

Review on the Suitable Methods in Measuring Service Quality for Public Transportation

Shuhairy Norhisham¹, Amiruddin Ismail², Muhamad Nazri Borhan², Nor Hazwani Nor Khalid¹, Herda Yati Katman¹

¹Institute of Energy Infrastructures, Department of Civil Engineering, College of Engineering, Universiti Tenaga Nasional, Kajang, Malaysia

²Department of Civil and Structural Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, Bang, Malaysia

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Abstract

This paper identified the most important methods and examined the suitable in measurement for level of service. The preliminary steps which is collection of data that included the comparison between the literature reviews. By this way, the idea on how to conduct the research will come out. The questionnaire survey is the most rating that have been done by most of researchers. Then, the observation in route test also one of the suitable method to conduct. The empirical analysis of the test route was carried out to understand the background of reliability issues and to establish a sound base scenario of the network. Other than that, interviewer is conducted to verify the answers and to organize a sound analysis and explanation as well. Next, modelling software is also carried out since with the developing modern technology, the work becomes easier and the results will more accurate. The mathematical equations or related formula also is proposed due to some calculation needed. Thus, the proper method should be identified in the first place to prevent any problem in the future research.

Keywords: Methodology; Level of Service; Measuring Quality Services, Public Transportation

Introduction

It is important to understand the best method in measuring the service quality for public transport. There are three approach to be discover which is quantitative approach, engineering approach and qualitative approach.

Generally, collection of data can be carried out by library research that includes reading, studying and gathering some ideas either from books, journals or scientific articles. (Poku-Boansi & Adarkwa, 2013) Other than that, field research is a one method that carried out to observed object by observation, interview and all other questions. From overall it can be summarized that the main instrument of qualitative research was observation. The used of

data is to generate the probability distributions towards the scenarios of research study. (Ozbay & Morgul, 2014).

Service Quality Measurement – Qualitative Approach

Mohammed et al. (2012) highlight the service quality for trip information of individuals included the purpose of the trip, mode of travel, total travel time and travel cost, improving the frequency, suitable waiting time at the minibus stops, distance for the residential location etc. Then, attitudes and perceptions on travel and policy measures. Shaaban & Khalil (2013) stated that the main important elements that highlight are accessibility, shade, safety, cleanliness, level of crowd and noise level, punctuality, cleanliness, travel time, frequency and cost. However, Kamaruddin et al. (2012) The content of questionnaire focussed on the elements that influence customer satisfaction which are safety, accessibility, reliability, fares communication and experience. (Shafiqah Baba, 2013) develop gender, age, area of place, purpose of trip, frequency usage and time usage.

A sample of questionnaire was carried out at Kajang are in determining the reasons for travellers; mode choice of minibuses as an alternative for private cars. (Mohammed, Alelweat, Karim, & Shams, 2012). Hafezi, Ismail, Al-Mansob, & Kohzadi Seifabad (2012) investigates the research by developed questionnaire survey only. He argues that questionnaires are often the best way of gathering such information and views among the other methods. Distribution of questionnaires is chosen according to bus line traffic and passenger demand.

Sample Size

Shaaban & Khalil (2013) distributed 500 samples of questionnaire were collected but only 278 surveys forms were considered complete and used in the analysis. Mohammed, Alelweat, Karim, & Shams (2012) collected 250 questionnaires within in 3 months only. About 467 out of 500 questionnaires were obtained giving a response rate of 93.4%. (Kamaruddin, Osman, & Pei, 2012). Hafezi, Ismail, Al-Mansob, & Kohzadi Seifabad (2012) targets the number of participants are 382 peoples after calculate the sample size. A structure questionnaire with five point scale was used to describe the items listed in the dimensions ranging from “very strongly disagree” to “very strongly agree” for all the questions involved in the study. (Kamaruddin et al., 2012).

Content of Questionnaire

In Mohammed et al. (2012) study, the questionnaire contains in socio-economic characteristics of individuals included household income, individual's income, age, gender, vehicle ownership, and total number of members in household, occupation and education level. Meanwhile, Shaaban & Khalil (2013) includes questionnaire with general information, other modes of transportation they use, and their perceptions regarding the quality of Doha bus service. Tanwanichkul, Taneerananon, Iamtrakul, Srisakda, & Sataphan (2007) Questionnaires and samples towards bus driver's survey are given in this section. Stakeholders that involved are bus driver, passenger, operator, and government agency for issues relating to bus safety. The questionnaire contains personal information, driving information, and factors affecting bus safety.

