SERVICE FREQUENCY AND SERVICE HOURS EVALUATION FOR BUS SERVICE IN WEST KLANG VALLEY

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Shuhairy Norhisham[1, 2]**, Muhammad Fadhlullah Abu Bakar**[1]**, Zainul Hazwani Abd Samad**[1]**, Agusril Syamsir**[1,2]**, Nur'atiah Zaini**[1]**, Herda Yati Katman**[1]**, Mohd Zakwan Ramli**[1]

[1]College of Engineering, Universiti Tenaga Nasional, 43000 Kajang, Selangor, Malaysia.
[2] Institute Of Energy Infrastructures (IEI), Universiti Tenaga Nasional, 43000 Kajang, Selangor, Malaysia.
*Corresponding author's email: Shuhairy@uniten.edu.my

Abstract. The Malaysian government has taken an initiative to mitigate public transport issues in the Klang Valley through the Land Public Transport Commission (SPAD). Several issues were raised by passengers in Klang Valley in regard to public transport, such as long waiting time and poor management of bus service hours. This study is aimed to investigate the service frequency for bus service performance and the public bus service hours in Klang Valley. Five different areas were selected, which consisted of three routes for each area in west Klang Valley, which were Klang, Shah Alam, Subang Jaya, Petaling Jaya, and Puchong. The time interval for every scheduled bus departure, average time interval, and bus service hours were determined based on the collected data. The result showed that Puchong has the shortest average time interval for service quality. Therefore, the bus performance with regard to service frequency and service hours should be improved to provide the public with better service.

1. Introduction

In 2010, less than 20% or approximately 1.24 million daily trips in Klang Valley used the public transport [3]. RapidKL is the major bus company that operates in urban areas of Klang Valley. It is a service brand operated by Prasarana Malaysia. The Klang Valley Network Revamp was established by the Land Public Transport Commission (SPAD) in December 2015 [2]. Other bus operators include Metrobus, Selangor Omnibus, Len Seng, Transnasional/*Kenderaan* Klang-Banting, Triton, and Permata Kiara, which are operated by Intrakota and Cityliner [4]. Another new addition to the Klang Valley bus services are the 120 RapidKL buses, which include 40 double-deckers that hit the Klang Valley streets in September. These RapidKL buses are capable of picking up an additional of 10,000 passengers a day when they operatinalise .The buses, especially the double-deckers, are expected to service the region's most heavily-used roads [7, 5].

All public transport modes, have several attributes that will affect the service performance. Bus service performance can be defined by several attributes, such as service hour, service frequency, and passenger load factor [11, 20]. These common attributes will determine factors on comfort and convenience that contribute to passenger satisfaction with the service and their likelihood to use it. Another factor that contributes to the bus frequency issue is the unpredictable traffic condition in the Klang Valley [4, 9]. It could be a major factor that cause a delay in service frequency and time travel to arrive at a selected distance. In this context, RapidKL have suggested to the authorities to provide bus lanes to show its support for public transport service. The unpredictable movements of public transport modes have caused difficulty for the public to plan their journeys effectively [10, 12].

In addition, passengers in the Klang Valley are plagued with numerous problems, such as long waiting time (service frequency), overcrowding, especially during peak hours (passenger load factor), and poor management of bus service hours, which will cause delays (service hour) [1, 14]. The issues should be able to identify why bus services in Klang Valley have poor performance. On the other hand, the service quality, particularly in service frequency [14], service hours, and passenger load factors, is at a satisfactory level [15]. Low frequencies also cause difficulty to fit transit trips into the activity time schedules that are carried out at different locations, and thus, may be an important impediment to the use of public transport [6, 8].

The hour or time of study is vital as the most crucial or peak hours of the day should be chosen to obtain the most critical results as possible in order to determine the quality of service (QOS) of a transit system [11]. A research conducted by Universiti Sains Malaysia on vehicles at signalised intersections was reviewed. Furthermore, the data collection time period was divided into three peak hours per day, which were morning (7.30am - 9.30am), afternoon (12.00pm-2.00pm), and evening (4.30pm-6.30pm) [19]. The real-time bus information for a particular area is provided by a bus service application that can be downloaded onto a smartphone. Therefore, it is much easier as identified the real-time bus information and its location as well [16]. In this study the service frequency for bus service performance and the service hours of public bus will be evaluated.

