

# Quality Approach on Strengthening Rapid Penang Services in Penang Tourism Sites

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**Abstract.** The effectiveness and efficiency of the public transport system is fundamental to the sustainable development of the country. In Malaysia, Penang is an example of a tourist destination with many attractions, particularly cultural attractions and heritage sites. Nowadays, most people refuse to use public transport because of the inefficient service performance and low quality of existing services that can contribute to traffic congestion and pollution. The main objective of this study was to identify Rapid Penang service performance. Two different routes had been selected, namely U101 and U104. In this study, 100 respondents among Rapid Penang users for each route were involved in the survey questionnaire. Both qualitative and quantitative methods were used to measure the performance of Rapid Penang buses on the routes chosen. The initial finding from the observation shows that the respondents' contribution is significant and more than half of the respondents are school or university students. In terms of the service quality results, there are 7 dimensions and 29 indicators that are found to be significant for route U101, while for route U104, it is slightly the same, with 7 dimensions and 31 indicators. They were used to measure the performance of public bus transportation services. The results show that the 7 dimensions observed for both routes were accessibility, reliability, understanding the needs, physical facilities, safety and security, environment and image. This finding will enhance our understanding of the issue and it will help the stakeholders and any agency involved to improve the effectiveness and efficiency of their bus services for the development of urban transport in Georgetown, Penang.

Keywords: Public bus transport, Service quality and performance, Quality approach, TRANSQUAL model, Penang tourism sites.

## INTRODUCTION

Nowadays, many regions in the world are progressing towards urbanized city where the city undergoes rapid development in socio-economic activities which then bears economic loss due to traffic problems. Therefore, an effective and operative system of public transport service has become the necessity for all developing countries. Public transportation is characterized as transportation that serves as special transport, which continually assists people to reach the destination [1].

Public bus transportation service offers a lot of benefits compared to the other mode of public transportation services that the people can access, for example, efficient, less accidents rate, low energy utilization, as well as large capacity. According to Abdullah and Talip, 2013 [2], past researchers found that the satisfaction of passengers can influence themselves in their bus preference as their main mode of public transportation. In order to satisfy and encourage people to use public bus transport as their main transport as well as to support the development of a sustainable country and reduce traffic congestion, service performance of the public bus transport should be provided with high level of travel services [3].

According to Haron et al., 2015 [4] in their study on service quality of Rapid Penang, it was found that the service performance level of Rapid Penang in Seberang Perai, Pulau Pinang is moderate. Thus, this study still

focuses on the Rapid Penang service performance, but it was conducted at different areas around Georgetown, Penang. The efficiency of service performance of public bus transport (Rapid Penang) was measured to attract people to use public bus as their main mode of public transportation in Georgetown, Penang [4]. Identifying the bus characteristics of service performance is the aim of this study in order to satisfy and encourage people to use public bus transport. Several parameters that lead to the improvement of the public bus transport were determined. From the observation, routes selection in this study focused on the North Channel of Penang Island which starts from Weld Quay to Tanjung Bungah (U104) and Weld Quay to Teluk Bahang (U101). Routes were selected based on the tourist attraction area to encourage the local and foreign people to use public bus.

The proposed coil setup which detects the breast tumor consist of an excitation coil and a detecting coil of the same radius,  $Z$  separated by a distance,  $D$  where  $Z \ll D$  resembling a tightly coupled coil system as shown in Fig.1. Workstation for the simulation works consists of a Dell Inspiron PC with i5 processor and 8GB RAM. In Comsol, triangular mesh with linear and iterative type of solver was used. The default solver relative tolerance is 0.001.

