The Validity of the Loyalty Model from Marketing in Public Transportation

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Abstract

Current mode-choice models do not properly account for emotionally motivated behavior. This study tries to fill this gap by incorporating insight from relevant consumer-behavior research in marketing. It adopts the loyalty model, a decision-making model, to better understand and evaluate passengers' attitudes toward public transport (PT) modes. This research describes the loyalty model, and then demonstrates and validates its use in transportation using a case study involving a choice between two PT modes: rail and bus. Based on factor analysis, two factors from the loyalty model were identified: loyalty attitude, which measures the repeat purchasing of the PT service and a passenger's attitude toward it; and hedonic commitment, which measures the emotional feeling after using a PT mode. The full loyalty model was validated for both rail and bus passengers. The research shows that like other consuming products, toward which subjective emotional feelings affect the consumer's behavior, passenger choice is significantly affected by subjective emotional feelings toward the PT mode. Additionally, the subjective effect can easily be measured using marketing research techniques.

Key Words

Marketing, public transportation, travel behavior, mode choice, loyalty, hedonic value.

1. Introduction

Most current mode-choice models are based on random utility models (RUM), which assume that passengers face a set of available modes and evaluate the mode that would provide them with the highest utility. The utility function is usually composed of various types of explanatory variables: level-of-service of the different modes, characteristics of the passenger (which sometimes includes some measures of their attitudes), characteristics of the trip (trip purpose, number of passengers traveling together) and various features of the area near the trip's origin and/or destination. However, these variables fail to account for emotionally motivated behavior. The latter has been studied in regard to consumer-purchasing behavior involving other products, such as banks (1) and shopping centers (2).

The marketing literature and modern research on consumer behavior, in particular, include some well-established theories for dealing with the mechanism of choice among products (see, for example, [3], [4], [5] and [6]). This study adopts the loyalty model from the field of marketing as a measurement tool for better understanding and evaluating passengers' attitudes toward public transport (PT). Considering PT modes as a product and passengers as consumers allows us to utilize this tool when investigating consumers' attitudes toward this product. The paper demonstrates the preparation and use of the loyalty model as a transport-service measurement tool and tests its validity toward this end, using a case study of the choice between two PT modes: rail and bus.

2. The loyalty model

The consumer choice process, according to the marketing literature, is motivated by three types of product values: a utilitarian value, which captures the functionality of the product for the consumer; a switching value, which reflects the technical effort in switching from one product to another; and a hedonic value, which captures the experience of emotion associated with the product in the consumer's mind (see Figure 1). The outcome of the model yields the level of satisfaction and the repeated choice of the product; i.e., the consumers' loyalty to the product. Satisfaction is the "consumer fulfillment response… a judgment that a product or service feature, or the product or service itself, provided a pleasurable level of consumption…"; whereas Loyalty is a "deeply held **commitment** to **re-buy** or re-patronize a **preferred** product or service **consistently** in the future" (7, pp. 178, emphasis added). While satisfaction is a short-term judgment of the product, loyalty reflects the consumer's attitude

and commitment toward the product in the long term. Levinson (7, pp. 173) divided loyalty creation into four stages:

1. Cognitive loyalty (knowing): the loyalty created after a short experience with the product; it is based on the level of satisfaction with the product's physical characteristics.
2. Affective loyalty (attitude): the creation of an attitude toward the product after a significant period of experience; this stage includes a personal commitment toward the product.
3. Conative loyalty (intention): the creation of intention to re-buy the product; this stage includes emotional feelings toward the product.
4. Action loyalty (re-buy): the top level of loyalty; it involves automatic re-purchasing of the product and being blind to competitors.

Marketing research usually deals with selected links among the loyalty model factors: satisfaction and loyalty (7), utilitarian and hedonic values (4), product utility and loyalty level (3) and others.

In classic utility theory, passengers will prefer a PT mode that provides a higher level of service in terms of time, cost, and other attributes. Considering a corridor with rail and bus service, this theory holds that if the bus service is significantly improved relative to the rail service, passengers will shift from rail to bus. Investigation of a passenger's behavior using the loyalty model, which includes the loyalty attitude and the subjective emotional preferences toward PT modes, may show, however, that fewer passengers will switch to bus transport, given their loyalty and emotional attitude toward rail.

2.1 The loyalty model in transportation research

Although marketing research treats Loyalty and Satisfaction as an outcome of a decision-making process, these characteristics are rarely used in transportation research as powerful explanatory factors to evaluate passengers' attitudes toward PT modes. The transportation research literature, for its part, mostly ignores modern marketing research and its measurement tools. Passengers are frequently asked directly about their loyalty and satisfaction toward a PT service. The mean results are used as a quality measure for level of service (8; 9); even when measured indirectly in factor analysis (10 and 11), these factors are not used as part of mode-choice modeling.