Analysis

The analysis is then conducted by performing exploratory factor analysis (EFA) for each measurement model to assess the parameter estimates, the statistical significance of the parameter estimates and overall fit. After that, Confirmatory Factor Analysis (CFA) was performed on those measurement models and finally, all the result were recorded. Kamaruddin et al., 2012) This survey also acquired another suggestion from customers' feedback (Shaaban & Khalil (2013) study which they recommend that customers' demand and personal comfort should enhance. Other than that, they also suggest that the priority for female seat should implement, number of bus routes should be increase. Then, they also highlight the utilities such as toilet and prayer room for both genders must be closer to bus stations and last but not least the importance of developing public awareness to inform users the importance of using public bus was also pointed out. In the meantime, Tanwanichkul et al. (2007) in his research found that in terms of bus driver experiences and opinions, 70% of drivers claims that they had not faced any bus accident during their driving career. Most of driver which is 85% of have the same opinion that human errors being a major factor causing an accident. Meanwhile, Hafezi, Ismail, Al-Mansob, & Kohzadi Seifabad (2012) make a conclusion that during light traffic periods buses can follow their scheduling exactly, as there is no traffic congestion and demand is lower.

Test Route – Engineering Approach

Concept

Napiah & Yaakub (2010) used the concept *on board* method instead of *off board* method. Basically, on board method is done by observation arrival and departure time at stops from the bus ride. Furthermore, on board method is easy because the researchers only observe the passenger profile and reason of delay. However, off board method is too complicated which the method need to records more bus trips per period of time.

Bus route in Kota Bharu provide two types of route, namely loop routes and direct route. Direct route type indicates that the bus route has other station to stop to at the end of the route meanwhile loop type indicates that the routes have no other stop except for the station. Therefore, Yaakub & Napiah (2011) applied the LOS qualitative measure in order to determine the level of service in Kota Bharu. Since Kota Bharu is a small city, it is clear that the buses only covers for small parts, which most highly populated area with more places as destination such as the government offices, shopping complexes, recreational and tourists' attractions, as well as centre for economic activities.

Process

Haron, Noor, Sadullah, & Vien (2010) collected the data manually by using two stages, firstly by checking several point at transit stop in order to determine the reliability performance. The researchers were assist to keep a record for arriving and departure time of buses. Test route that is done by Liu & Sinha (2007) based on three criteria. Firstly, investigate the frequent service having headways of less than 15 minutes, which means that average wait time is half the headway as passengers arrive randomly at the bus stop. Secondly, identify the availability of secondary information that includes FGC collects data on bus arrival times at the bus stops with their TRACKER system - an on-board GPS-based vehicle tracking system. Thirdly, examine the constant headway service, this is due to a constraint of the simulation model used in the study which can only model constant headways. For reliability, Haron et al. (2010) observe the performant measurement by checking several point at transit stops. The

time for arrival bus and other subsequent service is recorded as well as the headway time for every routes in order to determine the headway pattern for each route.

Measurement Variable

Yaakub & Napiah (2011) measured only three types of service quality in his study which are service coverage area, service frequency and hour of services to determine the level of service quality. The criteria for each variable is describes as follows:

- a) Service coverage area = any location within 400 meters of the route length is also considered service area of the bus. Generally, according to TCQSM, walking distance for passenger from a bus stop is 400 meters and 800meter from the bus station
- b) Frequency of bus = the number of buses per time distance. The more frequent a bus service, the shorter waiting time for passenger. The time is calculate based on the arrival or departure of bus at stations or stops.
- c) Hour of service = the total hour for the whole day that the service provided along a route.

Hawas, Khan, & Basu (2012) collected the data that containing number of passengers boarding or alighting at each bus stop. Other than that, to counted the total number of stops on each route direction and their exact locations, route lengths, average number of passengers per day on each route, travel time of each trip for all routes, operating hours, total number of buses operated on each route, total number of operators working on each route, user's concerns about each route, etc.

Napiah & Yaakub (2010) described that the data required for this method are bus schedule, number of trips for each routes, frequency of bus or headways, distance from bus station to each bus stops and end of the route, arrival and departure time from station and bus stops, number of designated bus stops and undesignated stops where commuters frequently alight and aboard and traffic, route, passenger, as well as bus and driver characteristics. All these data is based on the criteria needed in Kota Bharu since it is only a small city.

The survey was planned such that a representative sample of each of the service could be collected with some overlaps to check the variation. The data were collected on the number of alighting and boarding passengers, as well as the arrival and departure time of buses at each stop. A total sample of 18 trips was collected in the three days, of which 15 were for each of the peak period services and 3 overlapped to study the variation in the data collected over different days. (Liu & Sinha, 2007).

Preferred Time

Hawas et al. (2012) conduct all eight routes for three different peak periods (7am-9am, 12pm-2pm, and 5pm-9pm) daily, over a one-week duration. Haron, Noor, Sadullah, & Vien (2010) designated the selection time for collection data is during peak hour (7.00 am until 9.00 am) and non-peak hour (9.00 am until 2.00 pm). Both peak hour and non-peak hour will resulting different values hence the result was then compared to LOS for Urban Scheduled Transit (Highway Capacity Manual, 2000). However, Liu & Sinha (2007) claims the data is done only during peak hour from 7.30 am to 9.30 am and the main elements are to determine the number of alighting and boarding passengers, as well as the arrival and departure time of buses at each stop. The survey was planned in such a way due to representative sample of each of the service could be collected with some overlaps to check the variation. Haron et al. (2010) select the time in conducting the research during both peak hour and non-peak hour,

which is from 7.00 a.m. until 9.00 a.m. for peak hour and 9.00 a.m. until 2.00 p.m. for off peak hour.

