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The importance of service quality attributes in public transportation: Narrowing the gap between scientific research and practitioners' needs

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ABSTRACT

Customer Satisfaction Surveys (CSS) have become an important tool for public transport planners, as improvements in the perceived quality of certain service attributes can lead to greater use of public transport and lower traffic pollution. The literature shows that the importance of quality attributes has until now been estimated indirectly, as they are derived from the Customer Satisfaction Index using various different and complex techniques. Little work has been dedicated to its direct estimation (stated importance) by designing ad-hoc surveys, an approach that represents a considerable reduction in the length of the questionnaire.

This paper contributes to the limited existing literature by developing a survey technique based on hierarchy processes to estimate the stated importance of quality attributes, and compares the results with the derived importance obtained using conventional surveys with the same sample. The added value of this research is that it provides the first comparison between two quality survey methods using the same real case study in Madrid (Spain). The results achieved using this pioneer survey method (293 valid questionnaires) were validated using conventional face-to-face surveys (520 valid questionnaires). Factorial analysis, multiple regression analysis and Multiple Indicators Multiple Causes (MIMIC) models were applied to the conventional survey sample to analyse and derive the importance of the attributes. The results clearly show that, after a few teething troubles, the stated importance of quality attributes can be estimated directly, thus providing transport management companies with a simple and useful tool to implement in their Customer Satisfaction Surveys (CSS), and narrowing the gap between practitioners' needs and scientific research.

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1. Introduction

The analysis of Service Quality (SQ) is of vital importance for both operators and public transport authorities, as the increase in SQ in public transport has been shown to play a key role in attracting new passengers from private cars to the public transport system and in reducing traffic pollution as a result (Transportation Research Board, 1999). The literature reveals a significant gap between the scientific research and practitioners' needs. Scientific research regards the concept of SQ as complex, fuzzy and abstract, mainly due to the three aspects of service: intangibility, heterogeneity for each individual, and the inseparability of production and consumption (Parasuraman et al., 1985). Most scientific methodologies for analysing SQ are applied only to customer

perception surveys, although a number of authors (Grönroos, 1988) differentiate between consumer expectations and perception of service during the trip, and maintain that the perception of SQ is the result of the comparison of consumer expectations with actual service performance. Other authors such as Hu (2010) define service quality in terms of the difference between perceived and tolerable quality.

Leaving aside this theoretical approach, the study of quality took a giant stride forwards in linking the fields of research and practice with the QUATTRO project entitled "Quality Approach in Tendering Urban Public Transport Operations" (European Commission, 1998), whose objective was to define and introduce quality indicators into tendering and contracting in public transport services. The QUATTRO project was also the basis for the European Standard EN 13816 Quality of service in passenger transport services (2003), but provided a more practical concept of SQ. Four quality levels were identified in the QUATTRO project: expected quality, perceived quality, targeted quality and delivered quality. The level of quality desired (expected) by passengers and

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citizens in general may be different from the perceived quality – observed with varying degrees of objectivity – by the passengers during their journeys. The level of quality the company wishes to achieve (targeted quality) is determined by external and internal pressures, expected quality, budgetary constraints and competitors' performance. Finally, the delivered quality is the level of quality obtained on a daily basis in real operating conditions.

Likewise, the emphasis in the US was also on measuring service quality through customer satisfaction, as evidenced by the Handbook for Measuring Customer Satisfaction and Service Quality (TRB, 1999) and the Transit Capacity and Quality of Service Manual (TRB, 2004).

The only objective information for operating companies is the provided quality, normally established in the concession contracts; however Customer Satisfaction Surveys (CSS) are also conducted on a yearly or six-monthly basis to monitor the users' perception of the service. The data collected from the CSS are used to analyse the company's operations, and provide useful information on overall service quality. They are also used in research and by academics to focus on the mathematical analysis of perceived quality, and test a large number of indicators: from simple indices such as SERVQUAL (Chau and Kao, 2009; Chou et al., 2011), SERVPERF (Sánchez et al., 2007), Customer Satisfaction Index CSI (Hill et al., 2003) and Heterogeneous Customer Satisfaction Index HCSI (Eboli and Mazzulla, 2009) to other more complex indices obtained by applying econometric models to satisfaction rates, such as Structural Equation Models (SEM) and discrete choice models (Hensher et al., 2003; Román et al., 2014). Some authors (Del Castillo and Benitez, 2013; Celik et al., 2014) have used mixed methodologies to determine the quality of the bus service. Del Castillo and Benitez (2013) used three models simultaneously (weighted means, a multivariate discrete distribution and a generalised linear model), while Celik et al. (2014) integrated statistical analysis, SERVQUAL, interval type-2 fuzzy sets and VIKOR (Opricovic and Tzeng, 2004) to evaluate customer satisfaction with the rail transit network in Istanbul.

