

Urban Bus Service Quality through Sustainable Assessment Model

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Abstract - This article presents the sustainable assessment of service quality dimensions of urban bus service quality in order to support decision making and policy challenges in term of environment, economic and social context. A multiple-item scale of a sustainability assessment model was conducted on U43 Rapid KL buses to evaluate passengers' satisfaction based on their travel experience. The data were collected via survey questionnaires from 110 respondents (bus users) who are using the route. Findings indicated 5 significant dominant dimensions for the route, which are Environment, Reliability, Responsiveness, Physical Facilities and Safety. The higher value of Reliability is - 1.254 was found to be the critical dimension and showed that the bus is unpunctual. This has lead people to incline more towards the usage of personal transportation. The result helped the researchers to identify the shortcomings of the current service and deliver some recommendations that can improve the service quality to attract new passengers.

Keywords— Sustainable Assessment Model, Urban Bus, Service Quality, Perception and Expectation, Gap Analysis

1. Introduction

Utilizing public transportation as the main service to get around is considered a vital part of the solution to the country's economic and environmental challenges[1]. However, many of the major issues and problems revolving around the relationship between public satisfaction with the public transport has impeded further development and threatens Malaysia's ambition to become a high-income and a sustainable country [2]. Problems with public transport that are often raised by public in the newspapers mostly are unsatisfactory quality of

public bus service, i.e. the buses' journey schedules are inconsistent, excessive passengers crowding a single bus, bus trips are too long, the condition of the bus itself is not satisfactory, unreliable notice board, safety issues and so on. Besides that, quality of life and environmental concerns also deeply related to the effectiveness of the public transport system. Promoting public transport can reduce the usage of private vehicle and alleviate traffic congestion [3]. Population growth led to an increased use of private vehicles because it is hard to move freely amidst traffic congestion using public transport in urban areas [4]. Studies conducted by several environmental researchers have shown that the environmental problems have become increasingly challenging as population grows and private road vehicles increase in the city [5]. By using public transportation, air pollution, which harm human health for both short term and long term can be reduced [6].

Additionally, from observation, there were a lot of learning centers along the route studied (U43), such as Universiti Tun Abdul Razak, Binary University, Kolej Yayasan Felda, and many more. Hence, it is very important to study public perception towards public transport service in this area because young people especially, often raise the issue of satisfaction when using them in the city. Improving public transport may encourage young people to use this transit system as their main mode of transportation to reach their destination. Thus, issues of poor service quality of public transportation especially buses must be addressed by authority so they can provide a better and more comfortable service to attract the community and next generation to use public

transportation and at the same time raise the quality of life.

As such, the aim of this study is to determine the service quality for public bus transportation, focusing on U43 Rapid KL buses from Bandar Utama, Kuala Lumpur to Putrajaya Sentral and to determine the gap between passenger's perceptions and expectations. This gap study will highlight the relationship between public satisfaction in terms of transport with the quality of their lives and consequently display the key factors that affect the psychology of the people towards the service provided. Gap analysis shows that disparities exist between what the passenger experience and what they expect from the service provider. For that reason, the monitoring work for service quality gap and a robust action plan related to the gaps must always be a regular concern if service satisfaction is the aim of this effort.

2. Literature Review

Good service quality means meeting customers' expectation with the service provided. Quality is described as the difference between customer's perception and expectation [7]. In other words, service quality is measured based on the customer's expectation and perception towards the service delivered to them [8]. The SERVQUAL frequently serves as the main model used for measuring the service quality on public bus transport as demonstrated by a few researchers.

Past study by [9] in Kota Bharu, Kelantan revealed that passengers were not satisfied with the city bus service provided due to lack of punctuality (60.5%) and low in frequency (67.7%). In the same way, a research in Lembah Bujang, Kedah showed that users perception in terms of tangibles, reliability and responsiveness of the service of public transport differed greatly from the its ideal concept and the service quality dimension that influenced the service quality the most was the tangibles which focused on cleanliness and comfort of physical facilities [10]. Meanwhile, the research in Kuantan, Pahang shows that the reliability dimension which were punctuality and frequencies of the buses was the weakest among the five dimensions from SERVQUAL model [7].