Loyalty and satisfaction are normally measured in transportation without taking into account the full loyalty process, which includes a deeper investigation of the subjective and emotional effect on a consumer's choice. Ebony and Mazulla (12), investigated passengers' satisfaction with transit level of service, ignored the loyalty factor and other marketing factors that function as measurements of emotional value in marketing research. An indirect measurement for loyalty and satisfaction was made in Greece (10). Still, the methodology in that study did not include a thorough investigation of the effect of those factors. The effect of LOS variables on loyalty strength was investigated in Taiwan (13). That research, based on a similar model to the loyalty model described in chapter above, does not include a hedonic value or other factors that could measure the emotional effect on mode choice.

3. Methodology

The methodology for the present work aims to establish some practical tools that will enable an easy assimilation of the loyalty model from marketing research in transportation. The methodology has two main purposes:

1. To establish measurement tools (scales) for marketing research factors in transportation.
2. To validate the loyalty model in transportation, using a case study of choice between two PT modes.

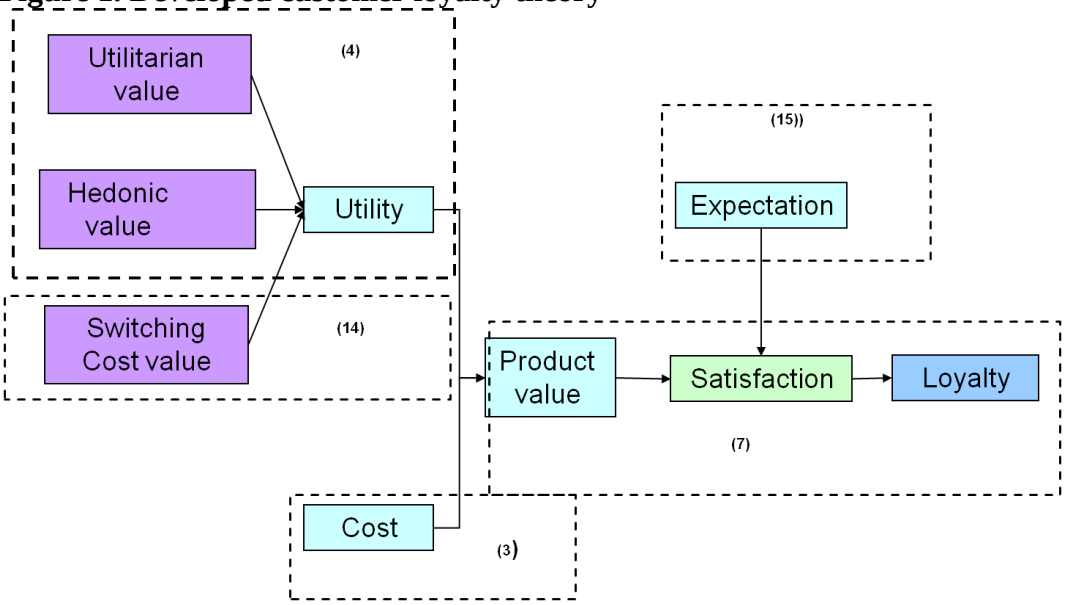
The investigation comprised six stages:

1. **Theory**: developing a full loyalty theory as a basis for the research.
2. **Measurement Scales**: identifying measurement scales from marketing to measure the factors included in the loyalty model, and adopting these scales to the mode-choice problem in transportation.
3. **Level-of-Service Factors:** identifying some level-of-service factors to be included in the model.
4. **Survey**: creating a database of a representative sample of PT users to measure the factor scales.
5. **Measurement**: measuring the factors using the factor-analysis technique;
6. **Validation**: validating a full loyalty model in transportation using the structural equation model (SEM) technique.

3.1 Theory: The loyalty model

Based on marketing research, we developed a full loyalty model. This model, shown in Figure 1, was synthesized from the various literature reviews presented above (the reference for each element is also shown in the Figure).

Figure 1. Developed customer loyalty theory



This theory assumes that the impressions that arise in the consumer's mind after using a product affect the individual's level of satisfaction with the product and that long-term satisfaction leads to a loyal consumer's behavioral pattern. The first impression takes into account not only practical utilitarian value, but also emotional-hedonic value. The model also captures the long-term effect of the PT mode upon a passenger through the loyalty factor.

3.2 *The measurement scales*

The loyalty model shown in Figure 1 identifies various factors in the loyalty attitude-building process. These factors are latent and cannot be observed directly; rather, they are measured indirectly through various direct questions (scales). In marketing research, special attention is given for measurement scales that are used to construct various factors, using the factor-analysis technique. An internal consistency index, α, measures the consistency level between the direct questions and the factor value, with a value of 0.8 considered a satisfying value (16). Some well-established measurement scales for the different factors of loyalty were developed in the marketing literature.

The current research adopted appropriate scales from marketing theory to measure loyalty model factors in transportation. This was done in two steps:

1. choosing an appropriate scale from marketing to adopt in this research;
2. Transforming the scales, which were developed for different products, to PT products (rail and bus).

The factors that are listed below play a critical role in loyalty theory and also have a well-established scale in marketing research. The information regarding the various factors chosen for the current research includes both a description of the scales selected for the measurement and an example of the questions, after being adapted to transportation, included in the questionnaire relating to this factor.

