

Service Supply and Customer Satisfaction in Public Transportation: The Quality Paradox

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Abstract

Satisfaction measures obtained from citizens are frequently used in performance-based contracts due to their presumed link with company performance. However, few studies have actually examined the link between traveler satisfaction measures and objective performance measures in public transport. This research analyzes the relationship between the objective performance measures of public transport services and the satisfaction perceived by travelers. Data were collected in six different European cities. Three objective service performance measures were obtained for each city from the UITP Millennium Database. Three subjective satisfaction attribute measures were obtained from Benchmarking in European Service of Public Transport (BEST 2001), answered by 6,021 respondents in total. In addition to subjective attribute measures, overall satisfaction was also used as a subjective measure. Several correlational analyses show that the relationship between satisfaction and service performance in public transport is far from perfect.

Introduction

In many countries, major investments are being made in public transport systems to make them more competitive vis-à-vis other means of transport, most notably private cars. New services are being developed and old ones are being improved.

However, an increase in supply (qualitatively or quantitatively) will not automatically lead to a corresponding increase in demand and satisfaction (cf. Fujii and Kitamura 2003, Mackett and Edwards 1998). To make sure that investment really attracts both the existing and the potential customers envisaged, knowledge of satisfaction and service performance should provide policymakers and operational managers in public transport with valuable information (Nathanail 2007).

The underlying assumption is that there is a direct link between the actual service and the customer's perception of it. To increase public transport use, the service should be designed and performed in a way that accommodates the levels of service required by customers (Beirão and Sarsfield Cabral 2007). However, the validity of this assumption has not been proven in previous research.

There is some knowledge of how customers perceive public transport. In the literature, aspects such as reliability, frequency, travel time and fare level (Hensher et al. 2003, Tyrinopoulos and Aifadopoulou 2008), comfort and cleanliness (Eboli and Mazzulla 2007, Swanson et al. 1997), network coverage/distance to stop (Eriksson et al. 2009, Tyrinopoulos and Antoniou 2008), and safety issues (Smith and Clarke 2000, Fellesson and Friman 2008) are all known to be important factors in customer evaluations of public transport service quality. In addition, Friman and Gärling (2001) underscore the importance of clear and simple transport information.

To meet potential and present customers' requirements, quality investments that really raise the perceived service performance regarding these attributes constitute an important issue (Richter et al. 2008a, 2008b). However, in the literature, quality and quality investments are often ambiguously defined, making it difficult to examine the impact of the objective conditions of the transport system on customer satisfaction. Further, Friman's (2004) results indicate that quality investments generally do not generate greater satisfaction. In her study, the respondents judged satisfaction even lower, or unchanged, after the quality initiative. Thus, the question of how the objective conditions of the transport system relate to subjective satisfaction remains.

Surprisingly, few studies have so far analyzed this relationship. In the product development literature, some models have been developed that attempt to link perceived quality dimensions to specific product attributes (Hauser and Clausing 1988, Nagamachi 1995). However, these models are confined to the design of new and discrete products. Services that are dependent on already-existing, complex systems of infrastructure and organizational arrangements are likely to require a

different logic (cf. de Brentani 1995, 2001). One motive for such studies is that they would provide a valuable basis for strategic and tactical decisions about how to develop and utilize public transport systems. The aim of this study is to investigate whether or not more public transport results in more satisfied citizens. By more, we mean any increase in the objective service supply, for instance, an increase in the number of bus departures, a new metro line, or new vehicles. The objective is to fill the identified knowledge gap by analyzing the objective supply of public transport and its relationship with the satisfaction levels reported by travelers.

Method

The sample used in this study was obtained from *Benchmarking in European Service of Public Transport* (BEST 2001), where citizen satisfaction with public transport has been measured by means of an annual survey. BEST started in 1999 with the aim of promoting mutual learning and development among the transport authorities in the major European cities participating in the project (for more information, see <http://BEST2005.net/>). The selected sample is the survey conducted in six European cities during 2001, consisting of people between ages 16 and 96 years. Satisfaction data were selected from the 2001 survey to correspond to obtained measures of service performance retrieved from the UITP Millennium Database (Vivier 2006). UITP, the international association of public transport, is a global organization with the aim of promoting public transport in all of its forms. The Mobility in Cities Database project consisted of gathering and analyzing urban mobility indicators in 52 cities worldwide for the year 2001.