2. Methodology

Data collection was conducted at selected RapidKL bus routes. The total capacity for RapidKL bus is 65 passengers, who consists of 25 comfortable sitting and 40 standing passengers. A bus schedule timetable was used to determine the service frequency and evaluate the average time for bus departure time interval. The bus schedule timetable was obtained from RapidKL bus counter at the station where the route began. Five different areas were selected, which consisted of 3 routes for each area in west Klang Valley. The routes were Klang (Routes KLG1, KLG2 and 704), Shah Alam (Routes T757, T758 and SA01), Subang Jaya (Routes T776, T777 and T778), Petaling Jaya (Routes PJ02, PJ03 and PJ04), and Puchong (Routes T600, T604 and T605). These areas have been selected as study areas because these cities could be considered as major cities in West Klang Valley. All the necessary information regarding schedule of bus service in these study areas could be obtained from bus counter at the station where the route begins. Table 1 shows the QOS for service frequency and classifies the quality of service based on average departure time interval.

Table 1: Quality of service (QOS) for service frequency
(Sources: *Transit Capacity and Quality of Service Manual* [18]).

Quality of Service	Average Departure Interval (min)	Comments
A	<10	Passengers do not require schedules
B	10 – 14	Frequent services, passengers consult schedules
C	15 – 20	Maximum desirable time to wait if a bus is missed
D	21 – 30	Service unattractive to choice riders
E	31 – 60	Service available during the hours
F	>60	Service unattractive to all riders

The bus service hours for a particular route can be obtained from the service operator and it will be considered from the first service trip until the last service trip. It can also be obtained from the website, which is updated by the Land Public Transport Commission (SPAD) for Puchong (Route T600, T604, T605, T601, T602, T603, SJ03), Petaling Jaya (Route PJ02, PJ03, PJ04, Citra Mall,

Paradigm Mall, PJ01, T780, T781, T782, T783, T784, T785, T786, T787, 802, T800), Subang Jaya (Route T776, T777, T778, SJ01), Shah Alam (Route T757, T758, SA01, T771, 754, T750, T751, T752, T753, T754, T756, SA03, SA04, SA05), and Klang (Route KLG1, KLG2, 704, T710, T712, T709, T713, T700, T701, T702, T703, T707), respectively, and service hours were recorded. Hence, by comparing the service hours between service operators, the service performance quality can be obtained, as shown in Table 2. The results are presented in a graph to compare all QOSs in every route and a QOS summary for the 3 routes in each five areas was concluded.

Table 2: Quality of services (QOS) for service hours
(Sources: Transit capacity and quality of service manual [18]).

Quality of Services	Service Hours	Comments
A	19 - 24	Night or "owl" service provided
B	17 - 18	Late evening service provided
C	14 - 16	Early evening service provided
D	12 - 13	Daytime service provided
E	4 - 11	Only peak hour service or limited mid-day service
F	0 - 3	Very limited or no service

