A New Customer Satisfaction Index for Evaluating Transit Service Quality

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Abstract

In this paper, an index based on customer perspective is proposed for evaluating transit service quality. The index, named Heterogeneous Customer Satisfaction Index, is inspired by the traditional Customer Satisfaction Index, but takes into account the heterogeneity among the user judgments about the different service aspects. The index allows service quality to be monitored, the causes generating customer satisfaction/dissatisfaction to be identified, and the strategies for improving the service quality to be defined. The proposed methodologies show some advantages compared to the others adopted for measuring service quality, because it can be easily applied by the transit operators.

Introduction

Transit service quality is an aspect markedly influencing travel user choices. Customers who have a good experience with transit will probably use transit services again, while customers who experience problems with transit may not use transit services the next time. For this reason, improving service quality is important for customizing habitual travellers and for attracting new users. Moreover, the need for supplying services characterized by high levels of quality guarantees competition among transit agencies, and, consequently, the user takes advantage of

better services. To achieve these goals, transit agencies must measure their performance.

Customer satisfaction represents a measure of company performance according to customer needs (Hill et al. 2003); therefore, the measure of customer satisfaction provides a service quality measure. Customers express their points of view about the services by providing judgments on some service aspects by means of ad hoc experimental sample surveys, known in the literature as "customer satisfaction surveys."

The aspects generally describing transit services can be distinguished into the characteristics that more properly describe the service (e.g., service frequency), and less easily measurable characteristics that depend more on customer tastes (e.g., comfort). In the literature, there are many studies about transit service quality. Examples of the most recent research are reported in TRB (2003a, 2003b), Eboli and Mazzulla (2007), Tyrinopoulos and Antoniou (2008), Iseki and Taylor (2008), and Joewono and Kubota (2007). In these studies, different attributes determining transit service quality are discussed; the main service aspects characterizing a transit service include service scheduling and reliability, service coverage, information, comfort, cleanliness, and safety and security. Service scheduling can be defined by service frequency (number of runs per hour or per day) and service time (time during which the service is available). Service reliability concerns the regularity of runs that are on schedule and on time; an unreliable service does not permit user travel times to be optimized. Service coverage concerns service availability in the space and is expressed through line path characteristics, number of stops, distance between stops, and accessibility of stops. Information consists of indications about departure and arrival scheduled times of the runs, boarding/alighting stop location, ticket costs, and so on. Comfort refers to passenger personal comfort while transit is used, including climate control, seat comfort, ride comfort including the severity of acceleration and braking, odors, and vehicle noise. Cleanliness refers to the internal and external cleanliness of vehicles and cleanliness of terminals and stops. Safety concerns the possibility that users can be involved in an accident, and security concerns personal security against crimes. Other service aspects characterizing transit services concern fares, personnel appearance and helpfulness, environmental protection, and customer services such ease of purchasing tickets and administration of complaints.

The objective of this research is to provide a tool for measuring the overall transit service quality, taking into account user judgments about different service aspects.

A synthetic index of overall satisfaction is proposed, which easily can be used by transit agencies for monitoring service performance. In the next section, a critical review of indexes for measuring service quality from a user perspective is made; observations and remarks emerge from the comparison among the indexes analysed. Because of the disadvantages of the indexes reported in the literature, a new index is proposed. The proposed methodology is applied by using experimental data collected by a customer satisfaction survey of passengers of a suburban transit service. The obtained results are discussed at the end of the paper.

Customer Satisfaction Indexes

The concept of customer satisfaction as a measure of perceived service quality was introduced in market research. In this field, many customer satisfaction techniques have been developed. The best known and most widely applied technique is the ServQual method, proposed by Parasuraman et al. (1985). The ServQual method introduced the concept of customer satisfaction as a function of customer expectations (what customers expect from the service) and perceptions (what customers receive). The method was developed to assess customer perceptions of service quality in retail and service organizations. In the method, 5 service quality dimensions and 22 items for measuring service quality are defined. Service quality dimensions are tangibles, reliability, responsiveness, assurance, and empathy. The method is in the form of a questionnaire that uses a Likert scale on seven levels of agreement/disagreement (from "strongly disagree" to "strongly agree").