Loyalty

There are a large number of measurement scales to measure consumers' loyalty strength toward a product. We selected an accepted scale based upon Oliver's four-stage theoretical model of loyalty--cognitive, affective, conative, and action loyalty (7)--which is summarized in Section 2. This scale, which was previously developed by Harris and Goode (16) on the basis of Oliver's theory, includes 16 direct variables (questions), 4 for each loyalty type. The scale was validated by a consistency α value of 0.88.

The questions that were adopted and converted to the transportation field exploring passengers' attitudes and preference toward PT modes are shown in Table 1. Three questions from the original marketing scale were omitted from the questionnaire, as they were found to be not relevant for transportation.

Satisfaction

Satisfaction is a widely used term in marketing and, as such, has a large number of measurement scales. Continuing with Oliver's theory (7), which explored the relationship between loyalty and satisfaction, we chose a measurement scale that had been developed by Allen and Mayer (17) based on Oliver's theory. It is a validated 5-stage Lykert scale composed of 6 questions (α=0.89) exploring the passenger's evaluation of the PT service (see Table 1). Three questions from the original scale were omitted as they were similar to other questions in the questionnaire.

Affective commitment

As the measurement of emotional value lies at the heart of this research, it was decided to evaluate an alternative factor, in addition to the hedonic value factor, to measure the passenger's emotional value. For this purpose we used the affective commitment factor developed and validated by Allen and Mayer (1990) (α=0.89). This is a 5-stage Lykert scale which measures the emotional commitment of consumers toward the PT mode. From the original six questions, one was found to be irrelevant for the current research and was omitted.

Hedonic value

Hedonic value has been evaluated by various marketing researchers in. A measurement of hedonic and utilitarian values developed by Babin et al. (4) is frequently cited and accepted as the most common measure (see 18 and 19). Babin's scale is a validated 5-stage Lykert scale consisting of 12 questions (α=0.91) exploring emotional feeling as adventure and escapism, which are generated in the passenger mind when using the PT mode (see table 1). From the 12 questions included in the scale, 7 were selected for the current research, the 5 others found to be irrelevant for the current research.

Utilitarian value

The utilitarian value is based on the same source as the hedonic value, a scale that was developed by Babin et al. (4). The questions of this scale explore the extent to which passengers like\dislike the PT service and the time spent inside the vehicle. The original scale is a validated 5-stage Lykert scale comprising five questions (α=0.80). Two questions were omitted in the current research, as they were found to be irrelevant.

Table 1. Factors and variables in marketing research field included in the research: Bus passenger questionnaire

	Factor	Code	Variable
Affective	Loyalty	la1	I'm satisfied with the bus service
		la2	I have a negative attitude toward buses
Conative		lco1	Bus tickets are very expensive
		lco2	The characteristics of a bus trip are inferior compared to rail
Action		lp1	Buses will remain my favorite mode choice in the future
		lp2	I prefer now and will prefer in the future bus service characteristics
		lp3	I prefer a bus on new bus routes when rail service is also provided
		lp4	I will always prefer this bus line even when competing rail lines will become available
Cognitive		lc1	Bus is a better option compared to rail
		lc2	Bus offers the best value for the money
		lc3	I prefer bus service compared to rail
		lc4	I'm satisfied with the bus trip
	Satisfaction	S1	It is a smart decision to travel by bus
		S2	This bus service didn't meet my expectations
		S3	The bus service is well managed
	Affective. commitment	ca1	I feel a strong belonging to buses
		ca2	I will continue to travel by bus, since I am happy to be a bus passenger
		ca3	I'm in a good mood when traveling by bus
		ca4	I feel part of the bus users' family
		ca5	I have an emotional feeling toward buses
	Hedonic value	vh1	I enjoy traveling by bus
		vh2	Using buses is a free willing choice, and not a forced necessity
		vh3	I have an escapism feeling when using buses
		vh4	I'm updated with timetables and new bus services
		vh5	I have a feeling of adventure when using buses
		vh6	I rest during bus trips
		vh7	It is not really a pleasure to travel by bus
	Utilitarian value	vu1	My travel time is well utilized
		vu2	I am disappointed with the service
		vu3	Arriving on time is all that concerns me when traveling by bus

3.3 Level-of-service factors

In addition to marketing factors, we also explored some perceived level-of-service factors that are not customarily used in transportation research. These factors explore the passenger's perceived quality of the PT level of service.

Comfort: measures the level of trip comfort for the passenger. The questions explore the perceived physical comfort of bus seats, air conditioning and crowdedness of the mode. The questions were taken from the common handbook for level-of-service measurement (8).

Convenience: measures the level of trip comfort felt by the passenger - the convenience of the service. The questions explore the passenger's feeling of safety, relaxation and other convenience issues. The scale is based upon research conducted in Washington, D.C. (20).

Reliability: measures the level of the trip's perceived reliability. The scale, which was originally developed by Prashker (21), explores the passenger's view of service reliability (arriving at destination on time, etc.). The scale is a 5-stage, 9-question Lykert scale (α=0.85).

