, indirect and total effects on endogenous variables.

		Effectiveness	*Security*	*Information*	*Interaction Quality of Personnel*	*Reliability*	*Disabled*	*Comfort*	*StationE*	*StaAcces*	*ServAcces*	*Seat Direction*	*Trust*	*Perceived Value*	*Involvement*	*Image*	*Satisfaction*
Image	D	.12**	-	.14**	.23*	.15*	-	-	-	.11**	-	-	-	-	-	-	-
	I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	T	.12**	-	.14**	.23*	.15*	-	-	-	.11**	-	-	-	-	-	-	-
Perceived Value	D	-	-	-	.11*	-	-	.20**	-	-	-	.08**	-	-	-	.57**	-
	I	.07**	-	.08**	.14*	.09*	-	-	-	.06**	-	-	-	-	-	-	-
	T	.07**	-	.08**	.25*	.09*	-	.20**	-	.06**	-	.08**	-	-	-	.57**	-
Trust	D	-	-	-	.16*	-	-	-	-	-	-	-	-	-	-	.73**	-
	I	.09**	-	.10**	.17*	.11*	-	-	-	.08**	-	-	-	-	-	-	-
	T	.09**	-	.10**	.33*	.11*	-	-	-	.08**	-	-	-	-	-	.73**	-
Satisfaction	D	-	-	-	.17*	.19*	-	-	-	-	-	-	-	.51**	-	.19**	-
	I	.06**	-	.07**	.17*	.07*	-	.10**	-	.05**	-	.04**	-	-	-	.29**	-
	T	.06**	-	.07**	.34*	.26*	-	.10**	-	.05**	-	.04**	-	.51**	-	.48**	-
Involvement	D	-	-	-	-	-	-	-	-	-	-	-	.28**	.37**	-	.10*	.14**
	I	.07**	-	.08**	.26*	.12*	-	.09**	-	.07**	-	.03**	-	.07**	-	.49**	-
	T	.07**	-	.08**	.26*	.12*	-	.09**	-	.07**	-	.03**	.28**	.44**	-	.59**	.14**
Loyalty	D	-	-	-	-	-	-	-	-	-	-	-	-	-	.43**	-	.43**
	I	.06**	-	.06**	.26*	.16*	-	.08**	-	.05**	-	.03**	.12**	.41**	-	.46**	.06**
	T	.06**	-	.06**	.26*	.16*	-	.08**	-	.05**	-	.03**	.12**	.41**	.43**	.46**	.49**

*p<.05; **p<.01; - undefined effect

The effective factors on the endogenous variables Trust, Perceived Value, Loyalty, Involvement, Image and Satisfaction are summarized as follows:

The most effective variable on Trust was found as Image (.73). Image was followed by Interaction Quality of Personnel, Reliability, Effectiveness and Information. Effectiveness, Information, Reliability and Station Access have indirect effects on Trust, while Interaction Quality of Personnel has direct effects.
When the total effects on Perceived Value were considered, again Image was the most effective variable (.57) among the others which was followed by Interaction Quality of Personnel, Comfort, Reliability, Seat Direction, Effectiveness and Information. If only the service quality dimensions were considered, the most effective variables on Perceived Value were Interaction Quality of Personnel and Comfort. The Seat Direction variable having direct effects on Perceived value was found to be statistically meaningful.

Loyalty was mostly affected by Satisfaction with a total value of .49. The direct effect (.43) of Satisfaction was much greater than its indirect effect. Satisfaction was followed by Involvement which has a direct effect (.43) on Loyalty and has no indirect effect. Among the indirect effective variables, the most effective one following Image was found as Perceived Value (.41) which was followed by Interaction Quality of Personnel, Reliability, Trust, Comfort, Information and Effectiveness.
When the most effective, variables on Involvement were analyzed, it was found that Image had the greatest effect (.59). The second and third most effective variables were Perceived Value (.44) and Trust (.28) on Involvement. Interaction Quality of Personnel was the most effective of the indirect effective variables.

On Image, Interaction Quality of Personnel (.23) was found to be the most effective direct variable. It was followed by other directly effective components of service: Reliability, Information and Effectiveness.
On Satisfaction, Perceived Value (.51) and Image (.48) were found as the variables with greatest effects. Interaction Quality of Personnel, Reliability and Comfort follow these variables. Interaction Quality of Personnel, Reliability and Image have both direct and indirect effects on Satisfaction while Effectiveness, Comfort, Station Access and Seat Direction variables have only indirect effects. For example, Seat Direction variable does not have a direct effect on Satisfaction but has an indirect effect through Perceived Value.

