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Analysis of bus transport service reliability – Case Study from Gampaha bus halt for Veyangoda to Pasyala bus route (Route No -189)

A. M. P. L. Athapaththu, S. H. H. Waravita, T. C. Weerasekara and A. H. S. Sharic*

¹General Sir John Kotelawala Defence University, Rathmalana, Sri Lanka
*ahmssharc@gmail.com

The objective of this research is to measure the bus transport service reliability of a bus route at a bus halt. Three measures, Coefficient of Variation (CV), Earliness Index (EI) and Width Index (WI), were used to measure the bus service reliability of bus route 189 (Veyangoda to Pasyala) at Gampaha bus halt in weekday and weekends for different time intervals. CV is defined as the ratio of standard deviation of scheduled headway deviation and mean scheduled headway deviation of buses at the halt. Headway deviation is the difference between actual headway and scheduled headway of buses. The scheduled headway at a stop is defined as the difference between the scheduled stop times of the consecutive two buses at the same stop. Actual headway is defined as the difference between leave times of the consecutive two buses at the same stop. The EI (Earliness Index) is defined as the percentile rank of delay/headway deviation of zero. The percentile rank of a particular delay/headway deviation is the percentage of delay/headway deviations in its frequency distribution that are lower or equal to it. WI is defined as the difference between the 95th percentile of headway deviations and the 5th percentile of headway deviations divided by the average scheduled headway. The data for scheduled arrival time, scheduled leave time, actual arrival time and actual leave time of buses at Gampaha bus halt for Veyangoda to Pasyala route were collected from timekeepers for 10 days including week days, weekends and a holiday from 1st February to 10th February 2019 which consisted records of 488 buses that arrived and departed the Gampaha bus halt. Convenience sampling method was used to determine these days. Each day was divided into 4-time intervals. The time intervals were 6 a.m. – 9 a.m., 9 a.m. – 12 p.m., 12 p.m. – 3 p.m., and 3 p.m. -6 p.m. Data analysis revealed that buses operated between 9 a.m. – 12 p.m. were more reliable compared to the other buses operated in other time intervals on weekdays as the CV value was as lesser as 0.53. It was found that buses operated between 12 p.m. – 3 p.m. were more reliable compared to the other buses operated in other time intervals on weekends as the CV value was as lesser as 0.43. But buses were more unreliable between 3 p.m. -6 p.m. on both weekdays and weekends as the CV values were 1.00 and 0.78 respectively. EI analysis revealed that as large as 32% of the buses operated in between 12 p.m. – 3 p.m. on weekdays departed early and as large as 50% of the buses operated in between 3 p.m. -6 p.m. on weekends departed early. WI value was as large as 2.78 between 3 p.m. -6 p.m. while the WI value at the same stop between 9 a.m. – 12 p.m. was 1.42 on weekday. WI value was as large as 1.41 between 9 a.m. – 12 p.m. while the WI value at the same stop between 3 p.m. -6 p.m. was 0.35 on weekends. WI analysis revealed the changing pattern of service reliability in different times of the day. This research describes methods of measuring variations in bus service reliability using secondary data.

Keywords: Reliability, Coefficient of Variation, Headway Deviation, Mean Scheduled Headway, Width Index, Earliness Index