ServQual provides an index calculated through the difference between perception and expectation rates expressed for the items, weighted as a function of the five service quality dimensions embedding the items. Some variations of this method were introduced in subsequent years. For example, Cronin and Taylor (1994) introduced the ServPerf method, and Teas (1993) proposed a model named Normed Quality (NQ). Although ServQual represents the most widely adopted method for measuring service quality, the adopted scale of measurement for capturing customer judgments has some disadvantages in obtaining an overall numerical measure of service quality; in fact, to calculate an index, the analyst is forced to assign a numerical code to each level of judgment. In this way, equidistant numbers are assigned to each qualitative point of the scale; this operation presumes that the distances between two consecutive levels of judgment expressed by the customers have the same size.

A number of both national and international indexes also based on customer perceptions and expectations have been introduced in the last decade. For the most part, these satisfaction indexes are embedded within a system of cause-and-effect relationships or satisfaction models. The models also contain latent or unobservable variables and provide a reliable satisfaction index (Johnson et al. 2001). The Swedish Customer Satisfaction Barometer (SCSB) was established in 1989 and is the first national customer satisfaction index for domestically purchased and consumed products and services (Fornell 1992). The American Customer Satisfaction Index (ACSI) was introduced in the fall of 1994 (Fornell et al. 1996). The Norwegian Customer Satisfaction Barometer (NCSB) was introduced in 1996 (Andreassen and Lervik 1999; Andreassen and Lindestad 1998). The most recent development among these indexes is the European Customer Satisfaction Index (ECSI) (Eklof 2000). The original SCSB model is based on customer perceptions and expectations regarding products or services. All the other models are based on the same concepts, but they differ from the original regarding the variables considered and the cause-and-effect relationships introduced. The models from which these indexes are derived have a very complex structure. In addition, model coefficient estimation needs of large quantities of experimental data and the calibration procedure are not easily workable. For this reason, this method is not very usable by transit agencies, particularly for monitoring service quality.

More recently, an index based on discrete choice models and random utility theory has been introduced. The index, named Service Quality Index (SQI), is calculated by the utility function of a choice alternative representing a service (Hensher and Prioni 2002). The user makes a choice between the service habitually used and hypothetical services. Hypothetical services are defined through Stated Preferences (SP) techniques by varying the level of quality of aspects characterizing the service. Habitual service is described by the user by assigning a value to each service aspect. The design of this type of SP experiments is generally very complex; an example of an SP experimental design was introduced by Eboli and Mazzulla (2008a). SQI was firstly calculated by a Multinomial Logit model to evaluate the level of quality of transit services. Hierarchical Logit models were introduced for calculating SQI by Hensher et al. (2003) and Marcucci and Gatta (2007). Mixed Logit models were introduced by Hensher (2001) and Eboli and Mazzulla (2008b). SQI includes, indirectly, the concept of satisfaction as a function of customer expectations and perceptions. The calculation of the indexes following approaches different from SQI presumes the use of customer judgments in terms of rating. To the contrary, SQI is based on choice data; nevertheless, by choosing a service, the user indirectly

expresses a judgment of importance on the service aspects defining the services. In addition, the user expresses a judgment of satisfaction about the service aspects when he/she describes the service habitually used. Also, SQI is calculated by a very complex procedure. Choice data can give more reliable results because the user must make a choice and makes a simultaneous comparison of all the service attributes; to the contrary, the evaluation of the attributes by rating generally influence the user to assign a high level of importance to each service attribute, and the user evaluates each attribute one by one. Nevertheless, SQI has some disadvantages because choice data are not usual for customer satisfaction surveys; in addition, this type of data must be collected by well-designed SP experiments.