## LITERATURE REVIEW

According to Eboli et al., 2012[5], a performance indicator is more precisely a performance of measure that is used to verify progress towards the goal and to observe performance. Performance indicator has three categories [6]. General performance indicator as the first category such as the passengers trip, vehicles kilometres and hours, and so on. The second category is the effectiveness measures such as service supply, service quality, and availability whereas the third category is the efficiency measures such as operating ratios, cost efficiency, labour productivity, and so on. According to Litman, 2009 [7], a performance indicator can be divided into three types: measures of service quality which produce user's experience regarding the service quality; outcomes indicator which produces outcome or outputs; and cost efficiency indicator which produces ratio of inputs (cost) to outputs (desired benefits). Based on a study conducted by Transportation Research Board, 2003 [8], customer's point of view is the real performance indicator to evaluate the service performance.

TRANSQUAL model aims to get a set of performance indicators was used as a basis for measuring the performance of the buses in this study area. TRANSQUAL model was presented by Haron et al., 2015 [9] where its function is to measure the performance of public transport. SERVQUAL model invented by Parasuraman et al. (1985) [10] were modified as TRANSQUAL model and focus more on public transportation attributes which aligned with the service quality measure. The researcher proposed new sets of dimensions which are accessibility, reliability, responsiveness, understanding, physical facilities, safety and security, environment, image, time, and fare. All the proposed dimensions were used in designing the questionnaire for this study.

## METHODOLOGY

An observation was conducted at the bus stops and bus stations for the selected routes. From the observation, bus and road characteristics, environment, routes, and fares were determined. Interviews were carried out and photographs were taken to provide enough evidence. At each routes, surveys focusing on 100 respondents [10] of Rapid Penang who mainly use and have the experience in using the public bus transport on both routes were conducted using the qualitative and quantitative approaches. Both routes were selected based on the tourist attraction area. The routes were located around residential areas, tourism areas, and shopping mall areas. The targeted respondents are in the range of 13 to 60 years old who live in Penang. The chosen range of age is because people at these ages have the behaviour of routine travelling by using the public bus transport as their main transport mode.

The process of this study began with identifying the issues of the community towards the public transport especially buses in Georgetown, Penang. The issues were identified through newspapers and the Internet. Then, public interviews were conducted involving public transport users. After all the issues were identified, a study on literature was done to identify the solutions of the issues. Based on the performance indicator of public bus that was identified, the method and research strategy can be determined. The TRANSQUAL model has been used in designing the questionnaire for this study. The questionnaires were distributed randomly to the public surrounding route U101 and U104. The data collected was transferred and analysed by carrying out reliability analysis and descriptive analysis to determine the reliability and validity issues towards the research sample.

## RESULTS AND ANALYSIS

The purpose of this study was to identify the Rapid Penang bus service performance. A further investigation was done to measure whether demographic variables such as gender, age, occupation, and vehicle license ownership affect this bus service performance. These services include bus reliable timetable, bus image, cleanliness, air pollution, ticketing system, the accessibility for the disabled or OKU (*Orang Kurang Upaya*), as well as safety and security. Public infrastructures and facilities such as bus terminals, bus stops, and pedestrian walkways are also important in providing good infrastructures which can lead to passengers' satisfaction. From the observations, it was found that improvement and regular maintenance of some facilities should be done in order to increase users' attraction.

### Demographic Analysis

A total of 100 respondents for each route were involved in this research. According to the result, the majority of respondents were female for Route U101 and Route U104 in which the female respondents (58% and 60%) were more than male respondents. However, the highest numbers of respondents according to their race are the Malay (64%), followed by Chinese (30%), Indian (10%), and other races (6%) for Route U101. Meanwhile, for Route U104, the highest number of respondents are dominated by the Chinese (34%), followed by Malay (30%), Indian (22%), and other races (14%).

In response to the question on the age, it was found that the age below 18 years old (62%) scored the highest, followed by the age between 18 to 29 years old (34%), and the lowest score is between the age 30 to 45 years old (4%) for Route U101. Meanwhile, for Route U104, the highest score is the age range of 18 to 29 years old (48%), followed by the age below 18 years old (46%), and the age between 30 to 45 years old (4%). The lowest score is the age range of 46 to 60 years old (2%).