Additionally, a research done in Jakarta, Indonesia shows that the researcher used the SERVQUAL model to determine the service quality and the five dimensions in this model are tangibles, reliability,

responsiveness, assurance and empathy. Past researchers mostly used the SERVQUAL model to determine service quality [11]. Different from SERVQUAL, TRANSQUAL model has a chain of service quality attributes that can be measured compare to SERVQUAL model. TRANSQUAL model have ten dimensions; accessibility, reliability, responsiveness, physical facilities, safety and security, understanding, environment, image, time, and fare. TRANSQUAL model is the modified concept introduced by [12], used as a mechanism to measure performance of public transport. Taking into account the necessity of consumer in the means of transport, a quantitative and qualitative study on the development of instrument scale for the sustainable assessment of travel experience was conducted. Hence, the presence of this figure makes it possible to make amendments in improving the performance of public transport services towards Sustainable Development Goal (SDG) [12]. As such, an efficient and comprehensive method to meet the social needs for public transportation service requires a logical approach to classify the gaps between social needs and services rendered [13].

3. Survey and Data Analysis

A survey focusing on 110 Rapid Kuala Lumpur respondents who frequently use or have the experience in using U43 Rapid KL buses was conducted using qualitative method and quantitative method. The study area was in Kuala Lumpur because it consists of one of highly urbanized intermodal infrastructure in Malaysia. The road selected starts from Bandar Utama, Kuala Lumpur and goes to Putrajaya Sentral that is a direct/straight route. There are various facilities along this road such as residential areas, shopping malls and learning centers. Among colleges near the route are First University College, UCSI College, KDU College, KBU College, Kolej Bandar Utama International College, Kolej Damansara Utama, Institut Pengurusan Wanita College, Murni International College and Aviation Management College Putrajaya Campus.

This study began with reading the information through printed media while at the same time incorporating qualitative and quantitative methodologies. Qualitative method includes observation and taking picture of the physical appearance and facilities provided on the buses and at the bus terminal [14]. Interview with the bus

operator, bus driver and bus passengers within the studied area was also conducted to get additional information. The quantitative methodology was applied by using questionnaire survey that was distributed to U43 Rapid KL buses' passengers. In this study, the TRANSQUAL models were used and the total ten dimensions were tested. They are accessibility, reliability, responsiveness, physical facilities, safety and security, understanding, environment, image, time, and fare. The analyzed data were carried on to the descriptive analysis, reliability analysis, factor analysis and gap analysis.

The data obtained from observation, interview and questionnaires were analyzed step by step using reliability analysis, factor analysis and gap analysis. Descriptive analysis assembled together respondents' demographic and the buses' routine while the factor analysis produced the result for KMO and Bartlett's Test, Extraction of Factor, Rotation of Factor and Factor Loading [11]. Factor Loading will determine which service quality among the 10 dimensions that is the most significant in this study. The gap between respondents' perceptions and expectations will be analyzed by using T- Test.

3.1 Demographic Analysis

In this study, the data was collected by using questionnaires survey for 110 respondents. Among the 110 respondents, it was found that the female respondents are more than male respondents; 63 of respondents are female (57.3%) while 47 of respondents are male (42.7%). In term of race, the largest percentage of respondents are occupied by Malay (36.4%), followed by Indian (33.6%), Chinese (27.3%) and other races (2.7%). Most of the respondents are unemployed, consisting students (60%), housewives (14.5%) and retirees (1.8%) while the rest are private employees (23.6%). Meanwhile, in response to the question on age, most of the respondent are youth with the age of 30 years old and below (70.9%), followed by the senior group in age range of 31-50 years (27.3%) and the smallest percentage which are over 50 years old (1.8%).

Most of them prefer to use public transports because of the cheaper fare. As most of the respondents are students, the percentage for individuals with no income is 76.4%. Respondents with income between RM 501 to RM 1000 made up 10.0% of the percentage and income between RM 1001 to RM 2000 made up 12.7%. 0.9% of the respondents has

income between RM 2001 to RM 4000. From this survey, it was found that 58.2% of the respondents do not have driving license while 41.8% have driving license. The percentage of respondents who do not have any vehicle is 69.1%, car owners is 21.8% and motorcycle is 9.1%. This is because most of the respondents were students who are below 30 years old. Majority of them have no income and they seem to live along the route. There are around ten colleges located nearby.