3. Result and Analysis

The data for service frequency were collected for each selected route in each location. All data are summarised in Figure 1. The three routes, which are from Klang (Route KLG1, KLG2 and 704), Shah Alam (Route T757, T758 and SA01), Subang Jaya (Route T776, T777 and T778), Petaling Jaya (Route PJ02, PJ03 and PJ04), and Puchong (Route T600, T604 and T605), were presented as RouteA, Route B, and Route C, respectively.
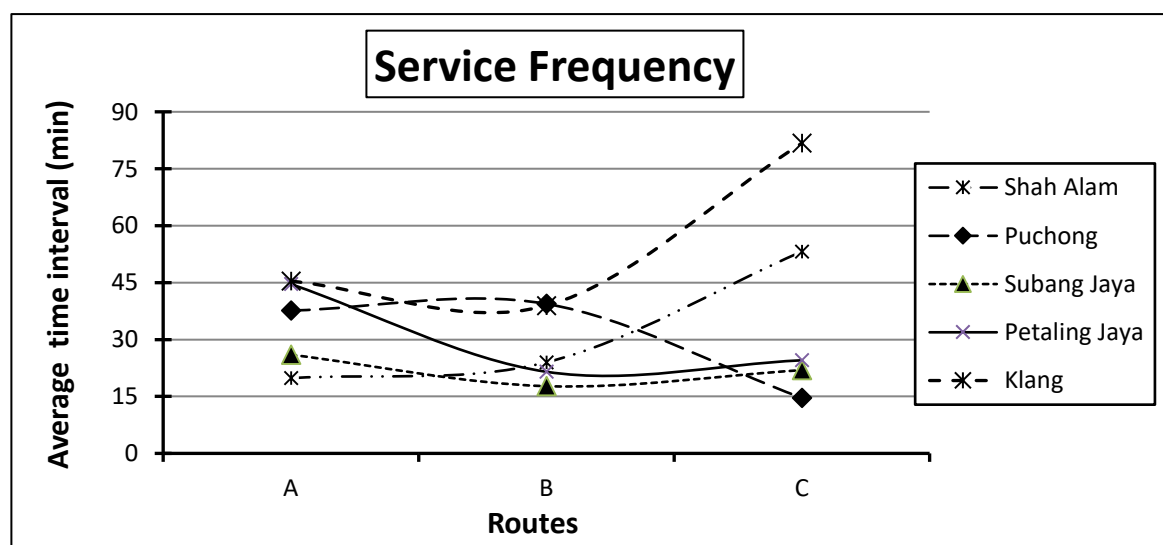

Figure 1: The service frequency graph at selected locations

As routes for those five areas did not have fixed service frequencies, the numbers of intervals were determined according to minutes per interval. The average interval for service frequency at Puchong and Subang Jaya, whose three routes were served by RapidKL, fell into QOS D. According to Transit Capacity and Quality of Service Manual, the average departure intervals for QOS D were in the range of   21-30 minutes, and were unattractive to all riders. The average departure interval for Petaling Jaya also fell into QOS D, but it is a free bus service initiated by Majlis Bandaraya Petaling Jaya (MBPJ) and served by PJ City Bus. On the other hand, the average intervals for Shah Alam fell into QOS E, which is served by RapidKL for Route T757 (A) and Route T758 (B), while Route SA01(C) is served by SMART Selangor bus. As for QOS E, the average departure interval was in the range of 31-60 minutes, where the service was available during the hours. In addition, the same was with Klang, which also fell into QOS E, but is served by SMART Selangor for Route KLG1 (A) and Route KLG2 (B), while Route 704(C) is served by Seranas. Therefore, the overall QOS, as in average for the five areas in West Klang Valley, was QOS D.

According to the manual, a QOS D gives an average headway of 16 - 30 minutes. From the passenger's perspective, passengers will have to check the scheduled arrival times to reduce waiting time. Furthermore, passengers are also required to adapt to the service schedule, which will in turn affect their usual arrival and departure times. But somehow in this case, fixed scheduled times were not provided by all operators. Passengers did not know at what time the next bus was scheduled to arrive. Apart from that, passengers could not measure their arrival and departure times. The arrivals and departures depended solely on the bus driver and the traffic flow condition at that period of time; hence, there was weakness and disadvantage in the system based on only the estimated range in service frequency. Besides, from the operator's perspective, to sustain the service frequency, two or three buses should be provided in an hour to achieve a20-30 minute headway to sustain the service frequency. However, if the traffic condition gets worse, the operator may not have the capacity to increase service frequencies.