3.4The survey

The survey was conducted among bus and rail passengers along the Haifa – Tel Aviv corridor. Tel-Aviv is the largest metropolitan area in Israel and the business core of the country, and Haifa is the third largest metropolitan area and features a port, industry, a hi-tech center, and two major research universities. Up until two decades ago, this corridor was served mostly by buses. In the past two decades, a parallel rail service was introduced, and it has achieved a large share of the PT passengers in the corridor even though the bus service remained competitive to the rail for some time including the time of the survey. The purpose of the survey was to investigate the various components of the loyalty model: hedonic and utilitarian values, affective commitment, satisfaction, as well as four factors that determine different stages in the evolution of consumers' loyalty, from "attitude" to "active loyalty."

Table 2. Perceived LOS factors and variables included in the research: Bus passenger questionnaire

Factor	Code	Variable
Comfort	c1	Bus is not overcrowded
	c2	I'm satisfied with the temperature inside the bus
	c3	I'm satisfied with the smoothness of the ride
	c4	The seats are comfortable
Convenience	co1	Waiting conditions at stops are comfortable
	co2	I feel safe and protected from threats when using the bus
	co3	I am secure from accidents when using the bus
	co4	I feel relaxed when traveling by bus
	co5	Bus is environmental friendly
	co6	There is seat availability inside the bus
	co7	I'm able to read when traveling by bus
Reliability	r1	Bus service is as fast as possible
	r2	I feel confident that the bus will not need to stop for repairs
	r3	Bus travel time is unaffected by traffic congestion or frequent stops
	r4	Bus travel time varies by less than 5 minutes from day to day
	r5	Bus is available in no more than 5 minute from the time scheduled
	r6	I'm able to estimate the actual time of arrival at destination
	r7	Bus travel time performance is not influenced by weather

The questionnaire comprised three parts:

1. Questions concerning the trip being made: origin, destination, access and egress modes, and purpose.
2. Questions concerning passenger characteristics: age, level of income, number of persons and children in the household, and availability of a vehicle for the specific trip.

3. Questions concerning the passenger's attitude toward both rail and bus modes. Respondents were asked to evaluate their attitude toward each mode through 50 questions (variables) according to the scales developed, which are detailed in Table 1 and Table 2. This evaluation served as the basis for the marketing research and the perceived LOS factors.

In all, 505 respondents completed the questionnaire, 286 rail passengers and 219 bus passengers. The representativeness of the sample was compared with other bus and rail passenger data and surveys and was found to be satisfactory.

3.5 Measuring marketing factors with factor analysis

Factor analysis is a statistical method that reduces a large number of observed variables to a smaller number of unobserved variables - latent variables, or as they usually termed: factors. Factor analysis classifies attitudinal variables in such a way as to reduce the number of these variables and detect structural relationships among them while retaining the explanatory power of each manifest attitudinal statement. This process groups the various attitudinal questions into a series of attitudinal factors. The factor analysis for the present study is based on the last part of the questionnaire, which asked passengers about their attitude toward both modes, and it included two stages:

1. **Exploratory factor analysis (EFA) -** A process in which the underlying data determine the structure and content of the resulting factors. This type is used to explore the survey data in order to determine the nature of factors accounting for the covariance among variables, without imposing any *a priori* hypothesis about the number and structure of factors underlying the data. This stage was conducted using SPSS software.
2. **Confirmatory factor analysis (CFA) -** A process in which judgment is applied in regard to the structure and content of the factors, and then the statistical results of these established factors are estimated. These results are supported by those from the exploratory factor analysis, as well as by theoretical hypotheses as to which variables correlate with which factors. This stage was conducted using the MX software. We present here only the confirmatory factor analysis results.

3.6 Validation of the model using SEM

The aim of the last part of the study was to test the validity of the loyalty model in transportation, using the Simultaneous Equation Model (SEM) technique (utilizing the MX

software). SEM is a modeling technique that enables the simultaneous testing of a set of linear equations. Two types of variables are used in the SEM:

- Manifest variables: these are observed variables that are directly measured from the questionnaires. In this study, there were two main groups of manifest variables: (1) attitudinal variables, which are the ratings that travelers gave to their attitude toward various travel statements; (2) socioeconomic and demographic variables, such as household size, household income, and vehicle ownership.
- Latent variables: these are unobserved variables that are not directly measured, but are inferred by the relationships or correlations among manifest variables in the analysis. There were two groups of latent variables in the SEM: (1) marketing factors representing the most important attitudinal and emotional dimensions for traveler behavior; (2) error terms associated with each variable involved in the SEM model. Conceptually, every variable has an associated measurement error. Thus, the SEM model includes an error term for each variable.

Using SEM, we were able to examine the structure of the loyalty model and the significance of the relationships among the factors composing it. We examined separately the attitudes of users of each mode toward their chosen mode: bus users toward bus, and rail users toward rail.