A more direct measure for service quality evaluation is provided by an overall index, often called "Customer Satisfaction Index" (CSI) (Hill et al. 2003). CSI represents a measure of service quality on the basis of the user/consumer perceptions on service aspects expressed in terms of importance rates, compared with user/consumer expectations expressed in terms of satisfaction rates. CSI plugs the gap of ServQual because is based on judgments expressed according to a numerical scale. Compared to all the described indexes, CSI is based on a simple procedure, fully described in the next section, which allows the index to be easily calculated0 by transit operators.

CSI does not take into account the heterogeneities among user judgments. To the contrary, the index proposed by the authors provides an overall service quality measure introducing the dispersion of the importance and satisfaction rates among users.

Methodology

The methodology adopted in this research aims to obtain a concise indicator that provides an overall measure of service quality by considering different service aspects. The indicator can be calculated on the basis of user judgments expressed by a numerical scale; this kind of scale has some advantages compared to the scales with points described by means of words (e.g., Likert and verbal scale) because it allows quantitative techniques of analysis to be applied. To measure customer satisfaction, different numerical values can be used, generally from 1 to 3, from 1 to 5, from 1 to 7, from 1 to 9, etc. The adopted scale can also have an even number of levels, for example, the traditional numeric scholastic scale composed of points from 1 to 10.

As mentioned above, this research focuses on CSI, which is calculated by means of the satisfaction rates expressed by users, weighted on the basis of the importance rates, according to the following formula:

$$CSI = \sum_{k=1}^{N} \left[\bar{S}_k \cdot W_k \right] \quad (1)$$

in which

$\bar{S}_k$ is the mean of the satisfaction rates expressed by users on the service quality k attribute

W_k (importance weight) is a weight of the k attribute, calculated on the basis of the importance rates expressed by users. Specifically, is the ratio between the mean of the importance rates expressed by users on the k attribute and the sum of the average importance rates of all the service quality attributes:

$$W_k = \frac{\bar{I}_k}{\sum_{k=1}^{N} \bar{I}_k} \quad (2)$$

CSI represents a good measure of overall satisfaction because it summarizes the judgments expressed by users about various service attributes in a single score. The more accurate the selection of the attributes, the more accurate the measure of the overall satisfaction. For this reason, the selected attributes should describe the service aspects exhaustively.

However, not all the attributes are important for the user in the same way; an index based only on satisfaction rates cannot take into account these differences. As an example, we consider five attributes with average satisfaction and importance rates reported in Table 1, according to a scale from 1 to 10. By considering only the satisfaction rates, the overall satisfaction is 7.16, and the attribute with the highest satisfaction score is attribute 2, which contributes to the overall satisfaction with an aliquot of 1.66; on the other hand, if importance rates also are considered, the attribute with the highest aliquot to the overall satisfaction is the attribute 4 (weighted score equal to 1.94). The less important attribute is attribute 5, with an aliquot of 1.05. The value of CSI is 7.28 out of 10. By converting this score

into a percentage, the satisfaction index shows that the service is about 73 percent successful in satisfying its customers. By comparing CSI with the average of all the satisfaction scores, it can be observed that there is a difference between the value of these two indicators, because each attribute adds up to overall satisfaction according to a different weighted score.

Table 1. Example of Calculating CSI (Scale of 1 to 10)

Attribute	Importance Score	Importance Weight	Satisfaction Score	Weighted Score
1	7.1	0.18	6.5	1.17
2	9.2	0.23	8.3	1.91
3	7.3	0.18	6.7	1.21
4	9.5	0.24	8.1	1.94
5	6.9	0.17	6.2	1.05
Total	**40.0**			**7.28**

However, when all the importance scores are close to a certain value, the importance weights are similar, and then the CSI value is close to the average of all the satisfaction scores. In this eventuality, CSI does not give any additional information compared to the indicator calculated by considering only the satisfaction scores. In addition, the average importance scores result from the rates expressed by a sample of customers, which can be very heterogeneous; the dispersion of the rates can be represented by the variance or the standard deviation from the mean. In the same way, the satisfaction rates can be very heterogeneous among users. These heterogeneities cannot be taken into account in the CSI calculation.