3.2 Bus Trip Characteristics

The analysis of bus trip characteristics is based on the questionnaires survey. For the first item 'how the respondent arrived at the bus stop' shows the most common way is by walking (37.3%), followed by being sent by someone (33.6%), driving (15.5%) and the smallest percentage of respondents take a bus to the other bus stop (10.9%). These results show that most people walk from One Utama shopping mall to One Utama bus terminal as it is very close. Based on observation, the students are mostly sent to Putrajaya Sentral or One Utama bus terminal by their parent(s). Next, the second item 'the distance access to the bus stop'. Distance less than 50 meter has the biggest percentage (75.5%). It shows that the bus stop is accessible and easier for people to reach it. In the distance between 51 to 200 meters and more than 401 meters, the percentage is 9.1%. For these distances, the respondents usually have someone send them there or change buses to reach the other bus stop. Most of the respondents wait for the bus for 16 to 20 minutes (46.4%), 22.7% wait for more than 20 minutes, 18.2% wait for 6 to 15 minutes and 12.7% wait between 1 to 5 minutes. Bus frequency (the frequency of bus coming to the bus stop), for the range of 21 to 30 minutes occupies the biggest percentage (60.0%), followed by 11 to 20 minutes (20.9%), 5 to 10 minutes (13.6%) and lastly, 31 to 40 minutes (5.5%). From observation and interview with the bus driver of U43 rapid KL, U43 Rapid KL bus comes every 30 minutes. Besides that, this survey shows that most of the respondents did not know the bus schedule (88.2%). They wait for the bus without knowing its schedule information. The remaining (11.8%) respondents know about the bus schedule because they often ride the bus.

As for the distance of one way travel, it is mostly 6 to 10 km (54.5%). For more than 15 km it is 18.2%, less than 5 km is 17.3% and 11 to 15 km is 10.0%. The most common time taken to commute using the bus is

between 21 to 40 minutes (31.8%). It shows that the respondents mostly use this route to travel long distances. Travel time at the range of 41 to 60 minutes made up 30.6%, more than 60 minutes made up 15.5% and less than 20 minutes made up 21.8%. Usually, most of the respondents (73.6%) do not change buses before arriving at the destination. However, a few respondents (17.3%) made bus change 1 time and 9.1% of respondents made bus change 2 times before arriving at the destination. From the analysis result, most of the respondents (40.9%) take the bus for sightseeing, 22.7% take the bus to commute to school, college or university while 21.8% use the bus to commute to workplace. The smallest percentage of respondents is 2.7% take the bus for shopping. Meanwhile, analysis of the frequency of travelling by bus in a week revealed 40.0% of respondents travel by bus only 1 to 2 times a week, 29.1% of them use the bus 5 to 6 times a week and 26.4% commute 3 to 4 times a week. The smallest percentage (4.5%) use the bus more than 6 times a week. Then, most of the respondents (66.4%) choose the bus as a mode of transportation because the fare is cheap while 26.4% chose bus because they are comfortable and easy to ride. 3.6% of the respondents do not have driver's license and 1.8% does not own vehicles.

The analysis found that most of the bus users took long journeys to go to college in order to avoid changing bus before arriving at the destination. For people who chose to travel short distances by bus, it is because the fare is very cheap compared to other mode of transportation, besides the fact that it is easier and more comfortable in the bus. Unfortunately, these individuals are not regular customers.

3.3 Results

Factor analysis is a one of the multivariate technique used to evaluate the correlation between observed variables so that the variables can be reduced and sorted into groups or dimensions [15]. The analysis starts by testing the reliability of the data by means of the Cronbach's Alpha in reliability statistics. Initial Cronbach's Alpha value for respondents' perceptions and expectation are 0.944 and 0.958 with 39 items respectively as shown in Table 1. This result is in the range of 0.8 to 0.95 which means it is high and satisfactory hence they are the items suitable to be used. Meanwhile, the final check for Cronbach's Alpha Reliability scale analysis was obtained after

some items were deleted. The Cronbach's Alpha value is 0.945 for respondents' perceptions and 0.954 for respondents' expectations. Both values are deemed satisfactory as it is within the acceptable range thus the items are suitable to be used [16].

Table 1: Initial and after of Reliability and Scale Statistics for Respondent's Perceptions and Expectations.

| | Reliability Statistic | | Scale Statistic | | |
|----------|-----------------------|------------|-----------------|----------|--------------------|
| | Cronbach's Alpha | N of items | Mean | Variance | Standard Deviation |
| P | 0.944 | 39 | 138.36 | 196.711 | 14.025 |
| E | 0.958 | 39 | 167.61 | 223.176 | 14.939 |
| P | 0.945 | 32 | 129.85 | 179.049 | 13.381 |
| E | 0.954 | 32 | 138.54 | 158.746 | 12.599 |

***P= Perception**

E= Expectation

Table 2 below shows the result of KMO Test for respondents' perceptions and expectations; 0.606 and 0.711 respectively. Both results of KMO Test show more than 0.5, thus this analysis is suitable for sorting out factor analysis. The result of Bartlett's Test for both respondents' perception and respondents' expectation shows P less than 0.001. Hence, the correlation between the items is good enough to do factor analysis [17].