Regarding the occupation group, it appears that the students from school and university dominated the other employment status with 80%. This is followed by 16% from the government sector and 4% of the respondents are from the private sector for Route U101. For Route U104, 74% of the respondents are students also from the school and university, followed by 18% of the respondents who have their own business, and 4% of the respondents are from the government sector. Those who were from the private sector and have housewife status made up of 2% respectively.

Based on the data collection, for Route U101, 78% of the respondents do not have any income. Those with the income below than RM500 scored 12% and the respondents with the income range between RM501 to RM1000 scored 10%. Meanwhile for Route U104, 74% of the respondents do not have any income followed by the income below than RM500 scored 18%. The respondents with the income range between RM501 to RM1000 scored 8%.

Furthermore, most of the respondents (86%) do not have a vehicle license especially the students who are using the public bus transport for both routes. For vehicle ownership, 92% of the respondents do not have a vehicle and 8% of the respondents have a motorbike for Route U101. Meanwhile, 96% of the respondents do not have a vehicle and 4% of the respondents have a motorbike for Route U104.

### Service Performance Analysis

The evaluation of bus service performance was done to determine the potential variables in evaluating the performance of the existing public transportation service for Route U101 and U104 respectively. The indicator was identified based on the scale of importance for each variable. The data collected will further strengthen the service quality analysis.

From the observation, most of the respondents reached the first bus stop by walking are 54% for Route U101 and 64% for Route U104. Therefore, the facilities along the road before the respondents reached to the bus stop should be improved and maintained in order to make sure they are safe and comfortable.

Bus schedule is one of the important parameters to measure the level of bus performance. This study has shown that 52% of the respondents did not know the bus schedule and only 48% of the respondents knew the bus schedule for Route U101, but for Route U104, the data collected is vice versa with Route U101. This shows that not all respondents were aware of their bus schedule.

Buses take a longer time than scheduled due to certain traffic conditions such as congestions, accidents, environment (heavy rain), and other reasons [9]. Most of the respondents said that they only have to wait around 6

to 15 minutes for the bus to arrive. It can be seen that 54% and 52% were recorded for Route U101 and U104. This notifies that there are sufficient buses to pick up the passengers at the bus stop. The lowest percentage was recorded is 6% for waiting time of more than 20 minutes for Route U101 and 14% for Route U104.

From the data collection, the highest bus frequency is about 5 to 10 minutes involving 58% for Route U101 and 48% for Route U104. The lowest bus frequency is about more than 50 minutes for a bus arrival or departure at a bus station or bus stop involving 2% for both routes. This shows that bus frequency at both routes are satisfactory and some data were recorded for more than 30 minutes maybe due to some factors such as congestions, accidents or other reasons.

For the characteristics of the respondents' time on the bus, it shows that respondents who take about 21 to 40 minutes on the bus, hold the major percentages as recorded (58%) for Route U101 and (52%) for Route U104. Based on user perception, it can be concluded that the respondents' time on the bus is satisfying because the respondents' time on the bus for more than 40 minutes is less than 8%, assumed as unsatisfactory.

### Service Quality Analysis

Early analysis result shown in **TABLE 1** indicates a Cronbach's alpha equals to 0.949 for Route U101 and 0.942 for Route U104. As suggested, the value that exceeds 0.9 is the best. However, 0.8 has already fulfilled the acceptable needed value [11]. The result shows that the reliability of data is higher and can be followed with KMO and Bartlett's test.

*Table 1. Initial Test for Overall Cronbach's Alpha Reliability Scale*

<b>Reliability Statistics</b>			
Route	Cronbach's Alpha	Cronbach's Alpha based on Standardized Items	N of Items
U101	0.949	0.949	40
U104	0.942	0.942	40
<b>Scale Statistics</b>			
	Mean	Variance	Standard Deviation
U101	139.76	555.043	23.559
U104	139.76	373.370	19.323

Based on the analysis in **TABLE 2**, it is found that Kaiser-Meyer-Olkin (KMO) values for Route U101 and U104 are equal to 0.662 and 0.613. Meanwhile, the Bartlett's Test shows the value of  $p < 0.001$  for both routes. Thus, the research data are appropriate using the factor analysis application [11].