To overcome this lack, importance weights can be corrected according to the dispersion of the importance rates from the average value. Analogously, satisfaction scores can be corrected according to the dispersion of the satisfaction rates from the average value. These adjustments have been introduced for calculating a new indicator, called Heterogeneous Customer Satisfaction Index (HCSI). The differences between CSI and HCSI are shown in Figure 1.

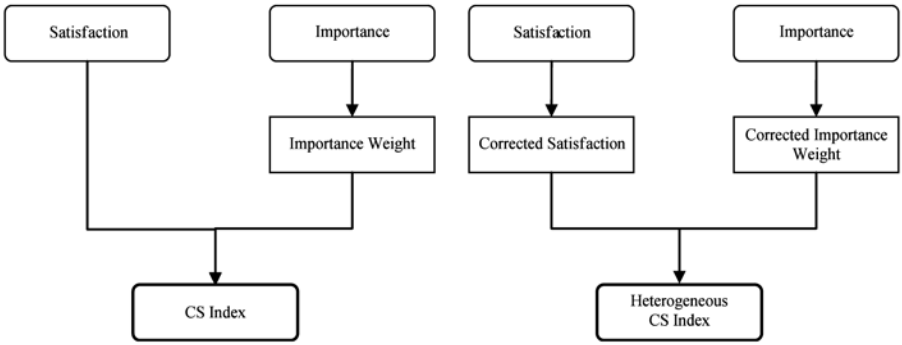

Figure 1. CS Index versus Heterogeneous CS Index

From a mathematical point of view, HCSI is calculated by the following formula:

$$HCSI = \sum_{k=1}^{N} \left[S_k^c \cdot W_k^c \right] \tag{3}$$

in which

S_k^c is the mean of the satisfaction rates expressed by users on the k attribute corrected according to the deviation of the rates from the average value

W_k^c is the weight of the k attribute, calculated on the basis of the importance rates expressed by users, corrected according to the dispersion of the rates from the average value.

S_k^c is calculated by the following formula:

$$S_k^c = \overline{S}_k \cdot \frac{\frac{\overline{S}_k}{\mathrm{var}(S_k)}}{\sum_{k=1}^{N} \frac{\overline{S}_k}{\mathrm{var}(S_k)}} \cdot N \tag{4}$$

The adjustment factor is calculated as the mean of the satisfaction rates expressed by users on the k attribute divided by the mean of the average satisfaction rates

of all the service quality attributes, weighted on the variance of the satisfaction rates.

W_k^c is calculated as the mean of the importance rates expressed by users on the k attribute divided by the sum of the average importance rates of all the service quality attributes, weighted on the variance of the importance rates, according to the following formula:

$$W_k^c = \frac{\frac{\bar{I}_k}{\mathrm{var}(I_k)}}{\sum_{k=1}^{N} \frac{\bar{I}_k}{\mathrm{var}(I_k)}} \tag{5}$$

The introduction of the variance for adjusting the importance and satisfaction rates allows the attributes characterized by more homogeneous user judgments to be considered more significant; to the contrary, the attributes with heterogeneous judgments are considered less significant.

The mathematical basis of the HCSI formula is demonstrated by assuming that all the customers surveyed gave satisfaction scores of 10 out of 10 for every service characteristic, and the average satisfaction scores would all be 10. When the variance of the satisfaction judgments expressed by the customers tends to zero for all service characteristics, the mean of the satisfaction rates divided by the deviation from the mean of each k attribute would tend to the maximum value of 10, and S_k^cwould tend to $\bar{S}_k$. Therefore, total customer satisfaction on all their attributes would produce a satisfaction index of 100 percent.