4. Conclusions

In this study, an integrative model was proposed to investigate antecedents of passenger satisfaction and passenger loyalty in High Speed Rail System line between Ankara and Eskişehir in Turkey based on the survey data. For this purpose, Structural Equation Modelling was performed with complementary –pre and post- analyses. We firstly focused on the factors of service quality, for which great attention was given to specialize them for HSRS as passenger information, service for disabled persons, accessibility to station, accessibility to service, effectiveness, station environment, security, comfort, reliability, interaction quality of personnel and seat direction, which in turn they provide us more comprehensive results to conclude about HSRS in Turkey.

To avoid model misspecification, the effects of the factors trust, perceived value, image, and involvement were also investigated in a holistic way.

TCDD, the main railway provider and operator of HSRS in Turkey has a strong image because of its long history and solid investments. One of the results of the model showing the direct and strong relationship between Image and Trust relies on this fact. Image has a direct effect not only on Trust, but also on Perceived Value. The other option to travel between the two cities is bus transportation. The ticket price is almost the same, but the trip takes approximately 3 hours by bus, which is twice as long as the duration of the trip by HSRS. Also, HSRS provides a more standardized and reliable service to passengers when compared to bus service providers. When the indirect effects are also considered, it can be seen that Image has effects on Involvement, Satisfaction and Loyalty of passengers as well.

The results show that Effectiveness, Interaction Quality of Personnel, Comfort and Reliability are the most effective dimensions of service quality. Especially, Interaction Quality of Personnel and Reliability are determined to have direct influence on Image. Because Interaction Quality of Personnel has an effect on almost all factors directly and also indirectly, the company should keep providing and enhancing reliable service as well as kind and caring personnel. The personnel, who are in direct contact with passengers, represent the face of the company and will shape passengers' ideas about the company and the service provided in terms of sufficiency, reliability, and responsibility. Also, kindness and the caring attitude of the personnel will make passengers feel that the fare of the ticket or other efforts made to take the trip are worth paying for. According to the results of the model, this feeling about the perceived value has positive contributions to satisfaction and involvement as well. As long as the passenger feels good about the amount and worth of payment or the effort, he/she makes, he/she will feel satisfied and prefer to travel with HSRS. On perceived value, another service quality - Comfort- was found to be effective. The lighting and air quality in the vehicles, availability of information and comfort of seats have positive contributions on passengers' perceived value. Those indicators of comfort make the passengers feel that they have made a reasonable decision by using HSRS. In addition to effects of Comfort, the seat configuration in terms of movement direction in the vehicles should be given attention as it was found effective on Satisfaction via Perceived Value.

Involvement and Satisfaction play a great role in Loyalty as can be seen from the results. This relationship has again been proved as in many previous studies [12, 10, 5, 7]. As a conclusion, it is recommended to HSRS management to focus on providing friendly and accessible personnel, reliable service, and a strong image to have satisfied and loyal passengers.
Besides these conclusions, there are some limitations of the study. As can be seen from Table 7, Security, Station Environment, Service Access, and Disabled dimensions of service quality do not provide significant effects on any factors. If the questions of Disabled dimension were asked to disabled persons during the study or if the questions about disabled persons include not only disabled but also special needs people like pregnant women or seniors, the results could have been different. These dimensions are planned to be enhanced besides considering other factors like switching barriers in further studies.

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References

[1] Carlson, E. D., Giuliano, G. and R. E. Skinner, Transit Cooperative Research Program, TCRP Report 8: A Guidebook for Developing Transit Performance-Measurement System. Kittelson and Associates Inc., **Transportation Research Board**, Washington. D.C, (2003).

[2] Harris, L. C., and M. M. Goode, The four levels of loyalty and the pivotal role of trust: a study of online service dynamics, **Journal of Retailing**, 80(2), 139-158, (2004).

[3] Park, J. W., Robertson, R., and C. L. Wu, The effect of airline service quality on passengers' behavioural intentions: a Korean case study, **Journal of Air Transport Management**, 10(6), 435-439, (2004).

[4] Ball, D., Simões Coelho, P., and A. Machás, The role of communication and trust in explaining customer loyalty: An extension to the ECSI model, **European Journal of Marketing**, 38(9/10), 1272-1293, (2004).

[5] Bennett, R., Härtel, C. E., and J. R. McColl-Kennedy, Experience as a moderator of involvement and satisfaction on brand loyalty in a business-to-business setting 02-314R, **Industrial Marketing Management,** 34(1), 97-107, (2005).

