

QUANTITATIVE METHODS IN SERVICES MARKETING: AN APPLICATION IN MEASURING SUBURBAN RAILWAY'S CUSTOMERS SATISFACTION

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Abstract

Public transportation is a structural element of urban environment. Its necessity and utility is obvious. Customers' satisfaction, i.e. passengers' satisfaction of public transport is a field of research in services Marketing that aims at locating both the positive elements and the arising problems and suggest appropriate solutions. In this paper, a track-guided transport means is examined: the Suburban Railway that connects the city of Athens with certain suburbs and the satisfaction of passengers from its operation. The variables examined are stations' access and environment, (customer) service offered by railway's personnel, time, ambience and safety of transportation and, finally, ticket prices. The usefulness of each of these variables to the measurement of total satisfaction is assessed and a linear model for the prediction of total customer satisfaction is proposed. This means that total satisfaction can be measured effectively through the selected variables and provide useful information for company's strategic marketing planning.

Keywords: Services Marketing, customer satisfaction, suburban railway, public transportation

1. Introduction

Public transportation is one of the main distinctive characteristics of urban settings. It aims to serve thousands of people a day and, therefore, it must operate both efficiently and effectively. To do so, it must be aware of what customers (i.e. passengers) think about the services offered. Thus, the goal of this study is to measure passengers' satisfaction from the services offered by the Suburban Railway that connects the city of Athens with certain suburbs. Despite their importance, this kind of studies is not very common in Hellas (Greece) due to the large number of stakeholders affected (passengers, the company and suburbs' inhabitants well being). The results of this study and the model proposed will enable company's marketing team to better understand passengers' needs and to formulate strategies that strengthen the positive and amend or eliminate the negative attitudes.

2. Background

Customer satisfaction is defined as a measure of how a firm's total product or service performs compared to a set of customer's expectations (Hill, 1996). It has long been a subject of research due to its importance for measuring marketing and business performance (Parasuraman *et al*, 1991; Szymanski and Henard, 2001). Measuring customer satisfaction is a prerequisite so as to have a meaningful assessment of customer's preferences and expectations (Cronin and Taylor, 1992; Zondiros *et al*, 2007). As a consequence, a lot of methods have been developed to measure customer satisfaction but the way they have been applied do not permit their easy and effective interpretation by marketing managers (Fornell *et al*, 1995). This requires an approach that will be simple and able to measure only the variables that are crucial to total customer satisfaction.

As a service, public transportation has the unique characteristics of services that differentiate services marketing from physical products marketing (Zeithaml *et al*, 1985). Services are intangible (cannot be

viewed or touched), heterogeneous (the same service may be offered differently by different people / personnel), inseparable (produced and consumed mostly at the same time and / or place) and perishable (cannot be stored for future use) in nature. So, the Suburban Railway faces the challenge to deliver an experience to its customers.

Hence, all models and criteria / variables used by previous researchers reflect the above (see, *inter alia*, Morfoulaki *et al*, 2007; Friman *et al*, 2001; Friman and Gärling, 2001; Andreassen, 1995; Grigoroudis and Siskos, 2004; Gorter *et al*, 2000; Novy, 2001; Bernini, and Lubisco, 2005); Chan, 1987; Stradling, 2002) as described in the next section.

3. Methodology

The population for this study was defined as all customers using public transportation means in the greater area of the city of Athens. The method of simple random sampling was selected. A common ground approach used by companies offering market research surveys is to pick a sample of 600 – 800 individuals in surveys conducted in this geographical area. The research took place on November –December 2008 in Suburban Railway's stations and terminals. The research instrument was a questionnaire filled by the interviewer (Frangos, 2004). The questionnaire was pre-tested and amended accordingly. In order to cover the possibility of denials to answer, a sample of 1.200 individuals was picked. The questionnaire was only to be answered by individuals that use the Suburban Railway even rarely as only a user could provide the data requested. Therefore, each interviewer had to ascertain that the individual was a user before starting the completion of the questionnaire. In total, the data of 475 properly filled questionnaires were used for analysis.