Application of Methodology

The proposed methodology was applied by considering an experimental case study regarding transit services in a medium-sized urban area. The urban area includes the town of Cosenza, which is a provincial capital of the Calabria region in southern Italy. Cosenza forms a single built-up area with the town of Rende, in a northerly direction. The urban area has grown over the years also because of the presence of the University of Calabria, which expanded north of Rende at the beginning of the 1970s. Cosenza and Rende represent a center of attraction for the province because of the administrative functions, job opportunities, and supply of services. The urban area has about 110,000 inhabitants. In addition, many univer-

sity students live in Rende or Cosenza; approximately 35,000 students attend the University of Calabria.

The analysed transit service is a suburban bus service offering the connection between the urban area and several small villages north and south of Cosenza. A survey was addressed to the habitual passengers of two bus lines, Line 17 and Line 1, to measure transit service quality from a user point of view. Line 17 runs in a southward direction and serves a catchment area of about 5,000 inhabitants; Line 1 runs in a northward direction and serves a catchment area of about 7,000 inhabitants. Bus line characteristics are reported in Table 2.

Table 2. Transit Service Characteristics

Service Characteristics	Line 1	Line 17
Path length	19 km	18 km
# of bus stops	23	13
Travel demand	800 pass/day	700 pass/day
Service time	14 hours (from 6:00 a.m. to 8:00 p.m.)	
Service frequency	1 run/hr from 6:00 a.m to 2:00 p.m.; only 2 runs in the afternoon	
Ticket cost	from 0.50 to 1.50 Euros (depending on the covered distance)	

The survey was conducted in the spring of 2008. An operator effected face-to-face interviews on board during the service time; 218 passengers were interviewed.

Although the population is evenly spread between male and female, the majority of the habitual transit users is female (66% of the sample). Most of the interviewed users are students (49%) and younger than 20 years (44%); only 9% of the population are students, and 22% are young people. The majority of the employed respondents are clerks or workers (92%) and work in the private or public sector (71%); these percentages are the same for the population. About 65% of the sample belongs to a middle class of family income and about 28% to a lower class; the classes of income refer to the net monthly income of the family unit, expressed in Euros (Table 3).

On average, the number of family members in a family unit is 3.8 and each family has 1.64 cars. Of the 218 respondents, 77 get one-way tickets, 64 get one-day travel cards, and 69 use monthly travel cards.

Table 3. Socio-Economic Characteristics

		#	%
Gender	male	74	34
	female	144	66
		218	100
Age	up to 20 years	95	44
	from 21 to 40 years	65	30
	from 41 to 65 years	46	21
	over 65 years	12	5
		218	100
Employment	employed	66	30
	unemployed	15	7
	housewife	16	7
	student	106	49
	pensioner	15	7
		218	100
Sector of Employment	energy	1	2
	business	18	27
	private sector	26	39
	public sector	21	32
		66	100
Professional Position	businessman	1	2
	freelancer	3	5
	clerk	35	53
	worker	26	39
	artisan	1	2
		66	100
Family Income Level	up to 1,000 Euros	62	28
	from 1,000 to 2,000 Euros	96	44
	from 2,000 to 3,000 Euros	34	16
	from 3,000 to 4,000 Euros	10	5
	from 4,000 to 5,000 Euros	4	2
	over 5,000 Euros	12	6
		218	100

To evaluate bus service quality, users provided information about 26 service attributes. They expressed a rating of importance and a rating of satisfaction on each attribute on a scale from 1 to 10 (decimal included); in addition, a rating of overall service in terms of perceived quality was requested. The service attributes describe the main aspects characterizing bus services, including route and service characteristics, service reliability, comfort, cleanliness, fare, information, safety and security, personnel, customer services, and environmental protection (Table 4). A first evaluation of transit service quality is effected by analyzing the rate of satisfaction and importance by means of the calculation of the average satisfaction and importance scores (Table 4).