[6] Hsu, S. H., Chen, W. H., and J. T. Hsueh, Application of customer satisfaction study to derive customer knowledge, **Total Quality Management and Business Excellence**, 17(04), 439-454, (2006).

[7] Olsen, S. O, Repurchase loyalty: The role of involvement and satisfaction, **Psychology & Marketing**, 24(4), 315-341, (2007).

[8] Chou, J. and C. Kim, A Structural Equation Analysis of the QSL Relationship with Passenger Riding Experience on High-Speed Rail: An Empirical Study of Taiwan and Korea, **Expert Systems with Applications**, 36(3): 6945-6955, (2009).

[9] Gölbaşı Şimşek G. and F. Noyan, Türkiye'de Cep Telefonu Cihazı Pazarında Marka Sadakati İçin Bir Model Denemesi, ODTÜ **Gelişme Dergisi**, 36: 121-159, (2009).

[10] Lai, W. T. and C. F. Chen, Behavioral intentions of public transit passengers-The roles of service quality, perceived value, satisfaction and involvement, **Transport Policy**, 18(2), 318-325, (2011).

[11] Chiou, Y. C., and Y. H. Chen, Service quality effects on air passenger intentions: a service chain perspective, **Transportmetrica**, 8(6): 406-426, (2012).

[12] Chou, P. F., Lu, C. S. and Y.H. Chang, Effects of service quality and customer satisfaction on customer loyalty in high-speed rail services in Taiwan**,** **Transportmetrica** , A: Transport Science, 10(10), 917-945. 2014.

[13] Feng, Y., Li, Xuamei, Li, Xuewei and L. Yang, Interrelations among the Urban Rail Service Quality, Passenger Satisfaction and Loyalty, Paper presented at the **Transportation Research Board 98th Annual Meeting**, Washington, DC, (2015).

[14] Shen, W., Xiao, W., and X. Wang, Passenger satisfaction evaluation model for Urban rail transit: A structural equation modeling based on partial least squares, **Transport Policy**, 46, 20-31, (2016).

[15] Van Lierop, D., and A. El-Geneidy, Enjoying loyalty: The relationship between service quality, customer satisfaction and behavioral intentions in public transit, **Research in Transportation Economics**, 59, 50-59, (2016).

[16] Yılmaz V. and E. Arı, The Effects of Service Quality, Image and Customer Satisfaction on Customer Complaints and Loyalty in High-Speed Rail Service in Turkey: A Proposal of The Structural Equation Model, **Transportmetrica**, A: Transport Science, 13(1): 67-90, (2017).

[17] LaBarbera, P. A. and D. A. Mazursky, Longitudinal Assessment of Consumer Satisfaction/Dissatisfaction: The Dynamic Aspect of the Cognitive Process, **Journal of Marketing Research**, 20(4): 393-404, (1983).

[18] Kotler, P. and K. L. Keller. Marketing Management. N., **Beta Publishing**, Istanbul, (2000).

[19] Özgüven, N, Hizmet Pazarlamasında Müşteri Memnuniyeti ve Ulaştırma Sektörü Üzerinde Bir Uygulama, **Ege Academic Review**, 8(2): 652-682, (2008).

[20] Sarı, Y., Kılıçlar, A. and C. Seçilmiş, Yüksek Hızlı Tren (YHT) Yolcularının Kişisel Değişkenler Açısından Memnuniyet Algılamalarının Değerlendirilmesi, **Anatolia: Turizm Araştırmaları Dergisi,** 22(2): 127-138, (2011).

[21] Cyr, D., Hassanein, K., Head, M. and A. Ivanov, The Role of Social Presence in Establishing Loyalty in E-service Environments, **Interacting with Computers** 19(1): 43-56, (2007).

[22] Zeithaml, V.A., Berry, L.L. and A. Parasuraman, The Behavioral Consequences of Service Quality, **Journal of Marketing**, 60(2): 31-46, (1996).

[23] Oyman, M, Müşteri Sadakati Sağlamada Sadakat Programlarının Önemi, **Kurgu Dergisi**, 19, (2002).

[24] Karadeniz, M. and N. M. Ünver, Şehir İçi Denizyolu Ulaşımında Müşterilerin Hizmet Algısı ve Memnuniyeti: Bir Uygulama, **Marmara Üniversitesi Öneri Dergisi** 42: 43-68, (2014).

[25] Grönroos C, A Service Quality Model and Its Marketing Implications, **European Journal of Marketing**, 18 (4): 36-44, (1984).