It is important to have several measures describing service performance on an aggregated level (cf. Transportation Research Board 2003). Norheim (2006) uses number of departures, the chance of finding a seat, and travel times to characterize the objective service performance of public transport. In the UITP database, these three measures correspond to Vehicle km/inhabitant, Total PT place km/inhabitant, and Average PT Speed. All three measures were used in the subsequent data analyses.

Procedure

The satisfaction data were collected by means of a telephone survey. The respondents were selected at random and telephoned between 5 and 9 p.m. They were informed about the purpose of the survey—to obtain information about various

aspects of citizen satisfaction with public transportation—and were then asked to participate in a telephone interview. Those who declined to participate in the survey were asked why they had chosen not to participate; the most common reason given was that they did not use public transportation and thus did not want to participate. The respondents who did not answer were called again up to six more times to obtain as high a level of participation as possible. Data collection was terminated when the interviewers had reached and collected data from 1,000 respondents in each city.

Data were collected by local survey institutes in each city. These local institutes were responsible for translating the questionnaire into the local language. The questionnaire also has been back translated (i.e., verified by a translation agency). The local public transport authorities were given the opportunity to go through the questionnaire to confirm that its content was suitable for each respective region.

The Mobility in Cities Database includes demographics, economics, urban structure, private vehicle stock and usage, taxis, road networks, parking, public transport networks, individual mobility and modal choice, the cost of transport to the community, energy consumption, air pollution, and accidents (Vivier 2006). In total, 120 raw indicators were collected from the sample's 52 cities. All data were provided by staff from member organizations of the UITP. Quality control was ensured by provision of a UITP handbook, designed to ensure consistency and uniformity in the data collection process across all cities.

Questionnaire

The questions asked concerned the respondents' opinions about public transport services. The respondents stated whether they agreed or disagreed with different statements about public transport attributes. Altogether, 17 attributes were rated. Three satisfaction attribute measures were used in this study, plus one measure of overall satisfaction. The three attributes correspond to the items identified and used by Norheim (2006). Although there are several other possible measures, these three captures central aspects of the public transport experience (e.g., Eboli and Mazzulla 2007, Felleson and Friman 2008, Hensher et al. 2003, Tyrinopoulos and Aifadopoulou 2008). All ratings used the following scale: (1) don't agree at all, (2) hardly agree, (3) neutral, (4) partially agree, and (5) fully agree. The respondents also answered some background questions.

Results

Sample Description

The total sample of 6,021 respondents obtained from six European cities (Stockholm, Oslo, Helsinki, Copenhagen, Barcelona, and Vienna) had a gender breakdown of 42 percent male and 58 percent female. The mean age was 47.2 years (SD = 18.0 years). A total of 52 percent of the respondents were working full time, 9 percent were working part time, 9 percent were students, 24 percent were retired, and 6 percent were occupied with other things. A total of 2,276 respondents (38 %) reported that they were daily users of public transport, with 1,670 (28 %) being weekly users, 1,091 (18 %) being monthly users, and 972 (16 %) using public transport either seldom or never.

Satisfaction with Public Transport

The satisfaction measures presented in Table 1 show that there are differences in overall satisfaction ($p < .005$). The citizens of Vienna are the most satisfied, and the citizens of Oslo are the least satisfied overall with public transport.

