

Jalan merupakan sebuah infrastruktur yang dihadirkan dengan tujuan memberikan aksesibilitas bagi kendaraan, pejalan kaki, serta berbagai moda transportasi lainnya untuk melakukan perpindahan dari satu lokasi ke lokasi lainnya. Sebagai inti dari infrastruktur transportasi, jalan dirancang agar mampu menampung beragam jenis kendaraan yang melintasinya selama umur rencana yang ditetapkan. Penambahan jumlah kendaraan yang melewati suatu jalan memiliki dampak terhadap kondisi jalan itu sendiri.

Penelitian ini bertujuan untuk menganalisis kondisi perkerasan Jalan Arteri Utara (AU) di Daerah Istimewa Yogyakarta (DIY) selama 20 tahun umur rencana akibat penambahan jumlah kendaraan menggunakan *software Highway Development and Management – 4 (HDM-4)*. Analisis dilakukan pada dua skenario yaitu *do nothing* (tanpa adanya *maintenance*) dan *do minimum* (penambahan *maintenance standard* sesuai Standar MDPJ 2017) dengan melakukan penambahan kendaraan sebanyak 500, 1000, dan 2000 kendaraan per moda pada kedua skenario *running*. Dilakukan analisis terhadap nilai *International Roughness Index (IRI)* dan *Life-cycle cost analysis (LCCA)* selama periode 20 tahun umur rencana, dengan beberapa indikator berupa *Road Agency Cost (RAC)*, *Road User Cost (RUC)*, dan *Total Transport Cost (TTC)*.

Hasil analisis menunjukkan bahwa penambahan jumlah kendaraan memiliki dampak signifikan pada peningkatan nilai *International Roughness Index (IRI)*. Pada skenario *do nothing* nilai IRI akan semakin meningkat seiring penambahan jumlah kendaraan. Kendaraan golongan berat memperoleh nilai IRI tertinggi. Pada skenario *do minimum* dengan melakukan pemeliharaan jalan (MDPJ 2017) nilai IRI mengalami penurunan. Estimasi biaya yang dihasilkan setelah penerapan standar pemeliharaan jalan (MDPJ 2017) untuk umur rencana 20 tahun menunjukkan biaya *Road Agency Cost (RAC)* sebesar Rp309.515.000.000, biaya *Road User Cost (RUC)* dan *Total Transport Cost (TTC)* diproyeksikan meningkat seiring dengan bertambahnya jumlah kendaraan.

Kata kunci: Penambahan Jumlah Kendaraan, HDM-4, IRI

ABSTRACT

Road are infrastructure designed to provide accessibility for vehicles, pedestrians, and various other modes of transportation to move from one location to another. As the core of transportation infrastructure, roads are designed to accommodate various types of vehicles passing through them during the designated design life. The increase in the number of vehicles using a road impacts the condition of the road itself.

This study aims to analyze the pavement condition of the North Arterial Road (Jalan Arteri Utara) in the Special Region of Yogyakarta (DIY) over a 20-year design life due to the increase in the number of vehicles using the Highway Development and Management - 4 (HDM-4) software. The analysis was conducted under two scenarios: do nothing (no maintenance) and do minimum (additional standard maintenance as per the 2017 MDPJ Standard) by increasing the number of vehicles by 500, 1000, and 2000 vehicles per mode in both scenarios. Subsequently, an analysis of the International Roughness Index (IRI) and Life-cycle Cost Analysis (LCCA) over the 20-year design life was conducted, with several indicators such as Road Agency Cost (RAC), Road User Cost (RUC), and Total Transport Cost (TTC).

The results of the analysis show that the increase in the number of vehicles has a significant impact on the increase in the International Roughness Index (IRI). In the do-nothing scenario, the IRI value will increase further with the addition of more vehicles. Heavy vehicles achieved the highest IRI value. In the do-minimum scenario, with road maintenance (MDPJ 2017), the IRI value decreases. The cost estimates resulting from the application of the road maintenance standard (MDPJ 2017) for the 20-year design life indicate that the Road Agency Cost (RAC) amounts to IDR 309,515,000,000. The Road User Cost (RUC) and Total Transport Cost (TTC) are projected to increase along with the rising number of vehicles.

Keywords: Increase in Number of Vehicles, HDM-4, IRI