Generally, the attributes with an average satisfaction score lower than 6.0 can be considered critical service aspects. For the analyzed services, only two attributes had an unsatisfactory average score, availability of shelter and benches at bus stop and availability of schedule/maps at bus stops, and announcements. The attributes with the highest average satisfaction scores were ease of purchasing a ticket, security against crimes on bus, and "personnel appearance."

By analyzing the importance rates, the most important attributes for the passengers can be identified. By observing the average importance scores, it appears that all the service attributes are considered very important by the passengers; in fact, each attribute is characterized by an average importance score close to or higher than 9.0, and for only two attributes the average score is lower than 9.0: number of bus stops/distance between bus stops and cleanliness of bus exterior.

Satisfaction and importance rates were analyzed also by means of the variance (Table 4). This type of measures allows the heterogeneity of passengers in the evaluation of service quality to be verified. In this case, the passenger judgments on expected quality (rate of importance) are much more homogeneous than the judgments on the perceived quality (rate of satisfaction). In fact, the value of variance, calculated by considering the rates expressed on all the attributes, is 1.42 for the importance and 6.16 for the satisfaction; the coefficients of variation are 12.6 and 32.5 percent, respectively.

Satisfaction and importance rates expressed by the bus passengers were used for the calculation of the CSI and HCSI (Table 5). In the third and sixth column, the weighted scores are reported, which represent the contribution of each attribute to the final value of CSI and HCSI, respectively.

Table 4. Importance and Satisfaction Statistics

			Importance				Satisfaction			
Service Aspect	**Service Attribute**	#	*Mean*	*Var*	*Conf. Int.*		*Mean*	*Var*	*Conf. Int.*	
Route Characteristics	path	1	9.17	1.82	9.00	9.33	8.15	3.86	7.92	8.39
	#of bus stops, distance between bus stops	2	8.61	2.74	8.42	8.81	8.23	2.99	8.02	8.44
	bus stop location	3	9.43	1.05	9.30	9.55	8.44	3.84	8.21	8.68
Service Characteristics	service frequency	4	9.65	0.63	9.56	9.75	6.78	4.91	6.51	7.04
	daily service time	5	9.53	0.81	9.42	9.64	6.57	5.16	6.30	6.85
Service Reliability	reliability of runs that come on schedule	6	9.73	0.75	9.63	9.84	8.69	3.49	8.46	8.91
	punctuality (runs that come on time)	7	9.62	0.99	9.50	9.74	8.26	3.65	8.03	8.49
Comfort	bus crowding	8	9.36	1.65	9.20	9.51	8.55	3.57	8.32	8.77
	comfort of seats on bus	9	9.29	1.16	9.16	9.42	7.70	5.08	7.43	7.97
	air conditioning on bus	10	9.46	0.88	9.35	9.58	7.32	7.38	7.00	7.65
	levels of noise and vibration on bus	11	9.06	2.07	8.89	9.24	7.01	6.82	6.70	7.32
	availability of shelter & benches at bus stop	12	9.57	0.78	9.47	9.68	5.53	8.31	5.18	5.87
Cleanliness	cleanliness of bus interior, seats & windows	13	9.51	0.87	9.40	9.62	7.63	4.52	7.38	7.89
	cleanliness of bus exterior	14	7.85	4.58	7.59	8.10	7.44	4.13	7.19	7.68
Fare	ticket cost	15	9.12	2.03	8.95	9.29	8.41	3.81	8.18	8.65
Information	availability of schedule/ maps on bus	16	9.52	0.80	9.42	9.63	7.00	7.94	6.66	7.34
	availability of schedule/ maps at bus stops	17	9.61	0.65	9.51	9.70	3.75	5.93	3.46	4.04
	availability of information by phone, internet	18	8.94	3.00	8.73	9.15	7.44	5.30	7.16	7.71
Safety and Security	vehicle reliability, competence of drivers	19	9.91	0.19	9.86	9.96	8.45	3.93	8.22	8.69
	security against crimes on bus	20	9.80	0.59	9.71	9.89	9.10	2.69	8.90	9.29
	security against crimes at bus stops	21	9.78	0.42	9.70	9.85	7.58	5.16	7.31	7.85
Personnel	personnel appearance	22	9.35	1.35	9.21	9.49	9.04	2.04	8.87	9.21
	personnel helpfulness	23	9.75	0.41	9.68	9.83	8.25	4.78	7.99	8.51
Customer Services	ease of purchasing a ticket	24	9.65	0.75	9.54	9.75	9.34	1.69	9.19	9.50
	administration of complaints	25	9.77	0.50	9.68	9.85	7.45	6.23	7.16	7.75
Environment	use of ecological vehicles	26	9.70	0.79	9.59	9.80	6.26	7.00	5.94	6.57

