

Analisis Penilaian Risiko Keselamatan dan Kesehatan Kerja (K3) di Tempat Pengolahan Sampah Terpadu (TPST X) Menggunakan Teknik Failure Mode Effects Analysis

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Abstrak

<div style="text-align: justify;">Tempat Pengolahan Sampah Terpadu (TPST) merupakan fasilitas yang dalam pengelolaan sampah perkotaan, berperan untuk mengurangi volume sampah yang dibuang ke tempat pemrosesan akhir. Namun, proses operasionalnya memiliki berbagai potensi bahaya yang dapat memengaruhi keselamatan dan kesehatan kerja (K3) pekerja. Penelitian ini bertujuan melakukan penilaian risiko K3 pada proses pengolahan sampah di TPST X Kota Cimahi menggunakan metode Failure mode and Effects Analysis (FMEA) serta menganalisis akar penyebab risiko menggunakan Swiss Cheese Model. Penelitian menggunakan desain deskriptif analitik dengan pendekatan semi-kuantitatif yang dilaksanakan di TPST X Kota Cimahi pada April–Mei 2025 melalui observasi, wawancara mendalam, dan telaah dokumen. Sebanyak 51 failure mode berhasil diidentifikasi pada seluruh tahapan operasional. Hasil penelitian menunjukkan bahwa 4 failure mode (8%) termasuk kategori risiko sangat tinggi, 25 (49%) risiko tinggi, 21 (41%) risiko menengah, dan 1 (2%) risiko rendah. Nilai Risk Priority Number (RPN) berkisar antara 24–240, dengan prioritas risiko tertinggi berupa paparan kebisingan pada mesin Turbo Separator, gibrik, dan centris (RPN = 240), serta penyumbatan material pada conveyor screw (RPN = 196). Berdasarkan analisis Swiss Cheese Model, risiko yang teridentifikasi terbentuk akibat kombinasi faktor pada lapisan organisasi, pengawasan, kondisi kerja, dan tindakan tidak aman, sebagaimana lazim ditemukan pada fasilitas pengolahan dengan sistem mesin yang terintegrasi. Hasil penelitian menghasilkan profil risiko, prioritas risiko, dan analisis akar penyebab pada proses pengolahan sampah di TPST X yang dapat digunakan sebagai dasar dalam penetapan prioritas pengendalian keselamatan dan kesehatan kerja pada fasilitas pengolahan sampah.</div><hr /><div style="text-align: justify;">An Integrated Waste Processing Facility (Tempat Pengolahan Sampah Terpadu/TPST) is a facility that plays a role in urban waste management by reducing the volume of waste disposed of at final processing sites. However, its operational processes entail various potential hazards that may affect the occupational safety and health (OSH) of workers. This study aimed to conduct an OSH risk assessment of waste processing operations at TPST X, Cimahi City, using the Failure Mode and Effects Analysis (FMEA) method, and to analyze the root causes of identified risks using the Swiss Cheese Model. The study employed a descriptive-analytic design with a semi-quantitative approach, carried out at TPST X, Cimahi City, during April–May 2025, through observation, in-depth interviews, and document review. A total of 51 failure modes were identified across all operational stages. The results indicated that 4 failure modes (8%) were classified as very high risk, 25 (49%) as high risk, 21 (41%) as moderate risk, and 1 (2%) as low risk. Risk Priority Number (RPN) values ranged from 24 to 240, with the highest-priority risks being noise exposure from the turbo separator, gibrik, and centris machines (RPN = 240), and material blockage in the conveyor screw (RPN = 196). Based on the Swiss Cheese Model analysis, the identified risks arose from a combination of factors across the organizational, supervisory, working condition, and unsafe act layers, as commonly observed in processing facilities with integrated machine systems. The study produced a risk profile, risk prioritization, and root

cause analysis of waste processing operations at TPST X, which may serve as a basis for establishing OSH control priorities at waste processing facilities.</div>