# INTISARI

Yogyakarta merupakan daerah dengan gelar kota pelajar dan kota wisata yang selalu mengalami kenaikan jumlah kendaraan bermotor yang signifikan setiap tahunnya. Untuk kasus di lapangan, penambahan jumlah kendaraan tidak diiringi dengan peningkatan kapasitas jalan. Sehingga terjadi kemacetan khususnya pada persimpangan. Salah satu persimpangan yang terletak di area pusat Kota Yogyakarta adalah Simpang Jetis. Dalam upaya merumuskan alternatif solusi untuk meningkatkan kinerja simpang bersinyal Jetis, dilakukan metode simulasi mikroskopik (mikrosimulasi). Mikrosimulasi memanfaatkan perangkat lunak PTV VISSIM yang dapat mengakomodasi berbagai jenis kendaraan serta dapat menyesuaikan perilaku pengendara di jalan raya.

Untuk memperoleh hasil mikrosimulasi yang akurat, dilakukan kalibrasi dan validasi pada parameter yang ada. Terdapat tujuh parameter yang disesuaikan dalam penelitian ini yakni *position at free flow*, *parameter overtake on same lane (R&L)*, *distance standing*, *distance driving*, *average standstill distance*, *additive part of safety distance* dan *multiplicative part of safety distance.* Dilakukan proses *trial and error* hingga mendapatkan hasil simulasi yang mendekati hasil observasi lapangan. Sedangkan proses validasi model digunakan metode *Geoffrey E. Havers* (*GEH*), serta metode *Mean Absolute Percentage Error* (*MAPE*). Dua variabel yang ditinjau pada penelitian ini adalah panjang antrian dan jumlah kendaraan. Selanjutnya, waktu siklus optimal diperhitungkan untuk durasi waktu sinyal berdasarkan MKJI 1997 yang dianggap dapat menyeimbangkan panjang antrian kendaraan.

Pada penelitian ini diperoleh bahwa persebaran kendaraan pada Simpang Jetis didominasi oleh sepeda motor sebesar 80,76%, selanjutnya kendaraan ringan (LV) sebesar 18,22%, lalu kendaraan tidak bermotor (UM) sebesar 0,88% dan kendaraan berat (HV) sebesar 0,15%. Hasil uji validitas metode *Geoffrey E. Havers* (*GEH*) pada tiap lengan simpang diperoleh nilai kurang dari lima sehingga dapat hasil simulasi dapat diterima. Sedangkan hasil metode *Mean Absolute Percentage Error* (*MAPE*) pada tiap lengan simpang adalah kurang dari 10% sehingga hasil simulasi termasuk dalam kategori model sangat baik. Dengan mengoptimalkan sinyal lampu lalu lintas pada Simpang Jetis mengacu pada MKJI 1997 diperoleh waktu siklus yang baru selama 152 detik. Hasil simulasi waktu siklus baru diperoleh panjang antrian kendaraan 117 meter pada lengan Utara, 118 meter pada lengan Timur, 125 meter pada lengan Selatan, 106 meter pada lengan Barat.

**Kata kunci**: Simpang Bersinyal, Mikrosimulasi, Kalibrasi, Validasi, PTV VISSIM, Optimalisasi Sinyal Lalu Lintas.

# ABSTRACT

Yogyakarta is a city which known as a student city and a tourist city. Yogyajarta always experiences a significant increase in the number of motorized vehicles every year. For cases in the field, the increase in the number of vehicles is not accompanied by an increase in road capacity. This causes traffic jams, especially at intersections. One of the intersections located in the downtown area of Yogyakarta is Simpang Jetis. In an effort to formulate alternative solutions to improve the performance of the Jetis signaled intersection, a microscopic simulation method (microsimulation) was carried out. Microsimulation utilizes PTV VISSIM software which can accommodate various types of vehicles and can adjust the behavior of motorists on the highway.

To obtain accurate microsimulation results, calibration and validation were carried out on the existing parameters. There are seven parameters adjusted in this study, namely position at free flow, overtake on same lane (R&L) parameters, distance standing, driving distance, average standstill distance, additive part of safety distance and multiplicative part of safety distance. A trial and error process is carried out to obtain simulation results that are close to the results of field observations. While the model validation process used the Geoffrey E. Havers (GEH) method, and the Mean Absolute Percentage Error (MAPE) method. Two variables reviewed in this study are queue length and number of vehicles. Furthermore, the optimal cycle time is calculated for the duration of the signal time based on the MKJI 1997 which is considered to be able to balance the length of the vehicle queue.

In this study it was found that the distribution of vehicles at Simpang Jetis was dominated by motorcycles by 80.76%, then light vehicles (LV) by 18.22%, then non-motorized vehicles (UM) by 0.88% and heavy vehicles (HV) by 0.15%. The results of the validity test of the Geoffrey E. Havers (GEH) method on each arm of the intersection obtained a value of less than five so that the simulation results can be accepted. While the results of the Mean Absolute Percentage Error (MAPE) method on each arm of the intersection are less than 10% so that the simulation results are included in the very good model category. By optimizing the traffic light signal at the Jetis intersection referring to the MKJI 1997, a new cycle time of 152 seconds was obtained. The results of the new cycle time simulation show that the vehicle queue length is 117 meters on the North arm, 118 meters on the East arm, 125 meters on the South arm, and 106 meters on the West arm.

**Keywords**: Signalized Intersection, Microsimulation, Calibration, Validation, PTV VISSIM, Traffic Signal Optimization.