Table 5. Calculating CSI and HCSI

Attribute	Importance Weight	Weighted score	Corrected Importance Weight	Corrected Satisfaction	Weighted Score
1	0.037	0.31	0.016	8.86	0.14
2	0.035	0.29	0.010	11.67	0.11
3	0.039	0.33	0.028	9.55	0.27
4	0.039	0.27	0.047	4.81	0.23
5	0.039	0.26	0.036	4.32	0.16
6	0.040	0.35	0.040	11.15	0.45
7	0.039	0.32	0.030	9.63	0.29
8	0.038	0.33	0.018	10.55	0.18
9	0.038	0.29	0.025	6.01	0.15
10	0.039	0.28	0.033	3.74	0.12
11	0.037	0.26	0.014	3.71	0.05
12	0.039	0.22	0.038	1.89	0.07
13	0.039	0.30	0.034	6.64	0.22
14	0.032	0.24	0.005	6.90	0.04
15	0.037	0.31	0.014	9.57	0.13
16	0.039	0.27	0.037	3.18	0.12
17	0.039	0.15	0.046	1.22	0.06
18	0.037	0.27	0.009	5.38	0.05
19	0.040	0.34	0.166	9.38	1.55
20	0.040	0.36	0.051	15.87	0.81
21	0.040	0.30	0.071	5.74	0.41
22	0.038	0.35	0.021	20.67	0.44
23	0.040	0.33	0.074	7.34	0.54
24	0.039	0.37	0.040	26.58	1.06
25	0.040	0.30	0.060	4.59	0.28
26	0.040	0.25	0.038	2.88	0.11
	CS Index	7.63		*Heterogeneous CS Index*	8.04

Discussion

From the experimental results, the value of CSI is 7.63. By weighting satisfaction and importance scores on the variance, we obtain a value of HCSI equal to 8.04. The difference between the CSI and HCSI values are due to the different contributions of each service attribute to each index. Obviously, if the variance of impor-

tance rates is the same for all the attributes and, contemporaneously, the variance of satisfaction rates has the same value for all the attributes, HCSI and CSI values are equal.

By analyzing the weighted scores regarding CSI, it emerges that the attributes giving the highest contribution to overall satisfaction are ease of purchasing the ticket, security against crimes on bus, reliability of runs that come on schedule, and personnel appearance. However, the values of the weighed scores range from 0.15 to 0.37 (Table 5); therefore, other attributes also make a considerable contribution. Although the gap between the two indexes is 0.41, the weighted scores of CSI are very different compared to those of HCSI, which range from 0.04 to 1.55. The attribute with the highest weighted score for the HCSI regards vehicle reliability and competence of drivers. The four most relevant service attributes for CSI are also relevant for HCSI. In addition, also the attribute regarding personnel helpfulness shows a considerable weight.

From the experimental results, HCSI can be considered a useful tool for measuring transit service quality to monitor transit agency performances and fulfil customer requirements. The index allows the causes generating customer satisfaction/dissatisfaction to be identified and the strategies for improving the service quality to be defined. HCSI introduces heterogeneity into user judgments because importance and satisfaction rates are corrected according to dispersion from the average value. By effecting this adjustment, more significance is given to the attributes characterized by homogeneous user judgments, while less significance is given to the more heterogeneous attribute.

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