



An alternative methodology for evaluating the service quality of urban taxis

R.C.P. Wong, W.Y. Szeto*

Department of Civil Engineering, The University of Hong Kong, Hong Kong



ARTICLE INFO

Keywords:

Level-of-service standard
Urban taxis
Customer satisfaction survey
Importance-satisfaction analysis
Enhanced linear regression model

ABSTRACT

This paper proposes an alternative methodology to evaluate the service quality of urban taxis and develops a level-of-service (LOS) standard for taxi customers to monitor performance. A customer satisfaction survey was conducted from January to March 2013 in Hong Kong, with the respondents invited to give specific satisfaction ratings for ten service aspects individually and a global satisfaction rating for the overall taxi service quality, as well as to rank the important aspects that influence the given global rating. The ten service aspects related to the amount of time consumed when taking taxis, services and facilities provided for finding taxis, internal environments of taxis, and personal services provided by taxi drivers. An enhanced linear regression model was developed to identify the priority areas for improvement of urban taxi service quality. Based on the numerical score of overall taxi service quality, a six-level LOS standard, similar to academic grading, is introduced accordingly to improve the general public's understanding of the current service level. This paper discusses the potential policy implications to enhance the taxi service quality in Hong Kong, which can be applied to other metropolitan cities that provide similar urban taxi services.

1. Introduction

Taxis continuously circulate in search of customers, which consumes a great deal of road space and worsens traffic congestion and air pollution. To tackle these problems, taxi regulation policies have often been studied and implemented in the form of price controls and entry restrictions (e.g., [Arnott, 1996](#); [Douglas, 1972](#); [Moore and Balaker, 2006](#)), but such studies have ignored the spatial structure of the taxi market. To address this issue, [Yang and Wong \(1998\)](#) first introduced a model to determine the taxi movements on a given road network. Later, the model was improved by other researchers to capture congestion effects, multiple user classes and taxi modes, day-to-day learning processes, stochastic travel time, temporal variation in passenger demand, time-dependent customer-search behavior, probability of meeting customers, and smartphone-based e-hailing applications (e.g., [He and Shen, 2015](#); [Leng et al., 2016](#); [Long et al., 2017](#); [Rose and Hensher, 2014](#); [Wong and Yang, 1998](#); [Wong et al., 2001, 2002, 2008, 2014a, 2014c, 2015a](#); [Yang et al., 2005, 2012, 2014](#); [Zhang et al., 2017](#)). However, these models mainly investigate the vacant taxi drivers' decisions in search of customers while ignoring the customers' preference of finding vacant taxis on streets.

To study the bilateral taxi-customer meeting and searching, [Wong et al. \(2005\)](#) adopted absorbing Markov chain approach to modeling micro-searching behavior of both customers and taxi drivers in a network. [Yang et al. \(2010\)](#) further extended this study by incorporating a

meeting function between customers and taxis to capture different meeting natures at taxi stands and on streets, and the searching decisions of customers and taxi drivers. [Yang and Yang \(2011\)](#) studied the bilateral searching and meeting function that characterizes the search frictions between vacant taxis and taxi customers. [Wong et al. \(2014b; 2015b\)](#) conducted stated-preference surveys to taxi drivers and customers, respectively, to investigate their search preferences to validate the modeling concepts.

Apart from the above surveys, annual taxi service surveys have been conducted in Hong Kong. The surveys have commenced since 1986 to gather quantitative measurements of customer and taxi waiting times, taxi utilization, and taxi availability at sampled taxi stands and roadside observation points ([Transport Department, 1986–2009](#)). These survey data have been used in numerous studies (e.g., [Loo et al., 2007](#); [Xu et al., 1999](#); [Yang et al., 2000, 2001](#)) to analyze how taxi fleet sizes influence customer waiting time (which was considered a unique measure of taxi service quality), vacant taxi headway, taxi occupancy, taxi passenger demand, and taxi idling time. They formulated the relationship between taxi fleet size and service quality, and arrived at a similar conclusion that taxi service quality increases as the taxi fleet size increases. However, taxis currently comprise a high proportion of the overall traffic stream in the urban area of Hong Kong and this situation occurs similarly at other metropolitan cities, such as Beijing and Taipei. A massive increase in the taxi fleet size may worsen traffic congestion, prolong taxi customers' in-vehicle traveling time and

* Corresponding author.