The more complex the indicators (and the techniques to obtain them), the less likely it is that practitioners will be able to understand and use them in practice. Due to its simplicity, CSI, based on the importance of "attributes" and satisfaction rates, is the most widely applied index – even by operating companies – to determine service quality in public transportation. From a marketing point of view, an attribute is a characteristic or feature of a product that is thought to appeal to customers. In the public transport sector, the term service attribute is commonly used to refer to cleanliness, on-time performance, availability, comfort or security, constituting the criteria applied to assess customer service quality.

As the main tools for analysing service quality in public transport are based on CSS, the design of the questionnaire is absolutely crucial and depends strongly on the service attributes to be considered and on the approach used to estimate the relative importance of the attributes to the customers. This relative importance is another key point, as once a group of attributes is selected for a specific survey, public transport operators and service industries need to know not only how the users rate the service in terms of detailed service attributes (attribute-performance rating), but also the relative importance of these attributes to their customers (attribute-importance measures). The CSS results can help managers choose from a long list of service attributes (e.g. cleanliness, on-time performance, availability, comfort or security) so they can target their organisation's attention and resources more effectively. The rates are normally expressed in two scales, numeric and linguistic. Numeric scales are more commonly used and have a wider range, from 3 to 11 points. Linguistic scales are used less, and have a narrower range, from 3 to 7 points (the 5-point Likert scales are the most widely

adopted).

The survey is usually designed by the operating companies, and the resulting database is used first by the companies and then passed on to researchers. This highlights the need to narrow the gap between theory and practice. There is currently no proper debate on the design and format of the survey, and in most situations researchers use only part of the survey results, as their modelling tools are only suited to a specific database. There is also a problem from the scientific point of view due to the lack of critical comparison – using the same case study – between the competing techniques in order to analyse user perception and attribute importance.

This paper contributes to the limited existing literature by developing a survey technique based on hierarchy processes to estimate the stated importance of quality attributes, and compares the results with the derived importance obtained with the same sample using conventional surveys. The added value of this research resides in the fact that it is the first comparison between two quality survey methods using data from the same case study, in Madrid (Spain). The article has been divided into the following parts in order to describe the research as a whole: introduction (Section 1); a review of the literature on the methods used to estimate attribute importance (Section 2); a description of the case study and conventional survey campaign (Section 3); the proposed new stated survey method and its application to the case study (Section 4); the validation of the stated importance survey using the conventional survey (Section 5); and finally, the presentation of the most important conclusions and recommendations (Conclusions section).

2. Estimation of attribute importance using CSS

The literature shows that a considerable number of attributes are used to evaluate SQ, so they are normally grouped into a smaller number, called dimensions. Although there is no general agreement as to the nature or content of SQ dimensions, it is generally recognised that service quality is a multidimensional (Lehtinen and Lehtinen, 1982), multilevel or hierarchical (Brady and Cronin, 2001) construct. Various papers (Eboli and Mazzulla, 2007) have pointed to several categories of attributes that have a greater or lesser impact on SQ and satisfaction. In 2002 the European Committee for Standardization CEN (2003) established a quality standard – EN 13816 Service Quality Standard for Public Transport – in connection with the QUATTRO research, and published a final report. The UNE-EN 13186 standard classifies the characteristics of a service into basic, proportional and attractive, depending on how compliance and non-compliance affects customer satisfaction. In the US, the Transit Capacity and Quality of Service Manual TCQSM (Transportation Research Board, 2004) groups attributes into availability factors, and comfort and convenience factors. The primary distinction made by the TCQS is whether a transit service is offered, and if it is, customers then consider both the type of availability (e.g. frequency or access), and its comfort and convenience. In practice, the choice of variables is far from straightforward and usually derives from exhaustive lists of attributes (for instance the one included in UNE EN 13816), although some are chosen through other CSS. Some authors like Dell'Olivo et al. (2010) recommend identifying the attributes to be included in the CSS independently. Focus-group methodologies are suitable for this objective, although they are costly and require a separate prior study. The heterogeneity of the users and services must also be taken into account when analysing CSS results, as demonstrated by Bordagaray et al. (2014) when modelling bus transit quality in the city of Santander.

Apart from the selection of attributes, the design of a CSS

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