Other Devices

Hawas et al. (2012) used GPS devices or known as Global Positioning System (GPS) (Rahman & Chin, 2011) as a main tools in order to find the exact location of bus stops (latitude and longitude data). The used of GPS is to obtain the travel time as well as to configure the traffic conditions, hour of operation and frequency. (Ibrahim, Adji, & Karim, 2013). Liu & Sinha (2007) introduced the secondary information on the service from the TRACKER data was available for only one of the services during the peak period.

From overall, it can be concluded that most of researchers conduct the survey at 7am to 9 am during peak hour and for non-peak hour at 9 am to 2 pm. Therefore, it can be summarized that morning time is the best period to conduct the survey. For measurement variable of service quality, majority the researchers highlight frequency of services, passengers load and travel time as the main attributes that should be conduct.

Interview – Qualitative Approach

Attrad M. (2013) adopted an interview strategy by analysing the mobility behaviour of the sample so that the conditions under which trips can be easily identified although other method is more than enough in obtaining result. The interviewed will focus on the service quality as analysed through customer satisfaction surveys carried out pre and post implementation of the public transport. Said (2012) mentioned that basically the main point interview was carried out is to make suitable condition between data and information of respondents all at once make some differentiation between those results. The main objective for Fonseca, Pinto, & Brito (2010) are to identify the important determinants of satisfaction and dissatisfaction of both customers and non-customers.

Method

Attrad M. (2013) conducted the interviewed by makes several telephone interviews to collect the data. The telephone numbers were extracted from telephone directory randomly and the interviews were held with the person that respond to the call. There was a very high response from females compared to male. Most of them age above 61 years old which be assume as unemployed and retired respondents. About 75% respondents do not regularly use public transport and about 54% respondents have a valid driving license.

People Involve

Interview method is done by starting with two key informants who were either driver or conductor for each of the routes. A total of 22 informants were selected and interviewed using an interview guide. Another 8 other informants included 2 Matatu Owners Association directors, one KBS director, and officials from the Transport Licensing Board (TLB), Ministry of Transport (MoT) and Nairobi City Council (NCC) were purposely chosen in order to acquire more information. (Chitere, McCormick, Orero, Mitullah, & Ommeh, 2012). Said (2012) conducted interview method to the related person, such as operational manager of transport service and driver. The total number for each operator selected was 7 respondents which included 1 respondent of employers of the service supplier and 1 from the driver. There were 5 respondents of service suppliers for each vehicle with two operated bus for each kind of operator bus and it was included one vehicle each depart and arrive section these respondents was selected by randomly according to the job and socio-economic level

included the gender of transport service user. While, Fonseca, Pinto, & Brito (2010) both interview and focus group were conducted in collecting data study. Few interviews is focusing on the company's perceive of quality and customer satisfaction. Meanwhile, the focus group concentrating towards customers and non-customers viewpoints. Most of the interview's people is come from different functional areas such as operations, marketing and hierarchical levels. Hierarchical levels includes executive vice-technical systems, director of president, director of marketing and communication, manager of operational securities and supervision of safety, lawyer and marketing manager-processing of complaints and suggestions. Additionally, the focus groups were conducted outdoor which have to meet peoples either customers or non-customers. Other than that, (Falamarzi, Borhan, & Rahmat (2014) interviewed expert peoples' because the author want to obtain good deal of practical experience.

Particular Questions

The main objective is to obtain the characteristics of the corridors and sub corridors and even characteristics of the respondents also their awareness as well as their views on BRT by referring to interview guide. (Chitere et al., 2012). The pattern service that was highlight are ticketing, operational standard of cost, time planning of departure and arrival, handling of claim, number of operated section and armada, number and skilful of human resources, employer motivation, trend of passenger, and the possibility of near distance service. Some photos and note book which related to the study be as documentation. Said (2012). Basically, the determining factor of dissatisfaction are exactly opposite from satisfaction such as reliability/failure to comply with schedules; comfort and cleanliness/discomfort and dirt; security/insecurity; punctuality/failure to comply with schedules. These determinants resulting that there is no such relationship between satisfaction and dissatisfaction, only for customers. Meanwhile different with the company, the conclusion is that these concepts are contrary, when referring to comfort/discomfort; security/insecurity at night/delays. Fonseca, Pinto, & Brito (2010)

As a summary by conducting this method it allows the focus on perception processes more than their interpret outcomes, and how the participants experiences and give them meaning. It can be concluded that the related peoples' involve are come from different level of positions because different people gives different perception and response. Therefore, some comparison of perception between authority, industry and users may be acquire.

Conclusion

As a review on suitable methods in measuring services quality for transportation, three approaches had been identified. Quantitative approach, engineering approach and qualitative approach.

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Corresponding Author

Shuhairy Norhisham
Institute of Energy Infrastructures,

Department of Civil Engineering,
College of Engineering,
Universiti Tenaga Nasional, Kajang, Malaysia
Email: Shuhairy@uniten.edu.my

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