4. Results

The results section includes an investigation of two main issues:

1. The existence of marketing behavioral phenomena (such as loyalty and satisfaction) in the PT mode-choice process; this was done by identifying such factors in the factor analysis investigation.
2. The validity of the loyalty model in transportation; this was done by examining the full loyalty-model structure (including the factors and the links among them), using SEM.

4.1. Descriptive statistical results

Table 3 shows mode choice according to certain socio-economic variables and access modes. As can be seen, rail users are wealthier than bus users and have higher levels of income,

education and motorization rate. Rail passengers use their private vehicles more frequently than do bus users (either as a driver or as a passenger) as an access mode to the station. It is important to note that the rail station and the central bus station in Haifa are located next to each other. Another interesting finding is that infrequent users prefer rail travel to bus travel.

Table 3. Socio-economic variables - rail and bus users

Variable	Category	Rail	Bus
Car availability		53%	29%
Education	**< 12 years**	34%	47%
	>=13 years	66%	53%
Income	**Low**	56%	69%
	>=average	44%	31%
Access mode	**Bus**	25%	60%
	Private vehicle	48%	17%
	Walk	20%	15%
Transit-use freq	**<= 1 a week**	41%	26%
	2-3 a week	32%	32%
	>3 a week	27%	41%

Investigation of the mean values of each group of variables composing each factor showed higher values given by rail passengers than by bus passengers (see Table 4).

4.2Factor analysis results

Factor analysis on the scales (description of the scales is given in table 1 and table 2) was conducted for bus and rail passengers separately. The results are shown in Table 5. The factor analysis identified two marketing and two level-of-service factors to be significant for both rail and bus users (written on the left side of the table). However, the loading values of the variables included in the factors (shown on the right side of the table) show differences between rail and bus users.

Table 4 Mean response to the original questions

		Rail		Bus	
Factor	**Variable**	**Mean Var.**	**Average all**	**Mean var.**	**Average all**
Loyalty attitude	LC1	4.41	3.49	2.50	2.59
	LC2	3.93		3.16	
	LC3	4.42		2.43	
	LC4	4.17		2.68	
	LA1	3.88		2.72	
	LP1	4.13		2.30	
	LP2	4.00		2.55	
	LP3	4.10		2.77	
	LP4	3.60		2.20	
	LA2	1.88		2.68	
	LA3	2.08		2.53	
	LA4	3.07		2.68	
	LCO1	3.10		2.27	
	LCO2	2.15		2.84	
Hedonic value	VH1	3.26	2.91	1.93	2.15
	VH2	2.73		1.76	
	VH3	2.03		1.62	
	VH4	2.84		2.08	
	VH5	2.01		1.63	
	VH6	3.17		2.18	
	VH7	2.42		3.28	
Reliability	R1	4.06	3.83	2.53	2.60
	R2	3.45		3.17	
	R3	3.86		1.86	
	R4	3.61		2.57	
	R5	3.70		2.65	
	R6	4.05		2.85	
	R7	4.08		2.59	
Comfort	C1	3.01	3.61	2.56	2.78
	C2	3.66		3.08	
	C3	3.75		2.67	
	C4	4.03		2.82	

Table 5. Factors and loading variables: Loading values in confirmatory factor analysis for bus and rail passengers

Factor	Code	Rail	Bus
Loyalty	la1	-	0.62
	lp1	0.64	0.62
	lp2	0.52	-
	lp3	-	0.53
	lp4	0.65	0.63
	lc1	0.44	0.54
	lc3	0.48	0.56
	lc4	-	0.59
Hedonic commitment	ca2	0.91	0.00
	ca3	-	0.62
	ca4	0.99	0.54
	ca5	0.86	0.56
	vh1	0.82	0.59
	vh2	0.99	0.62
	vh3	0.71	0.53
	vh5	0.75	0.63
Comfort&Convenience	c1	-	0.54
	c2	0.52	-
	c3	0.63	0.59
	c4	0.57	-
	co1	0.00	0.63
	co2	0.52	0.56
	co3	-	0.51
	co6	-	0.52
Reliability	r3	0.65	-
	r4	0.94	-
	r5	0.90	1.00
	r6	-	0.82

Loyalty attitude - Originally, four loyalty factors, representing the four loyalty stages included in Oliver's theory (7), were measured. Another factor, measuring the passengers' level of satisfaction - a satisfaction factor – was also measured. The analysis found the satisfaction factor to be insignificant. It also found no difference in passengers' attitude toward the four stages of loyalty. The loyalty factor, which was accepted in the factor analysis stage, combines variables representing the four loyalty components. This factor describes the level of loyalty, in terms of both attitude and behavior, of a passenger toward the PT mode; therefore, it was termed the *loyalty attitude*. This factor was used in the marketing model that was tested in the structural equation model (SEM) phase described later. The loading variables and their values are shown in Table 5.

Hedonic commitment - Originally, two factors that measure the emotional value toward the PT mode were meant to be measured: the hedonic value and the affective commitment. However, the factor analysis found a correlation between the questions composing the two factors. The joint factor combines variables representing these two factors and captures the emotional value associated with each mode in the consumer's mind. This factor was also used in the SEM phase described later. The loading variables and their values are shown in Table 5.

