

INTISARI

Ruas Jalan Lempuyangan mengalami kemacetan parah akibat hambatan samping aktivitas *pick-up/drop-off* (PUDO) dan parkir badan jalan, terutama saat kedatangan kereta api. Penelitian ini bertujuan mengevaluasi kinerja ruas jalan eksisting dan mensimulasikan manajemen fasilitas PUDO selama 20 tahun proyeksi. Data primer diperoleh melalui survei geometrik jalan, pencacahan volume lalu lintas, hambatan samping, waktu tempuh dengan metode *Moving Car Observer*, dan kuesioner persepsi terhadap 58 responden pengguna jalan melalui *Google Form* untuk mengidentifikasi penyebab kemacetan. Data sekunder mencakup Grafik Perjalanan Kereta Api (GAPEKA) 2025 dari PT KAI serta data jumlah penduduk dan kendaraan bermotor dari BPS.

Empat skenario diuji melalui simulasi mikroskopik PTV Vissim: 1) penggeseran lokasi PUDO ke sisi paling kiri badan jalan, 2) pelarangan parkir di badan jalan sisi kiri, 3) penyediaan fasilitas *lay-by* tipe A, dan 4) pembangunan gedung parkir serta relokasi PUDO ke dalam kawasan stasiun. Model divalidasi dengan metode GEH dan MAPE agar mendekati kondisi lapangan.

Hasil analisis PKJI 2023 dengan memperhitungkan reduksi lebar lajur efektif akibat blokade aktivitas PUDO menunjukkan derajat kejenuhan tertinggi sebesar 0,910 pada jam puncak, melampaui ambang batas kinerja memadai sebesar 0,85, dengan kecepatan tempuh hasil analisis sebesar 37,50 km/jam. Kecepatan aktual di lapangan tercatat hanya 9,83 km/jam akibat gangguan dinamis hambatan samping tinggi (621,1 frekuensi berbobot) yang tidak sepenuhnya tertangkap oleh parameter makroskopik PKJI 2023. Survei persepsi mengonfirmasi temuan ini dengan 87,9% responden mengidentifikasi aktivitas PUDO sebagai penyebab utama kemacetan. Hasil simulasi menunjukkan Skenario 1 dan 3 hanya efektif jangka pendek sebelum antrean melonjak di akhir proyeksi. Skenario 4 memberikan kinerja teknis terbaik namun memerlukan investasi infrastruktur besar. Skenario 2 terbukti sebagai solusi paling optimal dengan antrean rata-rata konsisten di bawah 13 meter dan waktu tempuh di bawah 2 menit sepanjang 20 tahun proyeksi.

Kata kunci: Stasiun Lempuyangan, *Pick-up/Drop-off*, Kinerja Lalu Lintas, Hambatan Samping, Ruas Jalan Perkotaan.

ABSTRACT

Lempuyangan Road experiences severe congestion caused by side friction from pick-up/drop-off (PUDO) activities and on-street parking, particularly during train arrivals. This study aims to evaluate the performance of the existing road segment and simulate PUDO facility management over a 20-year projection period. Primary data were collected through road geometry surveys, traffic volume counting, side friction observation, travel time measurement using the Moving Car Observer method, and perception questionnaires distributed to 58 road users via Google Form to identify the causes of congestion. Secondary data include the 2025 Train Travel Schedule (GAPEKA) from PT KAI and population and motor vehicle data from BPS.

Four scenarios were tested through microscopic simulation using PTV Vissim: 1) shifting the PUDO zone to the leftmost lane edge, 2) prohibiting on-street parking on the left side, 3) providing a Type A lay-by facility, and 4) constructing a parking building and relocating PUDO activities inside the station area. The model was validated using GEH and MAPE methods to approximate field conditions.

The PKJI 2023 analysis, incorporating the reduction of effective lane width due to PUDO blockage, yielded a maximum degree of saturation of 0.910 during peak hours, exceeding the acceptable performance threshold of 0.85, with an analytical travel speed of 37.50 km/h. The actual field speed was recorded at only 9.83 km/h due to dynamic disturbances from high roadside friction (weighted frequency of 621.1) that are not fully captured by the macroscopic parameters of PKJI 2023. The perception survey confirmed these findings, with 87.9% of respondents identifying PUDO activities as the primary cause of congestion. Simulation results indicate that Scenarios 1 and 3 are only effective in the short term before queues surge toward the end of the projection period. Scenario 4 yields the best technical performance but requires substantial infrastructure investment. Scenario 2 proved to be the most optimal solution, with average queue lengths consistently below 13 meters and travel times below 2 minutes throughout the 20-year projection period.

Keywords: *Lempuyangan Station, Pick-up/Drop-off, Traffic Performance, Side Friction, Urban Road Segment.*