For the measurement of Total customer Satisfaction (dependent variable), five criteria (independent variables) were used:

1. Ease of access to terminals and stations - Access,
2. Services offered in stations - Services
3. Services offered by personnel - Serving
4. Services offered in the train-vehicle - Vehicles Services
5. Prices of tickets and cards for unlimited use - Prices.

This measurement was relatively simple. The Likert attitude scale was used in each of the five criteria (1 = dissatisfied, 2 = quite dissatisfied, 3 = not satisfied, nor dissatisfied, 4 = quite satisfied, 5 = satisfied). Data were processed with **SPSS** for Windows.

4. Research Results

The sample contained 49% women and 51% men. The following table summarises the demographic characteristics of the sample.

Table 1
Demographic data

Demographics						
Age	< 18	19 – 25	26 – 35	36 – 50	51 – 65	> 66
% of the sample	8%	40%	20%	16%	10%	6%
Educational level	Primary	Secondary	Tertiary			
% of the sample	4%	39%	57%			
Frequency of use (times / week)	Rarely	Up to 5	6 – 10	11 – 15	> 16	
% of the sample	18%	21%	22%	23%	16%	
Reason for using the SR	Go to work	For shopping	For recreation	Other reasons	Note: Multiple answers were allowed in this question	
% of the sample	61%	50%	44%	15%		

The mean for Access is 3,49 that shows a quite high level of satisfaction. Variance is 1,593. Homogeneity coefficient CV is 36,16%, hence the sample is heterogeneous.

The mean for Station Services is 3,81 that gives a quite high level of satisfaction. Variance is 0,977. Homogeneity coefficient CV is 25,94%, hence the sample is heterogeneous.

The mean for Serving is 3,76 that shows a quite high level of satisfaction. Variance is 1,095. Homogeneity coefficient CV is 27,83%, hence the sample is heterogeneous.

The mean for Vehicle Services is 3,90 that denotes a quite high level of satisfaction. Variance is 0,958. Homogeneity coefficient CV is 25,10%, hence the sample is heterogeneous.

The mean for Prices is 3,06 that gives a medium level of satisfaction. Variance is 1,704. Homogeneity coefficient CV is 42,66%, hence the sample is heterogeneous.

The mean for Total Satisfaction is 3,82 that reveals a quite high level of it. Variance is 1,078. Homogeneity coefficient CV is 27,18%, hence the sample is heterogeneous.

The confidence intervals for the mean of each criterion and Total Satisfaction are shown in the following Table.

Table 2
Confidence intervals

Criteria	Mean	Lower	Upper
Access	3,49	3,37	3,60
Station services	3,81	3,72	3,89
Serving	3,76	3,67	3,85
Vehicles services	3,90	3,81	3,99
Prices	3,06	2,94	3,17
Total Satisfaction	3,82	3,73	3,91

Then, a t-test was applied so as to compare the means of the dependent samples of satisfaction criteria with Total Satisfaction. As shown in the next Table (3), the mean satisfaction is lower in Access and Prices criteria compared to Total Satisfaction while the means do not differ for the Station Services, Serving and Vehicles criteria.

Table 3
Paired Samples Test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Access - Total	-,338	1,312	,060	-,456	-,219	-5,602	473	,000
Pair 2	Station Services - Total	-,015	,897	,041	-,096	,066	-,359	471	,720
Pair 3	Serving- Total	-,057	,979	,045	-,145	,031	-1,267	473	,206
Pair 4	Vehicles Services- Total	,078	,873	,040	,000	,157	1,948	473	,052
Pair 5	Prices - Total	-,776	1,382	,064	-,901	-,651	-12,164	468	,000

5. Linear Model Construction

Then, linear regression was applied to construct a linear predictive model for Total Satisfaction from the separate satisfaction criteria. If all five satisfaction criteria are used, then the following Tables (4 and 5 – Coefficients and Collinearity Diagnostics) show that the Services criterion has a VIF (Variation Inflation Factor) $2,055 \geq 2$ και Tolerance index $0,487 \leq 0,5$. This means that this criterion cannot be included in the model because of collinearity. Thus, the model can be formulated as:

Total Satisfaction = $0,078 * \text{Access} + 0,241 * \text{Station Services} + 0,173 * \text{Serving} + 0,354 * \text{Vehicle Services} + 0,093 * \text{Prices} + 0,318$.