E-mail address: ceszeto@hku.hk (W.Y. Szeto).

adversely affect the service quality perceived by taxi customers. It is crucial to conduct a comprehensive study that measures customer satisfaction with urban taxi services and estimate appropriate taxi fleet size that achieves a minimum level-of-service (LOS) to taxi customers without causing serious traffic congestion.

Regarding the evaluation of LOS of public transport, [Transportation Research Board of the National Academies \(1999\)](#) prepared a handbook recommending methods to public transit agencies to identify the determinants of service quality from the customers' perspective. Other studies (e.g., [Chiou and Chen, 2012](#); [Correia et al., 2008](#); [Das and Pandit, 2015](#); [de Oña et al., 2016](#); [Del Castillo and Benitez, 2013](#); [Eboli and Mazzulla, 2011](#); [Kurtuluşoğlu et al., 2016](#); [Lai and Chen, 2011](#); [Lu and Chang, 2014](#); [Tam et al., 2010](#)) have also been carried out to evaluate the service quality of existing transportation systems and customer satisfaction. However, most efforts have focused on public transit modes rather than urban taxis. Different from the other public transit modes, taxis provide a tailor-made, point-to-point service to their customers, which have no fixed service frequency and routing. Taxi customers are not necessary to wait at a fixed location for the service, but have flexibility in finding a taxi in different ways (i.e., dispatching, street hailing, and waiting at taxi stands) ([Schaller, 2007](#)). The service natures of taxis are different from those of public transit, and hence suggestions for public transit on service enhancement cannot be applied directly to urban taxis.

Without a comprehensive study on customer perceptions on taxi service quality, the priority areas for improvements on taxi service quality cannot be identified. The government and taxi operators cannot effectively monitor the service performance and allocate their resources to make service improvements. To address this limitation, [Yao and Ding \(2011\)](#) firstly attempted to measure the quality of taxi services of Hangzhou, China. Follow up studies have been carried out (e.g., [Li and Song, 2011](#); [Dachyar and Rusydina, 2015](#); [Techarattanased, 2015](#); [Alonso et al., 2018](#)) to evaluate the taxi service quality in some other cities. Most of these studies found that the variables related to driver behavior were highly valued by the customers, and significantly influenced their level of satisfaction. Recently, [Shaaban and Kim \(2016\)](#) calibrated a structural equation model for evaluating the taxi service quality in Doha, Qatar and hence provided suggestions to enhance the accessibility to taxi ranks. However, their study only interviewed the taxi customers who got taxis at taxi stands while neglecting those customers got taxis by taxi dispatching and street hailing. In fact, many cities have a mix of dispatch, stand, and street hail trips. For examples in the United States, San Francisco, and Boston have predominantly stand and hail trips; New York City represents an extreme case where its medallion cabs do not serve any dispatch trips and most of their trips are via street hail ([Schaller, 2007](#)). In Hong Kong, urban taxis mainly serve street hailing trips while few taxi customers find a vacant taxi by calling for a service and waiting at a taxi stand. Hence, this paper proposes an alternative methodology for evaluating the service quality perceived by a mix of dispatch, stand, and street hail customers and determining the service aspects that are most in need of improvement.

