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Overall level of service measures for airport passenger terminals

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Abstract

Overall level of service (LOS) measures for airport passenger terminals are presented in this paper. These measures are useful to evaluate the overall LOS in a single scale, according to user perceptions. The procedure consists of observing passengers and collecting several socio-economic and physical variables that might influence the user evaluation of the airport as a whole. A psychometric scaling technique is used to obtain quantitative LOS ratings from survey data. Regression analysis is used to obtain mathematical relationships between the quantitative LOS ratings and global indices (total service time, total walking distance and two orientation indices). The methodology is illustrated with its application at São Paulo/Guarulhos International Airport in Brazil.

Keywords: Airport; Passenger terminal; Level of service; Overall analysis; Global index; Passenger perception

1. Introduction

The development of level of service (LOS) measures for airport passenger terminals has been one of the major issues for airport operators in the last decades. This has motivated a number of LOS studies by many air transportation agencies, including the Federal Aviation Administration – FAA (Transportation Research Board, 1987), Airports Council International – ACI (2000) and Transport Canada (1979). Despite the effort of these agencies, the LOS standards and methods provided by them have been the subject of criticism by airport professionals. One of the main concerns is the lack of passenger input. In those studies, the LOS standards have been developed arbitrarily. Several studies have also been undertaken to develop methods for LOS evaluation taking into account the user's perceptions. Most of them have provided results based on a poor database, and were not able to provide a high level of significance for testing the hypothesis considered.

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Additionally, most studies have focused on individual components of the airport passenger terminal (check-in counter, departure lounge, etc.), neglecting the overall evaluation.

A wide measure reflecting the LOS of the terminal as a whole would be very useful at the planning, design and management level. The main challenge to develop an overall measure is the data collection. It is relatively simple to collect characteristics of individual facilities (e.g. individual waiting time at the check-in counter) as opposed to obtaining overall measures (e.g. total walking distance by an individual). Several issues have to be addressed before a research effort is developed to collect overall measures. It is the purpose of this paper to provide a methodology for such an effort, illustrating it with the case study of São Paulo/Guarulhos International Airport.

A thorough review of the past research on LOS was presented in Correia and Wirasinghe (2004). Mumayiz and Ashford (1986) provided a method called perception–response concept, using graphical displays constructed from passenger responses concerning the LOS provided at airports in England. Omer and Khan (1988) employed the concept of utility theory to develop a relationship between characteristics of facilities (e.g. waiting time, space available) and user responses (0–1) about the LOS offered. Müller and Gosling (1991) applied a psychometric scaling technique to obtain a quantitative measure of LOS that might be used in a relationship similar to the one developed by Omer and Khan (1988). Seneviratne and Martel (1991) developed LOS standards for several components of the airport passenger terminal. The selection of the most important components and measures was based on a survey of Canadian airports (Martel and Seneviratne, 1990). Ndoh and Ashford (1993) employed theories of perception and scaling to evaluate LOS on airport access, using 12 attributes (e.g. mode economy, mode comfort, access information, etc.). Park (1994) used fuzzy logic to derive LOS measures for specific components of the airport passenger terminal. The methodology was applied in a case study of the Seoul Kimpo Airport. Yen (1995) conducted a survey at Austin Municipal Airport in Texas, USA. He applied binary logit models to estimate a ''long'' model and a ''short'' model to predict the probabilities that a passenger will rate a service on the basis of perceived time measures. Yen et al. (2001) presents a quantitative model to define the level of service at airport passenger terminals. The model uses the fuzzy concept to relate subjective service ratings to time measurements of associated waiting or service processes. Fernandes and Pacheco (2002) utilize data envelopment analysis to evaluate the capacity of 35 Brazilian airports, based on several operational parameters (e.g. number of check-in counters, average space available per passenger, etc.). Studies similar to Fernandes and Pacheco (2002) have been developed to analyze the efficiency of airlines, however employing variables that are more related to the airlines' perspective; see Inglada et al. (2006), for instance. Magri and Alves (2003) evaluate the LOS offered by six Brazilian airports as a function of 36 subjective parameters suggested by the Airports Council International (2000). De Barros et al. (2007) use regression analysis to evaluate the relative importance of transfer passenger ratings of individual facilities and services at Bandaranaike International Airport in Sri Lanka.

All the above studies concentrate on the LOS evaluation of individual components. No study has developed an objective overall LOS measure, reflecting the LOS provided by the airport passenger terminal represented by a single scale. This lack motivated the development of overall level of service measures, which is the object of this paper.

2. Facility characteristics

One of the first steps prior to developing an appropriate survey is the identification of the most important facility characteristics that have an influence on the user perception of the overall LOS. The Airports Council International (Airports Council International, 2000) sent a questionnaire to its 512 airport members, with questions concerning the quality evaluation process. Tables 1 and 2 provide the results of the survey concerning the objective and subjective criteria, respectively, employed to evaluate the overall quality of the airport.

It is possible to measure some of these criteria (e.g. waiting time, walking distance, punctuality). However, the measurement of very subjective criteria (e.g. overall attitude of staff, airport security, etc.) is very complex. On the other hand, the application of a multi-attribute model to evaluate the overall LOS demands the selection of the most important attributes. It is not feasible to employ too many variables – the data needs would be extremely high to validate such a model with a high level of significance. In this case, it is necessary to pick the attributes that have the greatest impact on the user perception of the overall LOS.