Table 2. KMO and Bartlett's Test

| KMO and Bartlett's Test | | P | E |
|---|--------------------|----------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | | 0.606 | 0.764 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 5867.055 | 3910.443 |
| | df | 780 | 496 |
| | Sig. | 0.000 | 0.000 |

***P= Perception**

E= Expectation

Table 3 shows the factor loading for 5 strong factors from 10 factors in TRANSQUAL Model for respondents' perception. The highest factor is Environment (0.798) with 6 items, followed by Safety (0.776) with 9 items, Responsiveness (0.724) with 5 items, Physical Facilities (0.723) with 6 items and Reliability (0.671) with 6 items.

Table 3: Factor loading with 5 Factors and 32 Items for Respondent's Perceptions

| Dimension | Item | Factor loading |
|------------------------|---|----------------|
| Environment (0.798) | 52.Level of air pollution emissions from bus. | 0.881 |
| | 51.Level of traffic congestion | 0.865 |
| | 53.Level of noise produced by bus | |
| | 50.Level of temperature in the bus | 0.859 |
| | 48.Bus's cleanliness | 0.785 |
| | 49.Cleanliness of terminal and bus stop | 0.744 |
| | | 0.656 |
| Safety (0.776) | 37.Safety and visibility of the bus stop | 0.800 |
| | 46.Risk of accidents during the trip | 0.790 |
| | 43.Presence of police in the area | 0.764 |
| | 42.Personal safety from criminal dangers at terminal and bus stop | |
| | 33.Frequency of complaints from passengers | 0.750 |
| | 47.Drivers are competent and well-trained | 0.712 |
| | 45.Harassment risk from other passengers | |
| | 44.Adequate lighting to prevent crimes | 0.695 |
| | 28. Drivers are patient and follow the rules | |

| | | |
|--------------------------------|--|-------|
| | | 0.630 |
| | | 0.528 |
| | | 0.537 |
| Responsiveness (0.724) | 30.Immediate response to information inquiry from passengers | 0.830 |
| | 31.Accessibility to travel information | 0.799 |
| | 34.Using simple language to communicate with passengers | |
| | 32.Driver understands the passengers' needs | 0.653 |
| | 56.Foreign language proficiency level of the driver and company staff | 0.647 |
| | | 0.692 |
| Physical Facilities (0.723) | 40. Facilitation of ticketing system for passengers | 0.874 |
| | 38.Passenger-friendly bus design (easy for passengers to sit and ride the bus) | 0.809 |
| | 36.Facilities availability at bus stop | |
| | 39.Disabled-friendly (easy for them to board the bus and sit comfortably) | 0.716 |
| | 22.Distance from departure point to destination | |
| | 35.Facilities availability at the bus terminal | 0.708 |
| | | 0.651 |

| | | |
|------------------------|--|-------|
| | | 0.584 |
| Reliability (0.671) | 25. Reliability of bus timetable | 0.821 |
| | 26. Arrival of bus on schedule | |
| | 58. Time in the bus before arriving | 0.799 |
| | 24. Time of the bus interchange followed | 0.709 |
| | 27. Departure of bus on schedule | 0.592 |
| | 57. Time waiting for the bus | 0.568 |
| | | 0.542 |

For respondents' expectation, there are 5 factors and 32 items that are significant in this study area. Table 6 shows that the highest factor is Safety (0.719) with 6 items, followed by Physical Facility (0.719) with 6 items, Reliability (0.662) with 7 items, Environment (0.649) with 6 items and Responsiveness (0.634) with 5 items.

Nevertheless, based on the outcome of the factor analysis, the remaining items that have high correlation contribute to passengers' satisfaction; this fact must be taken into consideration when assessing the productiveness of service sector [12], [18]. In order to increase the productivity of public transport, there should be an assessment after using this result to reduce the gap between passengers' perceptions and expectations.