Most of the urban taxis in Hong Kong were private-owned, unlike other metropolitan cities where usually controlled by a limited number of operators. The taxi fare in Hong Kong was based on a non-linear fare structure with declining increments on the travel distance and waiting time. The taxi fare structure was the same throughout the day, without surcharges at night or during peak hours. In this study, we interviewed 1008 Hong Kong taxi customers at taxi stands and pedestrians on streets who had taken taxis recently, and invited them to state their levels of satisfaction with each of ten service aspects, the overall taxi service quality, and their rankings of the importance of these aspects. An enhanced linear regression model is developed and an importance-satisfaction analysis is conducted. A six-level LOS standard (using letters A through F, with A being the best and F being the worst, similar to academic grading) and its associated thresholds for urban taxi service quality are consequently proposed. The findings help identify the

priorities of service quality improvements in terms of individual service aspects. The proposed LOS standard can be applied to evaluate the taxi service quality in Hong Kong and other metropolitan cities, and estimate the optimum taxi fleet size based on the predetermined policy target of minimum LOS to urban taxi customers.

This paper makes several contributions: (1) to the best of our knowledge, we are pioneers to introduce an LOS standard to monitor taxi service performance, (2) it proposes an alternative methodology to evaluate the service quality of urban taxis and identify the area of improvements, which has not been proposed by and used in other taxi service quality studies, and (3) it discusses novel and valuable policy insights to improve the taxi service quality in Hong Kong, as well as some cities that provide similar urban taxi services.

The remainder of this paper is structured as follows. Section 2 describes the details of data collection and performance evaluation survey. Section 3 presents the formulation of enhanced linear regression model and the score prediction curves for time-related quantitative service aspects, explains the results of the importance-satisfaction analysis, and gives a formula for determining the LOS score or equivalently the score of the overall taxi service quality. Section 4 illustrates the model results, suggests the priorities for taxi service quality improvements, and proposes an LOS standard and its associated thresholds. Section 5 recommends some policy implications. Finally, Section 6 concludes the paper.

2. Data

2.1. Data collection

A pilot survey was conducted about two weeks before the main survey, and about 50 taxi customers were interviewed to verify the feasibility of the survey approach and ensure the clarity of wording in the questionnaire. The main questionnaire survey was then conducted from January to March 2013 both during the day and at night. The face-to-face interviews took place in selected residential and commercial districts in Hong Kong. We randomly interviewed taxi customers at taxi stands and pedestrians on streets. The questionnaire survey would be ended and the data would be neglected from analysis if they had not taken urban taxis within the past three months. Besides the face-to-face interviews, the respondents were welcome to complete the questionnaire at home and mail back to us using an attached return envelope. In this study, we collected 1008 responses in total. About two third of the responses were collected on site during the face-to-face interviews, and the rest were collected by mail. The overall response rate was about 23%.

2.2. Performance evaluation survey

The questionnaire survey consists of two parts: 1) the demographic information of the urban taxi customers; and 2) satisfaction with the urban taxi services. [Fig. 1](#) shows the questions for taxi customers' satisfaction level in the questionnaire survey. The respondents were invited to rate their levels of satisfaction with respect to ten selected service aspects and the overall urban taxi service according to their latest travel experiences of taking taxis. The satisfaction levels with individual service aspects were considered to be highly correlated to that of the overall service ([Olawole and Aloba, 2014](#)). The ten aspects spanned four categories and covered a wide spectrum including [1] time consumed when taking a taxi, [2] services and facilities for finding taxis, [3] internal environments, and [4] personal services provided by taxi drivers. In particular, [2] depends on how the customers search for taxis. Most of these aspects were found to be important in the previous studies (e.g., [Yao and Ding, 2011](#); [Li and Song, 2011](#); [Alonso et al., 2018](#)), and were verified in the pilot survey. The respondents could only evaluate a market-specific service aspect of either (d) the punctuality of called taxis (*if the customer got a taxi by taxi dispatching*), (e)

Download English Version:

<https://daneshyari.com/en/article/7496855>

Download Persian Version:

<https://daneshyari.com/article/7496855>

[Daneshyari.com](https://daneshyari.com)