

ABSTRAK

Pemadaman listrik yang tak terencana di bandara dapat mengganggu operasional, seperti gangguan sistem komunikasi dan keselamatan penerbangan, gangguan sistem informasi dan sistem keamanan di bandara, keterlambatan penumpang, penundaan hingga pembatalan penerbangan. Dampak operasional ini dapat menimbulkan kerugian finansial yang dialami oleh bandara.

Penelitian ini bertujuan untuk mengestimasi kerugian finansial akibat pemadaman listrik tak terencana pada layanan aeronautika dan layanan nonaeronautika di Bandara Internasional Soekarno-Hatta dengan menggunakan metode simulasi Monte Carlo.

Penelitian ini menggunakan metode simulasi Monte Carlo yang dilakukan sebanyak 10.000 iterasi. Pendapatan per jam layanan aeronautika dan nonaeronautika dimodelkan sebagai variabel acak dengan distribusi normal dan lognormal. Pendapatan per jam efektif, durasi pemadaman, faktor gangguan pemadaman, serta skenario mitigasi genset digunakan untuk mengetahui kerugian finansial.

Hasil estimasi simulasi Monte Carlo menunjukkan bahwa kerugian finansial yang mungkin terjadi pada layanan aeronautika dan layanan nonaeronautika semakin besar dan semakin tidak pasti jika pemadaman listrik tak terencana berlangsung lebih lama, baik dengan distribusi normal maupun distribusi lognormal dan baik tanpa genset maupun dengan genset. Contohnya kerugian finansial pada layanan aeronautika pada durasi 6,4 jam dengan distribusi normal tanpa genset (Nilai rata-rata sekitar Rp5.159.000.000, standar deviasi sekitar Rp3.101.000.000, P95 sekitar Rp7.764.000.000, P99 sekitar Rp8.389.000.000). Penggunaan genset mampu mengurangi kerugian finansial meskipun tetap memberikan biaya operasional tambahan. Temuan ini menegaskan pentingnya memprioritaskan genset pada layanan aeronautika.

Kata kunci—pemadaman listrik, bandara, simulasi Monte Carlo, kerugian finansial

ABSTRACT

Unplanned power outages at airports can disrupt operations, such as disrupting communication and flight safety systems, disrupting information systems and security systems at airports, causing passenger delays, and delays or cancellations of flights. These operational impacts can result in financial losses for airports.

This study aims to estimate the financial losses caused by unplanned power outages in aeronautical and non-aeronautical services at Soekarno-Hatta International Airport using the Monte Carlo simulation method.

This study uses the Monte Carlo simulation method conducted in 10,000 iterations. Hourly revenue from aeronautical and non-aeronautical services is modeled as a random variable with normal and lognormal distributions. Effective hourly revenue, outage duration, outage disruption factors, and generator mitigation scenarios are used to determine financial losses.

The results of the Monte Carlo simulation estimates show that the financial losses that may occur in aeronautical and non-aeronautical services are greater and more uncertain if unplanned power outages last longer, both with normal and lognormal distributions and both without and with generators. For example, the financial loss in aeronautical services for a duration of 6.4 hours with a normal distribution without a generator (average value of around IDR 5,159,000,000, standard deviation of around IDR 3,101,000,000, P95 of around IDR 7,764,000,000, P99 around Rp8,389,000,000). The use of a generator can reduce financial losses, although it still incurs additional operational costs. These findings emphasize the importance of prioritizing generators in aeronautical services.

Keywords—power outage, airport, Monte Carlo simulation, financial losses