Table 4: Factor loading with 5 Factors and 32 Items for Respondents' Expectations

| Dimension | Item | Factor loading |
|-----------|---------------------------------------|----------------|
| | 46. Risk of accidents during the trip | 0.864 |

| | | |
|-------------|--|-------|
| | 45. Harassment risk from other passengers | 0.836 |
| Safety | 47. Drivers are competent and well-trained | 0.819 |
| (0.719) | 44. Adequate lighting to prevent crimes | 0.634 |
| | 43. Presence of police in the area | 0.632 |
| | 42. Personal safety from criminal dangers at a terminal and bus stop | 0.528 |
| | 24. Time of the bus interchange followed | 0.788 |
| Physical | 58. Time in the bus before arriving | 0.788 |
| Facility | 28. Drivers are patient and follow the rules | 0.766 |
| (0.719) | 26. Arrival of bus on schedule | 0.754 |
| | 57. Time waiting for the bus | 0.629 |
| | 25. Reliability of bus timetable | 0.587 |
| | 24. Time of the bus interchange followed | 0.794 |
| | 58. Time in the bus before arriving | 0.784 |
| Reliability | 28. Drivers are patient and follow the rules | 0.666 |
| (0.662) | 26. Arrival of bus on schedule | 0.653 |
| | 57. Time waiting for the bus | 0.617 |
| | 25. Reliability of bus timetable | 0.527 |
| | 27. Departure of bus on schedule | 0.596 |
| | 52. Level of air pollution emissions from bus. | 0.864 |
| | 53. Level of noise produced by bus | 0.759 |
| Environment | 51. Level of traffic congestion | 0.606 |
| (0.649) | 48. Bus's cleanliness | 0.578 |
| | 49. Cleanliness of terminal and bus stop | 0.563 |
| | 50. Level of temperature in the | 0.521 |

| | | |
|----------------|---|-------|
| | bus | |
| | 56.Foreign language proficiency level of the driver and company staff | 0.746 |
| Responsiveness | 31.Accessibility to travel information | 0.713 |
| (0.634) | 30.Immediate response to information inquiry from passengers | 0.601 |
| | 32.Driver understands the passengers' needs | 0.574 |
| | 34.Using simple language to communicate with passengers | 0.536 |

Gap analysis can be used as a monitoring aid for the stakeholders in public and private sector to improve the bus service quality according to the change in magnitude of the gap obtained. From Table 6, the highest gap among five factors is *Reliability* with the gap value of -1.254. This indicates that respondents are most dissatisfied in terms of reliability. The weak score is supported by the observation of the bus stop and terminal; the bus does not follow their schedule. Individual waiting for the ride always refer to the electronic time table that are located at the bus stop and at the bus terminals. However, the bus arrival time that is displayed at the electronic time table is not accurate at all, especially during peak hour. Based on the side survey at one of the bus stops along the route, it was found that the idle time is between 3 minutes to 15 minutes. Passengers feel that they were cheated by the timetable. Meanwhile, the indicators 'Personal safety from criminal danger while in the terminal and at the bus stop' and 'Presence of police and security officer in the area' were rated as dissatisfactory. The score is low and based on the observation along the route it was revealed that, there was no police or security personnel in the isolated area. The police and security are only available certain time at the terminal. Passengers are worried because of the possibility of criminal danger happening at any time, especially during early morning and late evening.

The second factor is *physical facility*, with the score of -0.771. The general perception of this aspect is moderate, but still does not meet passengers' expectation. Factor 'Facilities availability at bus stop'

is also supported by observation. Facilities provided at Bandar Utama, Kuala Lumpur Hub Bus are not enough, for example, no public phones and

toilets for commuters. Next, the factor 'Disabled-friendly and easy for them to board the bus (sit comfortably)'. The buses provided for this route is not disabled-friendly. It somewhat reduces the users' perception towards facility provided. In addition, the policy of bus operator to not give change during ticketing causes inconvenience for passengers.

Safety is the third lowest factor, receiving an overall score of -0.738. Passengers also expect bus operations to be free from the risk of accidents while travelling. 'The risk of accidents during travel' and 'Drivers are competent and well-trained' each earned a moderate score. These indicators require improvements in order to decrease the number of accidents on the road. Nevertheless, the survey found that security officers are always stationed at the Putrajaya bus terminal and the Bandar Utama bus hub, especially in the early morning and late evening to make passenger feel safe.