Tables 6, 7, 8 and 9 show that all indices are satisfactory after the removal of the Station Services criterion. Then, the model can be formulated as:

Total Satisfaction = 0,115 * Access + 0,249 * Serving + 0,443 * Vehicle Services + 0,101 * Prices + 0,452 with correlation coefficient $R = 0,704$. Thus, the model explains the 50% of the total variance of data.

Total Satisfaction = 0,115 * 3,49 + 0,249 * 3,76 + 0,443 * 3,90 + 0,101 * 3,06 + 0,452 = 3,83

The mean satisfaction calculated with this model is 3,83 compared to 3,82 calculated from Total Satisfaction data.

Table 4
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	,318	,162		1,970	,049		
	access	,078	,029	,095	2,678	,008	,821	1,219
	station services	,241	,048	,230	4,966	,000	,487	2,055
	serving	,173	,042	,175	4,076	,000	,563	1,776
	vehicles services	,354	,045	,335	7,878	,000	,577	1,734
	prices	,093	,027	,117	3,434	,001	,904	1,106

a. Dependent Variable: total satisfaction

Table 5
Collinearity Diagnostics^a

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions					
				(Constant)	Access	Station Services	Serving	Vehicles Services	Prices
1	1	5,709	1,000	,00	,00	,00	,00	,00	,00
	2	,123	6,799	,00	,11	,01	,00	,00	,91
	3	,079	8,504	,01	,84	,02	,05	,05	,07
	4	,037	12,365	,73	,01	,04	,33	,01	,01
	5	,029	14,123	,22	,00	,12	,53	,44	,01
	6	,023	15,852	,02	,04	,82	,09	,50	,00

a. Dependent Variable: Total Satisfaction

Table 6
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,704 ^a	,496	,491	,742

a. Predictors: (Constant), Prices, Access, Vehicles Services, Serving

Table 7
ANOVA^b

Model	Sum of Squares	df	Mean Square	F	Sig.
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1	Regression	250,982	4	62,745	114,025,000 ^a
	Residual	255,330	464,550		
	Total	506,311	468		

a. Predictors: (Constant), Prices, Access, Vehicles Services, Serving

b. Dependent Variable: Total Satisfaction

Table 8
Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	,452	,162		2,780	,006		
access	,115	,029	,140	3,968	,000	,873	1,146
serving	,249	,040	,251	6,175	,000	,656	1,524
vehicles services	,443	,042	,419	10,482	,000	,680	1,470
prices	,101	,028	,127	3,664	,000	,907	1,103

a. Dependent Variable: Total Satisfaction

Table 9
Collinearity Diagnostics^a

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	Access	Serving	Vehicles Services	Prices
1	1	4,740	1,000	,00	,00	,00	,00	,01
	2	,120	6,292	,00	,17	,01	,01	,88
	3	,076	7,898	,03	,81	,08	,08	,11
	4	,036	11,409	,64	,01	,61	,00	,01
	5	,028	13,057	,32	,01	,30	,91	,00

a. Dependent Variable: Total Satisfaction

6. Conclusions

The sample is quite satisfied from the services offered by Suburban Railway. There is room for improvement especially in the Access and Prices criteria which are rated lower than mean total satisfaction. The Station Services criterion does not affect satisfaction measurement due to collinearity. The linear model using the Access, Serving, Vehicle Services and Prices criteria, is expected to predict Total Satisfaction with a high level of reliability. Thus, company's marketing managers must focus on passengers' overall experience through policies that aim at the further enhancement in each of these criteria.

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