*Table 2. KMO and Bartlett's Test*

<b>KMO and Bartlett's Test</b>		<b>Route U101</b>	<b>Route U104</b>
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.662	0.613
Bartlett's Test of Sphericity	Approx. Chi-Square	1333.189	1377.653
	df	406	465
	Sig.	0.000	0.000

**TABLE 3** shows the final Cronbach's Alpha Reliability scale analysis on the whole data. The Cronbach's Alpha value equals to 0.946 for Route U101, while 0.931 for Route U104 indicates a high internal consistency on the overall scale [11].

*Table 3. Final Test for Overall Cronbach's Alpha Reliability Scale*

<b>Reliability Statistics</b>			
Route	Cronbach's Alpha	Cronbach's Alpha based on Standardized Items	N of Items
U101	0.946	0.946	29
U104	0.931	0.931	31
<b>Scale Statistics</b>			
	Mean	Variance	Standard Deviation
U101	103.46	285.968	16.911

U104	103.10	227.031	15.068
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A set of performance indicators was analysed through this study. As a result, there are 7 dimensions with 29 indicators found on Route U101, while 7 dimensions with 31 indicators were found on Route U104. **TABLE 4** and **TABLE 5** show the average load factor for each dimension at both routes.

*Table 4. Final Scale of 7 Dimensions with 29 Indicators (Route U101)*

<b>Dimension</b>	<b>Item</b>	<b>Factor Loading</b>
<b>Reliability</b> (0.814)	Bus departs on schedule	0.850
	Bus arrives on schedule	0.809
	Bus reliable timetable	0.783
<b>Image</b> (0.780)	Enhance bus image through ad & promotion	0.844
	The bus company's image	0.829
	Driver's proficiency in foreign language	0.693
<b>Accessibility</b> (0.765)	Internal and external bus cleanliness	0.553
	Distance access from home to the bus stop	0.889
	Distance access from origin to destination	0.838
	Bus interchange situation to reach destination	0.724
<b>Understanding</b> (0.700)	Bus interchange time	0.607
	Use simple language with passenger	0.814
	Respond quickly to the information required by passenger	0.793
	Ready to listen to complaints from passenger	0.654
	Driver follows rules, is patient and courteous	0.649
<b>Environment</b> (0.699)	Driver/company is willing to provide assistance when needed	0.589
	Level of noise produced by the bus	0.813
	Level of air pollution due to bus emissions	0.795
	Adequate lighting to prevent crime in the area	0.791
	The risk of interference from other passenger in the bus	0.644
<b>Physical Facilities</b> (0.687)	Personal safety from crime/danger at the bus terminal and bus stop	0.582
	The presence of police and security in the area	0.569
	Design of bus facilitates the passengers to sit comfortably	0.756
	Amenities at the bus stop	0.737
<b>Safety &amp; Security</b> (0.681)	Amenities at the bus terminal	0.661
	Ticketing system to facilitate passenger	0.594
	Prudent driver (trained & competent)	0.785
	The bus stop is safe and easily identifiable	0.679
	Risk of accidents during the journey	0.578

*Table 5. Final Scale of 7 Dimensions with 31 Indicators (Route U104)*

<b>Dimension</b>	<b>Item</b>	<b>Factor Loading</b>
<b>Accessibility</b> (0.820)	Distance access from origin to destination	0.856
	Distance access from home to the bus stop	0.839
	Bus interchange situation to reach destination	0.794
	Bus interchange time	0.790
<b>Image</b> (0.778)	The bus company's image	0.812
	Enhance bus image through ad and promotion	0.744
<b>Reliability</b> (0.751)	Bus departs on schedule	0.800
	Bus arrives on schedule	0.785
	Driver follows rules, is patient and courteous	0.740
	Bus reliable timetable	0.720
	Ready to listen to complaints from passenger	0.711