[26] Delgado-Ballester, E. and J. L. Munuera-Aleman, Brand Trust in the Context of Consumer Loyalty, **European Journal of Marketing,** 35(11): 1238-1258, (2001).

[27] Morgan, R. M., and S. D. Hunt, The Commitment Trust Theory of Relationship Marketing, **Journal of Marketing**, 58(2): 20–38, (1994).

[28] Mikulic, J., Seric, M., and L. Matas Milkovic, Airline loyalty determinants among business travelers: empirical evidence from Croatia, **Transportation Letters**, 9(3), 177-183, (2017).

[29] Hellier, P. K., Geursen, G. M., Carr, R. A. and A. Rickard, Customer Repurchase Intention: A General Structural Equation Model, **European Journal of Marketing**, 37(11): 1762-1800, (2003).

[30] Hapsari, R., Clemes, M., and D. Dean, The mediating role of perceived value on the relationship between service quality and customer satisfaction: evidence from Indonesian airline passengers, **Procedia Economics and Finance**, 35, 388-395, (2016).

[31] Zaichkowsky, J. L. Measuring the Involvement Construct, **Journal of Consumer Research**, 12(3): 341-52, (1985).

[32] Martin, C., L, Relationship Marketing: a High-Involvement Product Attribute Approach, **Journal of Product & Brand Management** 7(1): 6-26, (1998).

[33] Keller, K. L Conceptualizing, Measuring, Managing Customer-Based Brand Equity, **Journal of Marketing** 57(1), 1-22, (1993).

[34] Akkaya, E, Marka İmajı ve Bileşenleri: Otomobil Sektöründe Bir Uygulama, Paper presented at the **4. Ulusal Pazarlama Kongresi,** 21. Yüzyıl Eşiğinde Ulusal Pazarlama, Antakya, Türkiye, 101-111, (1999).

[35] Aydin, S., and G. Özer The analysis of antecedents of customer loyalty in the Turkish mobile telecommunication market, **European Journal of marketing,** 39(7-8), 910-925 (2005).

[36] TCDD (Turkish State Railways). 2015. Yüksek Hızlı Tren Projeleri - Ankara-İstanbul Hızlı Tren Hattı. http://www.tcdd.gov.tr/ankara-istanbul+m272. Accessed: November 17th 2015.

[37] Sirohi, N., McLaughlin E.W., Wittink D.R, A Model of Consumer Perceptions and Store Loyalty Intentions for a Supermarket Retailer, **Journal of Retailing,** 74: 223-245, (1998).

[38] Kırbaş, U., The Preferability of Light Rail Transit Systems between Transportation Modes: Samsun Case, **Conference: 1. International Conference on Intelligent Transportation Systems** - BANU ITSC'20 (2018).

[39] Shackelford, W., Wacks, M. and R. E. Skinner, Transit Cooperative Research Program. TCRP Report 47. A Handbook for Measuring Customer Satisfaction and Service Quality. Morpace International, Inc., et al., **Transportation Research Board**, Washington, D.C., (1999).

[40] Akyıldız Alçura, G., Kuşakcı Gündoğar, Ş., Gölbaşı Şimşek, G., Gürsoy, M. and Tanrıverdi, S. C., Impact Score Technique for Analyzing the Service Quality of a High-Speed Rail System, **Transportation Research Record**: Journal of the Transportation Research Board 2541: 64-72, (2016).

[41] Gölbaşi Şimşek G., F. Noyan Tekeli. Understanding the Antecedents of Customer Loyalty by Applying Structural Equation Modeling, **Handbook of Research on Developing Sustainable Value in Economics, Finance, and Marketing**, IGI Global, Hershey, PA, pp.420-445, (2015).

[42] Irtema, H. I. M., Ismail, A., Borhan, M. N., Abdelsalam, H. M., Alshetwi, A. B., Albrka, S. I., and H. A. Yahia, Perceptions Passengers on Service Quality: Public Transport in Kuala Lumpur, **International Journal of Engineering & Technology**, 7(2.29), 865-870, (2018).

[43] Hair, J.F., Anderson, R.E., Tahtam, R.L. and W.C. Black, **Multivariate Data Analysis**, Prentice Hall, New Jersey, USA.1998.

[44] Anderson, J. C. and D. W. Gerbing, Structural Equation Modeling in Practice: A Review and Recommended Two Step Approach, **Psychological Bulletin,** 103(3), 411-423, (1988).

[45] Bagozzi, R. P., & Yi, Y, On the Evaluation of Structural Equation Models, **Journal of the Academy of Marketing Science**, 16(1), 74-94, (1988).