Table 1. Means and Standard Deviations Overall and Attribute Satisfaction Measures

Variable	Stockholm		Oslo		Helsinki		Copenhagen		Barcelona		Vienna	
	M	Sd	M	Sd	M	Sd	M	Sd	M	Sd	M	Sd
Overall satisfaction	3.61	0.86	3.18	0.98	3.96	0.66	3.49	0.94	3.81	0.78	4.00	0.79
Frequency	3.44	1.19	3.18	1.43	3.78	1.14	3.36	1.37	3.62	1.39	3.69	1.26
Seat	3.72	1.01	3.49	1.29	3.95	0.99	3.55	1.22	3.15	1.38	3.95	1.07
Travel time	3.71	1.04	3.33	1.37	3.91	0.96	3.42	1.27	4.07	1.15	4.01	1.11

Below, each individual attribute has been analyzed in relation to UITP objective data.

Frequency versus Vehicle km/inhabitant

Vehicle km per inhabitant portrays the relative size of the public transport service offering as an aggregate measure of frequency and coverage. The objective service frequencies presented in Figure 1 show that Stockholm has the highest and Barcelona the lowest route production in 2001 of the six included cities.

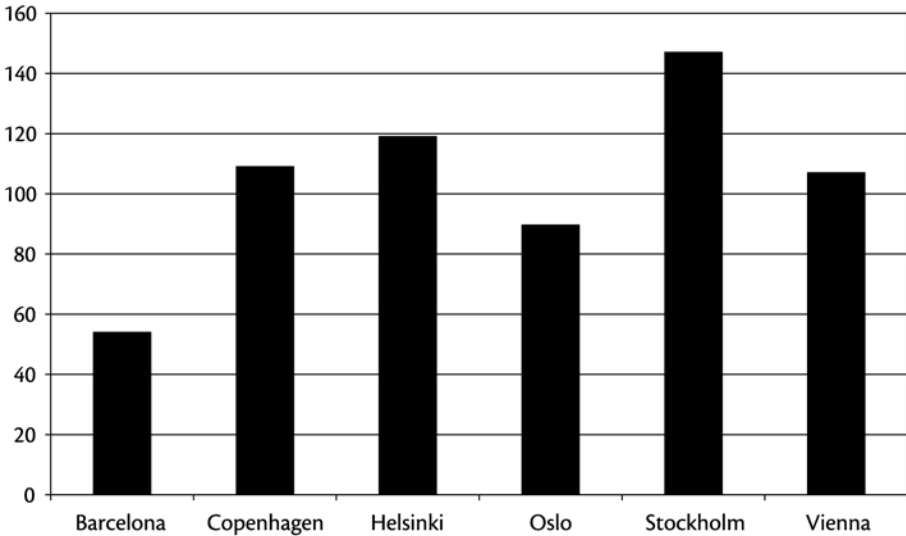


Figure 1. Vehicle km/inhabitant

Bivariate correlate analyses were performed to establish possible relationships between the objective and subjective data. First, the relationship between vehicle km per inhabitant and overall satisfaction was analyzed. This relationship was found to be insignificant. Second, an analysis was performed on the relationship between vehicle km per inhabitant and the satisfaction attribute measure “I’m satisfied with the number of departures.” This result was also found to be insignificant.

Seat versus Total PT Place km/inhabitant

Travel time is perceived to be longer when travelers have to stand as opposed to being seated (Litman 2008). This implies that total PT place km/ inhabitant is an important factor. Figure 2 shows that Stockholm has the highest and Barcelona the lowest total PT place km/inhabitant in 2001 of the included cities.

Arguably, place km/inhabitant corresponds to satisfaction with the number of seats in public transport. There are significant differences ($p < .005$) in how satisfied the citizens of the six cities are regarding the possibility of having a seat. The citizens of Helsinki and Vienna are the most satisfied, whereas the citizens of Barcelona are the least satisfied (Table 1).

