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Index numbers for monitoring transit service quality

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ABSTRACT

The measurement of transit service quality is very important for guaranteeing a transport supply characterized by satisfactory service levels for the passengers. Even more important is the monitoring of the levels of service quality over time, which can be very useful to determine if the goals established by the transport planners are being met or exceeded. The status and evolution of transit service quality can be monitored through periodic and regular updating of the opinions expressed by the passengers about the service during the well-known Customer Satisfaction Surveys, allowing the effect of policies to be evaluated and specific interventions to be introduced. In this work, just the issue of monitoring service quality based on users' opinions is approached, and the index numbers usually applied in the economic and industrial field are proposed for this purpose. Index numbers permit to study the fluctuations or variations of a variable or more variables over time, providing a powerful measurement for making comparisons and predictions of the analyzed concept. The index numbers were calculated on the basis of data collected from Customer Satisfaction Surveys addressed to the passengers of the metropolitan public service of Granada (Spain). The analyzed time period has been established from 2007 to 2013. Interesting results derive from the calculation of the index numbers. Since both perceptions and importance rates are considered in this methodology, the results can inform, not only on the satisfaction tendencies but also on the trend on customers' priorities, which is actually the expected quality. Therefore, policies could more efficiently be designed to adjust the service to the users' real needs.

1. Introduction

Transit service quality has long been recognized as an important factor in influencing travellers behavior, and it is one of the main drivers of sustainable transport policies as it encourages travellers towards selecting transport modes that are more efficient in energy and space (European Commission, 2007). Therefore, the transit performance evaluation is needed to capture the existing demand trends, peaks of operation, existing stakeholders concerns, and unmet service needs (Hassan et al., 2013).

For a long time the performance evaluation of public transport has been carried out from the service managers' perspective only (Transport Company and government), based on the cost efficiency and cost effectiveness of public transport

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services and operations. However, in the last few decades, practitioners, managers and researchers have started to focus on passengers' perspective, given that public transport services are offered directly to customers; so the resultant quality of a service should be seen as an outcome of user perception (Das and Pandit, 2012, 2013; Tyrinopoulos and Antoniou, 2008).

As emphasized in Cascetta and Cartenì (2014), in this lapse of time also the European Union adopted a user-oriented view of service quality, and promoted a quality approach to public transport focused on customers' needs and expectations (e.g., European Commission, 1995, 1996, 2001, 2007). In addition, in 2002 the EU Committee on Standardization enacted the standard EN 13816 where passenger and service provider point-of-view was joined in a service quality loop (European Committee for Standardization, 2002).

Customer perception of the quality (perceived service quality) depends on customers' personal experience of the service, on the information they receive about the service and their personal characteristics (e.g., gender, age, socioeconomic group) (European Committee for Standardization, 2002). These perceptions are usually measured by the Customer Satisfaction Surveys (CSS) (de Oña et al., 2014a, 2014b), and the data collected are used for developing indicators providing useful information about the global service quality. The surveys are generally conducted every year or with a 6-month frequency, monitoring users' perception about the service and its evolution along the time.

Quality of service, and particularly the quality of a public transport mode, is considered as a multidimensional construct (Brady and Cronin, 2001; Parasuraman et al., 1985, 1988), evaluated considering a large number of attributes describing the performance of the service. However, when customers evaluate the quality of a service as a whole, some service attributes are considered more important than others (Mokonyama and Venter, 2013), being their influence implicitly taken into account with their global evaluation. Therefore, there are several categories of attributes having a greater or lesser impact on service quality (de Oña et al., 2013; Eboli and Mazzulla, 2012; TRB, 2004; Tripp and Drea, 2002); their influence should be considered when an indicator of the level of quality is calculated.

The relative importance of each attribute as for the overall service quality can be extracted through different ways (de Oña and de Oña, 2014): by considering the importance rates stated by the passengers during the survey (stated importance) or, alternatively, deriving their weight by calculating the correlation between the satisfaction expressed by the users about each attribute and the satisfaction about the overall service (calculated importance). This last one is preferred by researchers and academics because of their numerous advantages (Weinstein, 2000), such as a more reliable evaluation of the users, who otherwise tend to indifferently give importance to all the attributes if they have to directly state a rate of importance.

The importance assigned by the passengers to each service aspect as well as their judgements of satisfaction change across the years, because of changes in the transport system or in the opinions of the passengers who can become more critics towards the service as time goes by.

First of all, transit supply could have improvements or worsening, and passengers' satisfaction with the service is closely connected to these variations.

Also the importance assigned by the passengers to the use of transit system and to the different aspects of the service can change over time; specifically, it can vary due to factors concerning people attitudes towards the transit mode, people sensitisation towards economic and environmental aspects, people expectation about the service, who are ever more demanding. As an example, with the improvement of the living-standard of people and the development of transport industry, passengers have put forward higher and higher requirements on some aspects of the service, such as the comfort of their journey (Fu et al., 2012).

In this context, measuring and monitoring quality of supplied services becomes a great priority for all the stakeholders associated with the transport system (dell'Olio et al., 2011); this updated evaluation of the service is fundamental for formulating adequate transport strategies.

Just for this reason, in this paper we deal with the issue of monitoring service quality across the years, on the basis of users' opinions, that are fundamental for the evaluation of service quality, as discussed above. Specifically, we propose the use of the index numbers usually applied in the economic and industrial field for analyzing the variation of service quality over time.

The systematic observation of a phenomenon over time permits to construct a time series. The size of the changes in a time series can be easily and conveniently measured by calculating ratios between two or more values of the series. The values obtained from the ratios are just the index numbers. As the governments control the trend of the main macro-economic and socio-demographic variables of their country (e.g. the unemployment rate, inflation, birthrate, immigration rate) we control the trend of transit service quality levels through a simple tool such as index numbers. Index numbers generally refer to the variation of prices or quantity of goods or services, such as the consumer prices, or the output prices, or the quantity of industrial goods. Starting from these concepts, we decided to adopt simple and composite index numbers to analyze the variation of the quality of a service by using the passengers' satisfaction rates as equivalent of the price values.

A reference or base period has to be established in order to measure changes over time referring all the analysis to this base situation. The reference time period can be the same for all the analyses (fixed base index numbers), or can be represented by the time period immediately before the analyzed period (chain base index numbers).

As widely treated in the scientific literature, service quality is a multidimensional construct and then the variation of the quality level perceived by the users depends on how passengers' satisfaction with the various service aspects changes over time. The judgements of the users in terms of satisfaction have to be weighted on the importance assigned by the users to each aspect, as the quantities of goods are included in the calculation of the overall price of goods. So, for this analysis, we adopt a composite index number obtained as an aggregation of indices of more attributes characterizing the service, in order