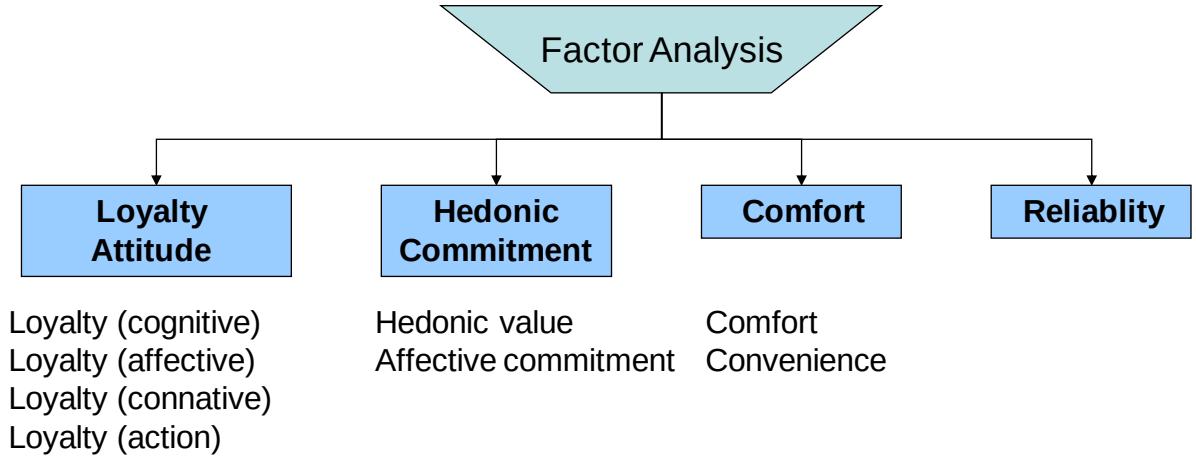
Comfort and convenience - The analysis included two factors that reflect the perceived comfort and convenience of the PT mode. The factor analysis found no difference in a passenger's attitude toward these two factors. Therefore, the perceived comfort factor combines variables from both perceived comfort and convenience factors. The loading variables and their values are shown in Table 5.

Reliability - This factor measures the perceived reliability of the PT mode and was found to be significant. The loading variables and their values are described in Table 5.

Utilitarian value - The utilitarian value was found to be insignificant for both rail and bus users.

A summary of the confirmatory factor analysis results is shown in Figure 2

Figure 2. Confirmatory factor analysis results



4.3 SEM: Model Structure and Validity

The third part of the study aimed at testing the validity of the loyalty model using the SEM technique (MX software). Using this technique enabled us to test the significance of the relationships between the factors composing the model. The factors included in the investigation are those that were found to be significance in the confirmatory factor analysis investigation (see figure 2). Since the utilitarian value factor was found to be insignificant, but it was important to include some LOS variable in the SEM, we decided to include a time-proportion variable (TIMPOR) that measured the time by rail compared to the time by bus for each origin-destination as the representative variable of the utilitarian value.

We examined separately the passengers' attitudes toward their chosen mode: bus users toward the bus mode, and rail users toward the rail mode. The two models were tested using two statistics (22):

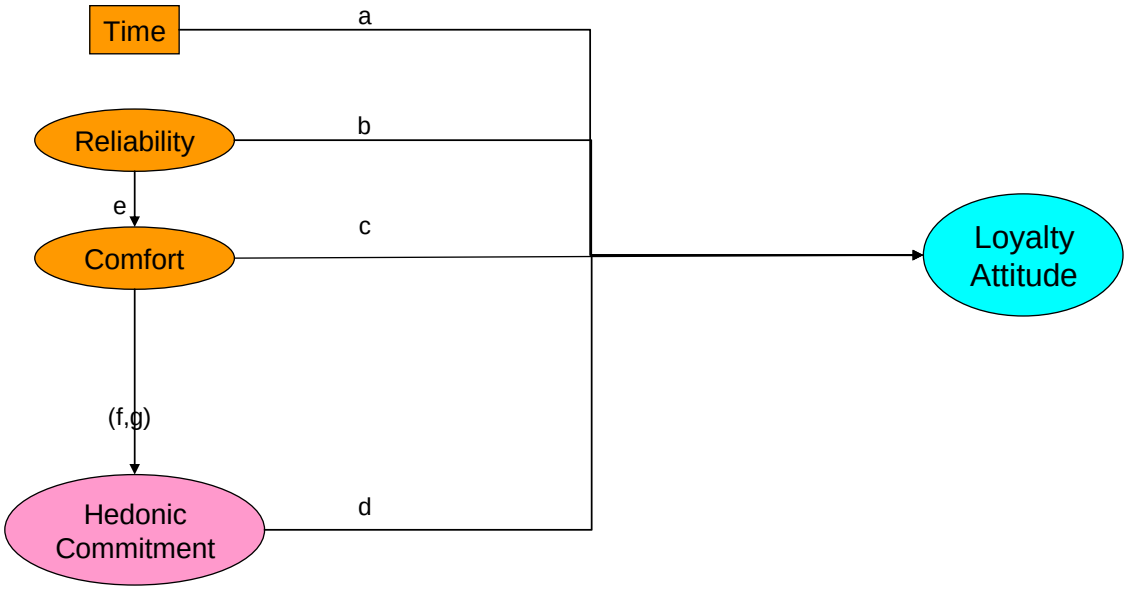
1. The Root Mean Square Error Approximation (RMSEA statistic), which measures the extent of the fitness of the model to the data: a value of zero reflects perfect fitness between the data and the model; a value lower than 0.08 is accepted as sufficient to accept the model's validity (22).
2. Comparative Fit Index (CFI statistic), which measures the extent of improvement of the model compared to a base model that assumes no links between the factors; a value higher than 0.9 is accepted as sufficient to accept the model's validity (20).