The data for service hours were collected for each selected route at each location. Based on the data provided by the Land Public Transport Commission (SPAD) website for Shah Alam, Puchong, Subang Jaya, Petaling Jaya, and Klang, the location consisted of 14, 7, 4, 16, and 12 routes, respectively. The results for bus service hours are summarised in Figure 2. Service hour prescribes the number of operating hours for a particular bus route on a given day. In regard to the SPAD website information, the operating hours for RapidKL buses are varied and depend on the traffic flow condition or the number of buses that operate on thats particular day, which may increase, maintain, or decrease.
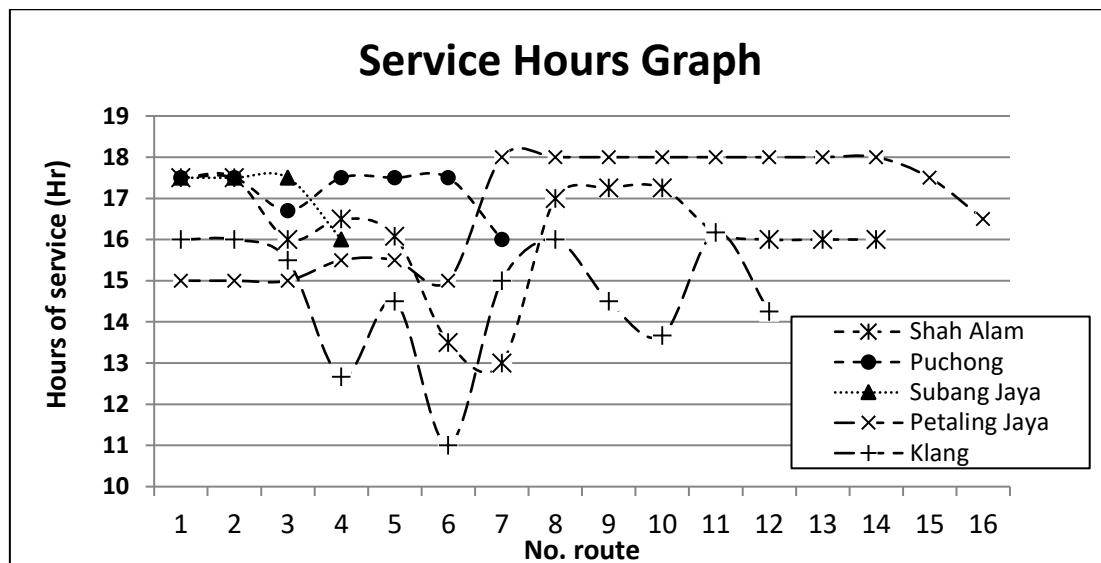
Figure 2: Service hour graphs at selected routes

For example, it can be seen that the service hours in Shah Alam were not consistent because a few routes operated at about 17.5 hours, 13.5 hours, and 16.5 hours. However, the most common operating hour for RapidKL was 17.5 hours, which started from 6.00 am until 11.30 pm. Meanwhile, for SMART Selangor,which is a free bus service provided by the Selangor State Government and operated by Prasarana Bhd, operated for 16 hours for all routes, starting from 6.00 am to 10.00 pm. In addition, the PJ City Bus, is also a free bus service initiated by Majlis Bandaraya Petaling Jaya (MBPJ) to serve only Petaling Jaya areas. It operated for 15 hours in all routes, starting from 6.00 am to 9.00 pm. Lastly, as for Seranas bus, the operating hours were not fixed just like the RapidKL buses since its service hours cover differently for Klang, which were 15.5 hours, 14.5 hours, and 15 hours, depending on the traffic flow condition, number of buses serving a particular route for that day, and the number of people who will ride the bus at that particular time. Based on Table 2, it can be seen that the QOS obtained fell into QOS B for Puchong and Subang Jaya, while QOS C was for Petaling Jaya, Shah Alam, and Klang.

4. Conclusion

The study has evaluated the service frequency for public bus service performance and service hours in Klang Valley. The results showed that Puchong had the shortest average time interval for service quality, in which the three routes served by RapidKL fell into QOS D, and Shah Alam had the longest average time interval for service quality, which fell into QOS E, whereby those routes were served by RapidKL for routes T757 (A) and T758 (B). Meanwhile Route SA01(C) was operated by SMART Selangor bus. Overall, Petaling Jaya had the highest number of routes and Subang Jaya had the lowest number of routes, which were 16 and 4, respectively. Based on the service hour analysis, the QOS obtained fell into QOS B for Puchong and Subang Jaya, while QOS C was for Petaling Jaya, Shah Alam, and Klang. The bus route has been selected by RapidKl and these routes have been approved by government's authority. Based on the results the inconsistencies of routes for each area was shown in this study and the reason for the inconsistencies is that these areas have certain difference factors such as location, living density, and transportation options. There might some room for improvement of the service quality in these areas. For example, there are some certain routes which have not been considered as main routes and competition with e-hailing services recently. In addition, several routes should be revised in order to improve the coverage area, service frequency, and service hours. The

output of this study could be a reference for improving the quality service of buses in Malaysia in the future.

5. Acknowledgment

6. Reference

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