The fourth factor that is considered moderate is *environment* (-0.610). Based on open interviews with avid bus users, whereas, 'Level of noise pollution emitted by bus' and 'Level of air pollution emitted by bus' is graded as unsatisfactory by commuters. There were slight noise and air pollution at the bus terminal where buses assemble at the Putrajaya bus terminal. Based on the observations, there are many types of Rapid KL buses. Some of U43 buses use older model that is currently in the process of exchanging to new buses. Thus, the old model of bus pollutes the surrounding environment by emitting CO₂ gas. This air-polluting gas was noticed by the passengers. Besides that, the noise produced by the bus is annoying and uncomfortable for the passengers.

The last factor is *responsiveness* which obtains an overall score of -0.507. Indicator "Drivers'/operator's willingness to help when needed" obtained a moderate score. Interview sessions with some of the passengers claimed that most bus drivers are willing to help when asked. But the bus driver will not help if they need to exchange money to pay the bus fare. Certainly, passengers must provide the exact amount of money to pay the fare. The indicator 'Accessibility

to travel information (fare, schedule and maps)' and "Give quick feedback of information when needed by passenger" earned an average score. A survey of this bus route found facilities to be available at the information counter Putrajaya central bus terminal and main bus hub in the city. Passengers can obtain information by asking the clerk at the counter.

Table 5: Gap Analysis between Respondent's Perception and Expectation

| No. | Dimension | Gap | No. of item |
|-----|---------------------|--------|-------------|
| 1. | Reliability | -1.254 | 11 |
| 2. | Physical Facilities | -0.771 | 5 |
| 3. | Safety | -0.738 | 3 |
| 4. | Environment | -0.610 | 10 |
| 5. | Responsiveness | -0.507 | 6 |

4 Conclusion and Recommendations

In general, the results showed that demographic and bus trip characteristics influence the satisfaction level among the passengers. The bus trip characteristics, which include how passenger arrive at the bus stop, access distance to the bus stop, waiting time, travel time, frequency of bus, bus schedule are presented as significant angles in evaluating the effectiveness of bus services. From the demographic profile, it was found that the main patrons of the service are from the low-income category. This is because buses are more economical when it comes to the fare. The fares may be under the control of a local government subsidiary. Hence, it is more affordable. As demonstrated above, the significance of service quality was thoroughly examined and studied in order to make further improvements to the current bus service. From the service quality study, it can be concluded that some of the services that are provided by U43 Rapid KL buses are unsatisfactory. Based on the result of factor analysis, there are 5 factors and 32 items which are significant from the 10 factors and 39 items in this study area. These 5 factors are

Environment, Reliability, Responsiveness, Physical Facilities and Safety.

Measuring the gap of service quality of U43 Rapid KL is the step used to improve the bus service quality according to the differences between respondents' perception and respondents' expectation [7]. The result shows that if the respondents' perception is lower than respondents' expectation it will be considered as a poor service quality and vice versa. From all 5 significant factors, the most unsatisfied factor rated by respondents is Reliability with 5 items and gap value of -1.254. Reliability means punctuality and frequency of the buses; whether the buses are following their schedule or not [19]. The highest gap shows the item 'bus timetable' to be unreliable. It can be concluded that the reliability quality of bus timetable is the most unsatisfactory factor/element according to respondents. From observations, sometimes the bus drivers do not adhere to bus schedules because only a few passengers ride the bus at the bus station. The bus driver has to wait until the bus full of passengers before departure. Unfortunately, most passengers are not happy with this situation and they felt unsatisfied with these services.

A few appropriate recommendations are suggested to improve the shortcomings of current service. The most important step is improving traffic on this route by providing dedicated bus lanes at congested area. The bus lane will improve the punctuality and frequency of the bus and at the same time can improve time of travel. Besides that, the bus driver should be given periodic training to improve their self-confidence. As dedicated drivers, they can respond immediately in the event of emergencies, and give information requested by the passengers. In addition, the utilities inside the bus should be maintained and checked regularly before starting its service every day to ensure it functions well. The bus should be in a good condition, especially the touch and go ticketing system. Furthermore, it is crucial that the security at bus terminal and bus stop is monitored and maintained by the service provider. Installing the closed-circuit television (CCTV) and adequate lighting can improve security level thus, reduce the chances of crime happening.

In short, these factors must be taken into account during improvement efforts so more people will use buses. This is also to upgrade the quality of service for regular public transport users. The findings suggest that improving service quality and promoting awareness while maintaining low fares are extra effective in increasing the usage of public buses. Hopefully, with all suggestions above, it could help attract people to use public transportation as their main mode of transport.