<b>Understanding (0.700)</b>	Level of air pollution due to bus emissions	0.881
	Driver/company knows the requirements/needs of the passenger	0.849
	Level of noise produced by the bus	0.780
<b>Environment (0.699)</b>	Driver's proficiency in foreign language	0.587
	Hygiene at the terminal and bus stop	0.829
	Prudent driver (trained and competent)	0.795
	Internal and external bus cleanliness	0.639
	Time waiting for the bus	0.626
<b>Physical Facilities (0.687)</b>	Risk of accidents during the journey	0.588
	Design of bus facilitates the ride for the disabled	0.838
	Design of bus facilitates the passengers to sit comfortably	0.836
	Ticketing system to facilitate passenger	0.811
	Amenities at the bus terminal	0.730
	Amenities at the bus stop	0.710
	Easy to obtain travel information	0.669
<b>Safety &amp; Security (0.681)</b>	The bus stop is safe and easily identifiable	0.587
	Adequate lighting to prevent crime in the area	0.756
	Personal safety from crime/danger at the bus terminal and bus stop	0.740
	The risk of interference from other passenger in the bus	0.624
	The presence of police and security in the area	0.614

The higher loading shows the strong level of agreement and the lower is the less agreement of respondent data. For Route U101, the results show that reliability obtained factor scored the highest value (0.814), followed by image (0.780), accessibility (0.765), understanding (0.700), environment (0.699), physical facilities (0.687), and the lowest is the safety and security (0.681). Meanwhile, for Route U104, accessibility shows the highest value (0.820), followed by image (0.778), reliability (0.751), and understanding, environment, physical facilities, as well as safety and security recorded the same value as Route U101. Based on the observation, it can be seen that respondents from Route U101 are more satisfied in the bus reliability compared to the respondents from Route U104. Most of the respondents from Route U104 complained about the unreliability of the bus schedule. Moreover, respondents from Route U104 felt satisfied with the distance that they are travelling compared to the respondents from Route U101 due to the higher factor loading in accessibility.

## CONCLUSION AND RECOMMENDATION

The results from the factor analysis show that 7 dimensions with variables items for both routes are significant in the area of study and the top three factor scores are reliability, image, and accessibility. From the observation, there are insufficient securities inside the bus, making passengers especially women feel uncomfortable to use public buses because they are exposed to interference by other passengers in the bus. Lack of monitoring from the police at the terminal also makes passengers feel unsafe and uncomfortable because they are exposed to crime at the bus terminal such as pickpocketing. Besides, it was found that insufficient maintenance of some facilities at the bus stop and bus terminal makes passengers feel unsafe and insecure especially for the disabled or OKU passengers.

The level of security especially inside the bus should be improved by providing adequate lighting, security guards, as well as installing the CCTV to avoid interference by other passengers in the bus. Besides, the level of security at the bus terminal as well as at the bus stops also requires improvement by providing police monitoring to avoid crime such as pickpocketing. Moreover, improvement and regular maintenance of some facilities at the bus stop and bus terminal should be done in order to make sure passengers feel safe and secure especially for the disabled or OKU passengers. An increase of the disabled facilities is required to provide easy access to the disabled passengers. Moreover, the image of Rapid Penang buses should be improved by conducting campaigns so as to expose the benefits that the passengers can gain from using the public bus transport.

Improvement towards the performance of public transport provided in Penang tourism sites can be made based on the results of observation. It's will be the guidance document for respective parties or the government to enhance the good and safe public bus transport service for the customers which can provide benefits to public transportation

agencies in Malaysia to improve their operation and the image in the eyes of local and international customers. With the excellent service provided by the public bus transport specifically, it will slowly encourage the customers to use the public bus transport as their main mode of transportation in reaching to their desired destinations without any problem or trouble. Besides, it can also help in reducing the frequency of traffic congestion and pollution in Penang tourism sites and also can keep energy efficiency away from the transport sector for more economical and environment-friendly of Penang.

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