Bivariate correlate analyses were then performed to establish possible relationships between objective and subjective data. First, the relationship between total

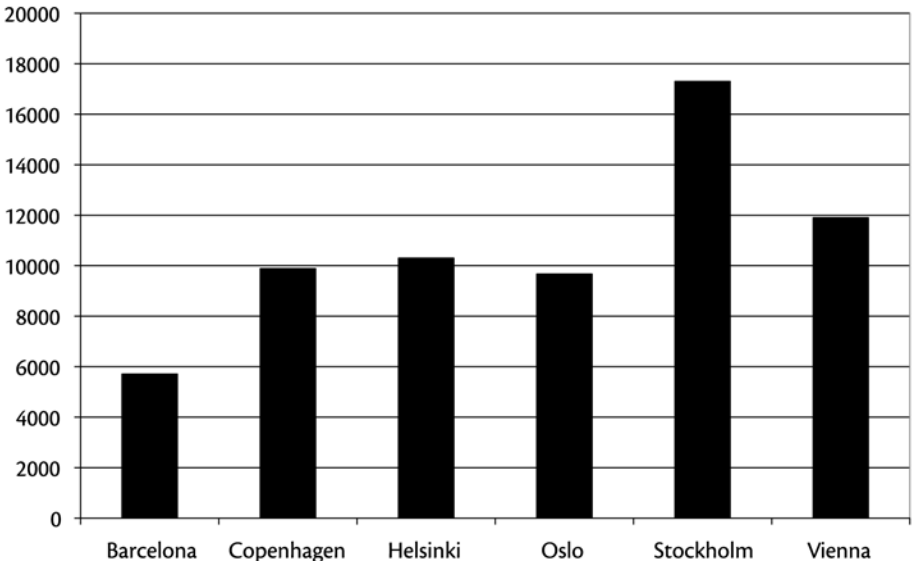


Figure 2. Place km/inhabitant

PT place km/ inhabitant and overall satisfaction was analyzed. This relationship was found to be insignificant. Second, an analysis was performed on the relationship between total PT place km/inhabitant and the satisfaction attribute measure “I normally get a seat.” This result was found to be significant ($r = 0.14, p < .005$).

Travel Time versus Average PT Speed

Travel time is an important aspect for the traveler (Felleson and Friman 2008). Average PT speed is a measure that captures travel time. Figure 3 show that Copenhagen and Oslo have the highest average speed in 2001 of the included cities.

Speed corresponds to perceived travel time in public transport. There are significant differences ($p < .005$) in how satisfied the citizens of the six cities are with regard to travel times (Table 1). The citizens of Barcelona are the most satisfied, whereas the citizens of Oslo are the least satisfied.

Bivariate correlate analyses were performed once again. First, the relationship between average PT speed and overall satisfaction was analyzed. This relationship was found to be significant, although surprisingly negative ($r = -0.26, p < .005$). The result implies that an increase in the average travel speed decreases overall satisfaction with public transport.

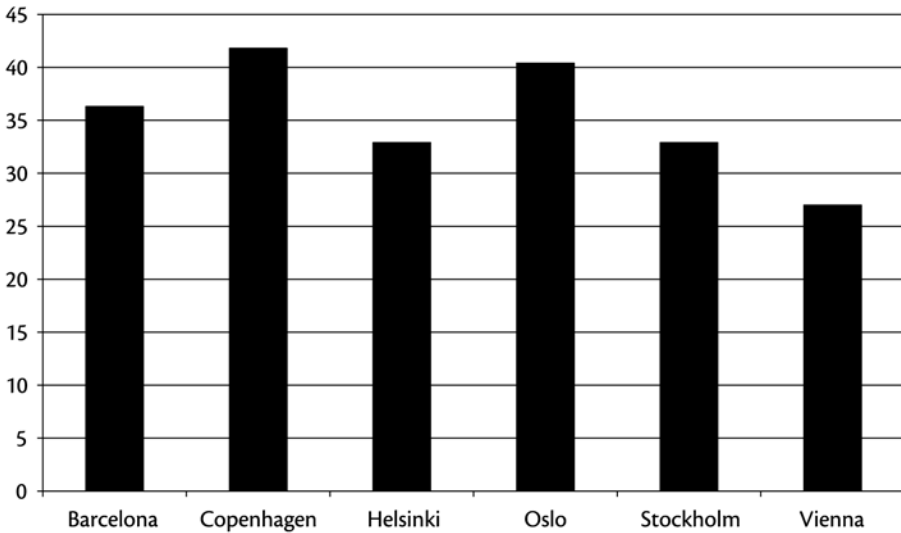


Figure 3. Average PT speed km/h

An analysis was then performed on the relationship between average PT speed and the satisfaction attribute measure “Travel time on PT is reasonable.” The result was once again unexpectedly found to be negative and significant ($r = -0.18, p < .005$).