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References

- [1] I. Silva Cruz and T. Katz-Gerro, "Urban public transport companies and strategies to promote sustainable consumption practices," *J. Clean. Prod.*, vol. 123, pp. 28–33, 2016.
- [2] The World Bank, "Malaysia Economic Monitor: Transforming Urban Transport," Kuala Lumpur, 2015.
- [3] A. S. I. Almselati, "An Overview of Urban Transport in Malaysia," 2011.
- [4] L. Eboli and G. Mazzulla, "Willingness-to-pay of public transport users for improvement in service quality," vol. 38, pp. 107–118, 2008.
- [5] C. Kamga and M. A. Yazici, "Achieving environmental sustainability beyond technological improvements: Potential role of high-speed rail in the United States of America," *Transp. Res. Part D Transp. Environ.*, vol. 31, pp. 148–164, 2014.
- [6] H. C. Ong, T. M. I. Mahlia, and H. H. Masjuki, "A review on emissions and mitigation strategies for road transport in Malaysia," *Renew. Sustain. Energy Rev.*, vol. 15, no. 8, pp. 3516–3522, 2011.
- [7] L. Yao, F. Siali, M. Ridzuan, B. Darun, and M. F. Ismail, "Service Quality and Customer Satisfaction: Rapid Kuantan in Kuantan Route , Malaysia," no. September, pp. 6–12, 2014.
- [8] S. Sumaedi, I. G. Mahatma, Y. Bakti, and M. Yarmen, "The Empirical Study Of Public Transport Passengers ' Behavioral Intentions : The Roles Of Service Quality , Perceived Sacrifice , Perceived Value , And Satisfaction (Case Study : Paratransit Passengers In Jakarta , Indonesia)," *Int. J. Traffic Transp. Eng.*, vol. 2, no. 1, pp. 83–97, 2012.
- [9] M. Napiyah and N. Yaakub, "Preliminary Assessment On Reliability of Public Bus Service in Kota Bahru," *Malaysian Unversities Transp. Res. Forum Conf.*, vol. 2010, no. December, pp. 49–58, 2010.
- [10] Z. Zakaria, Z. H. Hussin, M. Fajil, A. Batau, and Z. Zakaria, "Service Quality of Malaysian Public Transports ;," *Cross-cultural Commun.*, vol. 6, no. 2, pp. 84–92, 2010.
- [11] A. Parasuraman, V. Zeithaml, and L. Berry, "SERVQUAL : A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality," *J. Retail.*, vol. 64, no. 1, pp. 12–40, 1988.
- [12] S. Haron, S. Noor, and F. Sadullah, "New Dimension of Bus Service Quality Performance Measure," in *Proceedings of International Conference on Advances in Civil and Environmental Engineering (ACEE 2015)*, 2015, no. July, p. F-54.
- [13] G. Currie, "Quantifying spatial gaps in public transport supply based on social needs," *J. Transp. Geogr.*, vol. 18, no. 1, pp. 31–41, 2010.
- [14] S. K. Ribeiro, S. Kobayashi, and M. Beuthe, "Transport and its infrastructure," *Clim. Chang. 2007 Mitigation. Contrib. Work. Gr. III to Fourth Assess. Rep. Intergov. Panel Clim. Chang.*, pp. 324–386, 2007.
- [15] S. Jomnonkwao and V. Ratanavaraha, "Measurement modelling of the perceived service quality of a sightseeing bus service: An application of hierarchical confirmatory factor analysis," *Transp. Policy*, vol. 45, pp. 240–252, 2016.
- [16] A. Field, *Discovering Statistics Using SPSS*, Third Edit. Los Angeles: SAGE, 2009.
- [17] A. Field, *Factor Analysis Using SPSS*, vol. 8057. 2005.
- [18] S. Haron, I. Zainuddin, and S. Azman, "Factors Affecting Service Quality of Rapid Penang Bus Operation and Passenger

Satisfaction,” *Proc. Int. Conf. Adv. Civ. Environ. Eng.*, no. July, 2015.

- [19] R. Kamaruddin, I. Osman, and C. A. C. Pei, “Public Transport Services in Klang Valley: Customer Expectations and Its Relationship Using SEM,” *Procedia - Soc. Behav. Sci.*, vol. 36, no. June 2011, pp. 431–438, 2012.