The full loyalty theory as shown in figure 1 could not be investigated in this research, because it was impossible to measure all the factors composing it. The model shown in Figure 3 includes the most important links from loyalty theory:

1. The link between utilitarian value (TIMPOR variable) and loyalty - Link a.
2. The link between other level-of-service values (Reliability & Comfort) and loyalty - Links b and c.
3. The effect of the emotional value (hedonic commitment factor) on loyalty - Link d;
3. The link between level-of-service values (Reliability & Comfort) and the emotional value (hedonic commitment factor) - Links f and g.

These links attempt to explain the generators of the emotional attitude toward a PT mode. The two models were tested using the RMSEA and CFI statistics mentioned above.

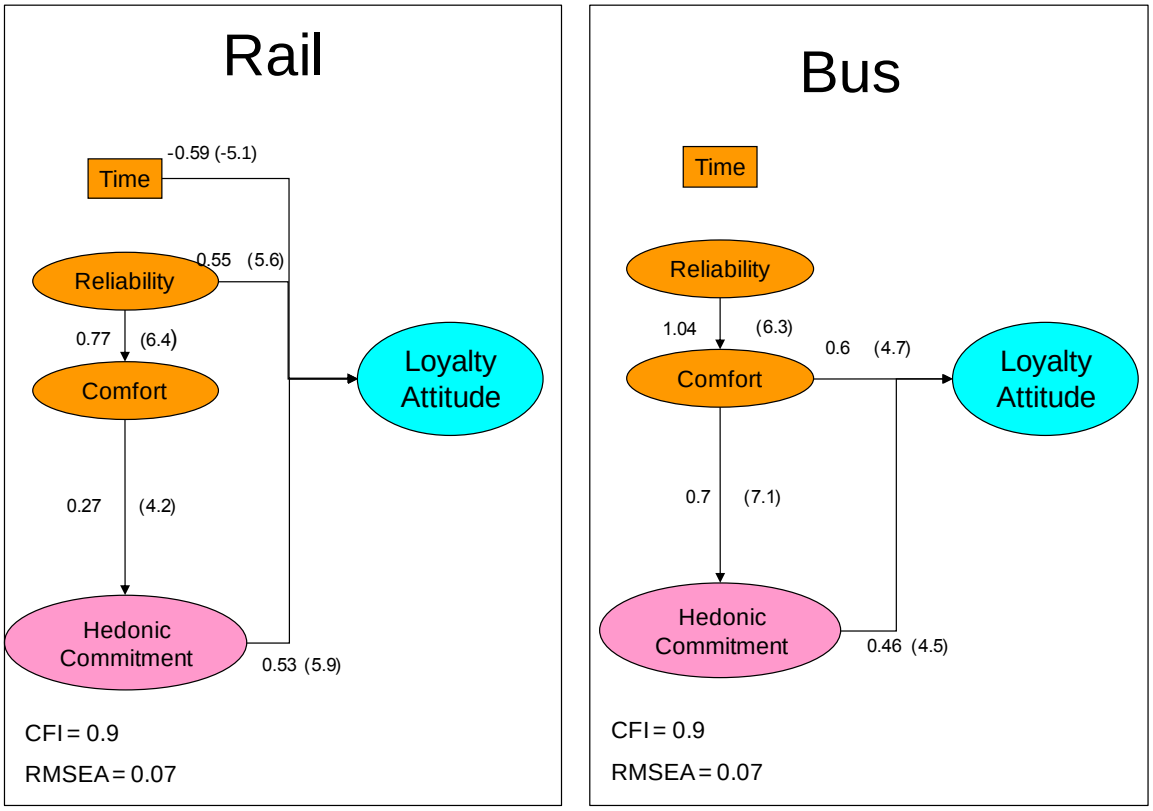
Figure 3. Model structure investigated by the SEM technique



4.3.1 Rail loyalty model

The rail loyalty model, which investigated rail passengers' attitudes toward the rail mode, is shown in the left side of Figure 4. The loading value and its significance (t-test in parentheses) are written on the arrows representing the links between factors.