Discussion

The results warrant several comments. The lack of correlation between the actual supply of public transport and the citizens’ overall assessments indicates that the latter are not solely (or even primarily) based on the actual conditions of the transport system. “More” public transport does not automatically result in more satisfied customers. This is well in line with service research whereby the perceived service quality is defined as a function not only of *what* the customer gets but also *how* he or she gets it (Grönroos 2000, see also Schneider and White 2004). This makes the objective conditions of the service offering only partly responsible for how satisfied people are with public transport. Further, there might also be a market share effect, as a very small system is likely to be used only by those who are already enthusiastic about public transport or by those who lack any real alternatives.

As is indicated by the fact that respondents with either no or very limited experience of the relevant public transport systems are still able to express opinions about them when asked in the survey, the level of satisfaction might be even less related to the actual transport system (Pedersen et al. 2009).

When it comes to the relationship between satisfaction with specific attributes and the objective conditions of these attributes, the results are more difficult to explain intuitively or from a theoretical point of view. There are some potential explanations for this situation, however. The lack of correlation between transport supply and frequency satisfaction might depend on the difficulties of matching supply with demand (transport may be provided but not at the time and/or location needed). Such a mismatch not being reflected in the relationship between perceived and provided seat availability could reflect the fact that the shortfall in frequency is compensated for by increased vehicle capacity. At least, the data suggest that an increase in seat availability is noted by travelers. The negative (and counterintuitive) correlation between average speed and travel time might reflect the impact of the type of travel. A long journey is likely to be perceived as time-consuming even in a fast moving vehicle. Transport systems with a high proportion of long distance commuter journeys might thus score lower on perceived travel time than systems primarily consisting of (comparably slow) inner city buses used primarily for short journeys as a substitute for walking.

Additional research is needed that investigates a richer set of quality attributes such as safety, staff behavior, information, and fares. Other techniques (e.g., structural equation modeling and PLS) should also be used for analyzing the relationship between traveler satisfaction measures and objective performance measures.

The study also raises the issue of what constitutes relevant measures, both of objective supply and of satisfaction. Public transport systems are inherently complex, and describing them using a number of standardized key indicators necessarily requires significant simplifications and a substantial amount of subjective interpretation (Norheim 2006, Vivier 2006). This is particularly true when data are collected on a transnational level, as is the case with the Millennium Database. Similarly, satisfaction is known to be difficult to measure, as it is influenced by complicated psychological and social processes. For example, a recent study revealed that customers responding to specific questions about their current journey were nonetheless taking previous experience, media coverage, and hopes of future improvements into consideration when answering (BEST 2009).

Conclusions

Does this mean, then, that satisfaction measures are irrelevant? Absolutely not! Satisfaction is pivotal for understanding public transport from the customer's perspective. However, there is a problem when the subjective assessments of the users (and even the non-users) are conflated with the objective conditions of the transport system. As has been shown, a high level of satisfaction does not necessarily indicate an objectively "better" system and vice versa. Instead, satisfaction scores should be interpreted in their wider context, thereby enabling a further contextualization of the objective conditions as well. This is particularly important when comparisons are made between different cities: satisfaction is a relative concept and not a measure of absolute success in public transport.

Understanding—rather than taking for granted—the links between satisfaction and an objective service supply is a key management challenge that requires a genuine understanding of how the transport system functions, from the point of view of both the customer and production. Such a dual understanding will provide an indispensable foundation for developing the public transport systems of tomorrow. Once the subjective and partly-independent nature of the satisfaction measures is acknowledged, their potential value to managers and policymakers can be realized.

Acknowledgment

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