

INTISARI

ANALISIS RELIABILITAS DAN BIAYA *DOWNTIME* ALAT BERAT PADA PROYEK JALAN TOL JAKARTA-CIKAMPEK SELATAN

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Tingkat keandalan alat berat yang rendah dapat menyebabkan *downtime* tinggi dan menimbulkan kerugian biaya operasional pada proyek konstruksi. Penelitian ini bertujuan menganalisis reliabilitas dan estimasi kerugian biaya *downtime* alat berat pada proyek Jalan Tol Jakarta-Cikampek Selatan, *site* JAPEKSEL. Data yang digunakan berupa *daily report* periode Oktober 2024 – Oktober 2025 dari populasi 83-unit alat berat, dengan lima unit *breakdown* tertinggi dipilih sebagai sampel menggunakan metode *purposive sampling* berbasis prinsip Pareto. Analisis dilakukan menggunakan perhitungan *Mean Time Between Failure* (MTBF), *Mean Time to Repair* (MTTR), *Availability*, distribusi Weibull, diagram Pareto, dan estimasi *opportunity loss*. Hasil penelitian menunjukkan variasi pola kegagalan pada tiap unit, dengan kebocoran hidrolik/*hose* sebagai kontributor dominan kerusakan. Nilai *Availability* kelima unit sampel berkisar 72,8% – 90,2%, sebagian besar masih di bawah standar industri. Total estimasi kerugian akibat *downtime* mencapai Rp398.080.000. Hasil penelitian ini diharapkan menjadi dasar penyusunan strategi *preventive maintenance* untuk meningkatkan keandalan dan efisiensi biaya operasional alat berat.

Kata kunci: reliabilitas, *downtime*, MTBF, MTTR, *Availability*, distribusi Weibull, alat berat, *opportunity loss*

ABSTRACT

RELIABILITY AND DOWNTIME COST ANALYSIS OF HEAVY EQUIPMENT AT THE JAKARTA-CIKAMPEK SELATAN TOLL ROAD PROJECT

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Low reliability of heavy equipment can lead to high downtime and result in significant operational cost losses in construction projects. This study aims to analyze the reliability and estimate the downtime cost losses of heavy equipment at the Jakarta-Cikampek Selatan Toll Road project, JAPEKSEL site. The data used consist of daily reports from October 2024 to October 2025, drawn from a population of 83 units of heavy equipment, with five units having the highest breakdown frequency selected as samples using purposive sampling based on the Pareto principle. The analysis was conducted using Mean Time Between Failure (MTBF), Mean Time to Repair (MTTR), Availability, Weibull distribution, Pareto diagram, and opportunity loss estimation. The results show varying failure patterns across units, with hydraulic hose leakage as the dominant contributor to damage. The Availability values of the five sample units ranged from 72.8% to 90.2%, mostly below industry standards. The total estimated downtime loss reached IDR 398,080,000. These findings are expected to serve as a basis for developing preventive maintenance strategies to improve the reliability and cost efficiency of heavy equipment operations.

Keywords: *reliability, downtime, MTBF, MTTR, Availability, Weibull distribution, heavy equipment, opportunity loss*