Figure 4. Loyalty model link system, rail passengers toward rail mode compares to bus passengers toward bus mode



The rail-passengers-loyalty model shows that the strong loyalty attitude that exists among rail users derives from both emotional and utilitarian sources. The emotional source is shown in the link between the hedonic commitment factor and the loyalty attitude (with a loading value of 0.53). The utilitarian source is shown in the links between the time variable and the reliability factor to the loyalty attitude factor (with loading values of -0.59 and 0.55, respectively). The negative value for the time-loading value is a result of the time-definition variable, whereby the higher the value, the slower is the rail service compared to bus for a selected trip. The model also shows the links between utilitarian and emotional factors. The perceived comfort of the service increases the hedonic commitment factor. The model is validated through the CFI and RMSEA statistics.

4.3.2 Bus loyalty model

The bus-loyalty model, which investigated bus passengers' attitudes toward the bus mode, is shown in the right side of **Figure 4.** The loading value and its significance (t-test in parentheses) are written on the arrows representing the links between the various factors.

The lower loyalty-attitude value of bus passengers compared to rail passengers, which is shown in Table 4, can be explained by the absence of a link between the time variable and the reliability factor to the loyalty attitude. The utilitarian source exists only in the link between the comfort factor and the loyalty-attitude factor (loading value of 0.6). The perceived comfort of the service increases the hedonic commitment factor. The model is validated with the CFI and RMSEA statistics.

5. Discussion

PT modes render services that passengers consume. Like other products, these services offer a solution to a need raised by consumers. Therefore, we proposed employing some of the marketing models in order to gain a better understanding of travelers' choices of PT modes.

This research explored the loyalty theory from marketing and tested its validity to travel behavior in regard to choosing between two alternative PT modes, bus and rail. The research had two main goals:

1. To show the existence of loyalty and other attitudinal and emotional factors from marketing in transportation.
2. To validate the loyalty process mechanism in choosing between two alternative PT modes.

5.1 The loyalty model in transportation

Four marketing research phenomena were investigated: utilitarian and emotional values, which represent the technical and emotional values, respectively, that are generated in one's feeling after consuming the product at the beginning of the loyalty-building process; and satisfaction and loyalty, which are the outcomes of the process. Eight factors were measured using the factor analysis technique: four factors to measure the four stages of loyalty, two factors to measure the emotional value (hedonic value and affective commitment), and one factor each to measure satisfaction and utilitarian value.

Two factors were identified in the factor analysis investigation:

1. **Loyalty attitude**: The investigation could not differentiate among the four loyalty stages. The joint factor therefore includes the four loyalty stages, and was termed the loyalty attitude. This factor measures the repeated use of the PT service, as well as the passengers' attitudes toward it.

2. **Hedonic commitment**: The investigation could not differentiate the passengers' attitudes toward hedonic value from affective commitment loading variables. The joint factor thus measures the emotional feeling that is created among passengers as a result of using a PT mode.

Utilitarian value and **Satisfaction** factors were not identified among bus and rail passengers.

The main phenomena we were seeking to find among passengers - loyalty and emotional value - were identified in passengers' attitude. The loyalty phenomenon points to the fact that passengers develop an attitude toward a PT mode that may affect their behavior and the probability of choosing the selected PT mode. The emotional value shows that passengers develop a feeling, and not just a consideration of its utilitarian value, that might affect their mode choice.

5.2 The validity of the loyalty model in transportation research

Of the two factors that were not identified in the factor analysis investigation, the utilitarian value factor, was essential for the SEM investigation. In the absence of a marketing scale measurement, we used the level-of-service factors that were measured: perceived comfort and perceived reliability of the PT mode. In addition, a direct variable that calculates the relative travel time in the two modes was used. The objective was to identify the effects of utilitarian and emotional values on passengers' loyalty toward a PT mode in the same way as these effects have been found in marketing research (4).

The mechanism by which an emotional value is created in the passenger's feeling after using a PT mode, thereby increasing the loyalty attitude toward this mode, was shown for both rail and bus passengers. We were mainly interested in the link between emotional value and loyalty, a link that shows a similarity to other consumer products: just as subjective emotional feelings affect a consumer's behavior, a passenger's choice is significantly affected by subjective emotional feelings toward the mode. Furthermore, that subjective effect can easily be measured, using marketing research tools.

The model investigated enables us to explore a passenger's attitude toward bus and rail. The stronger loyalty attitude of rail users compared to bus users (Table 5) is explained in the following way:

1. The rail mode has stronger emotional and utilitarian values among rail passengers as shown in Error! Reference source not found.
2. The bus model structure (Figure 4), which shows that the loyalty attitude of bus users is less affected by utilitarian factors and, therefore, is less supportive of the loyalty attitude, decreases the strength of the loyalty attitude and may decrease the number of bus passengers in the long run.

The loyalty model, with its factors and scales, can improve our understanding of passengers' attitude toward a PT service. It can be used both by decision makers and by PT operators seeking to gain a better understanding of the passenger decision-making process.

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