Analisis Work as Imagined dan Work as Done pada Kasus Collision Haul Dump Truck Berdasarkan Functional Resonance Analysis Method (FRAM) di PT X Tahun 2025

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Abstrak

Aktivitas hauling pada industri pertambangan batubara merupakan sistem kerja kompleks non-linear yang melibatkan interaksi operator, unit, pengawas, prosedur, teknologi pemantauan, dan kondisi lingkungan. Meskipun PT X telah menggunakan Root Cause Analysis Technique (RCAT) dalam investigasi insiden, collision Haul Dump Truck (HD) yang menyebabkan fatality pada tahun 2025 menunjukkan perlunya pendekatan yang mampu menjelaskan interaksi sistem secara lebih menyeluruh. Penelitian ini bertujuan menganalisis perbedaan Work as Imagined (WAI) dan Work as Done (WAD) pada kasus collision HD menggunakan Functional Resonance Analysis Method (FRAM). Penelitian menggunakan desain studi kasus kualitatif dengan data primer dari wawancara operator, pengawas, dan pihak SHE, serta data sekunder berupa Laporan Penyelidikan Insiden (LPI), SOP, instruksi kerja, dan dokumen investigasi perusahaan. Hasil penelitian menunjukkan gap WAI–WAD pada kesiapan operator, deteksi fatigue, komunikasi, pengendalian visual, sistem ICC/FCW/fatigue alert, serta monitoring kondisi tidak aman. Variabilitas fungsi manusia, teknologi, prosedur, dan lingkungan saling terhubung dan menghasilkan functional resonance yang berkontribusi terhadap collision. Penelitian ini menyimpulkan bahwa insiden merupakan emergent outcome dari interaksi variabilitas, bukan akibat satu penyebab linier. FRAM memberikan nilai tambah dalam mengidentifikasi fungsi kritis, risiko tersembunyi, dan peluang penguatan pembelajaran organisasi. Penelitian ini menyimpulkan bahwa insiden tidak dapat dipahami hanya sebagai hasil penyebab linier, melainkan sebagai emergence dari interaksi variabilitas dalam sistem kerja. FRAM memberikan kontribusi dalam mengidentifikasi risiko tersembunyi dan memperkuat pembelajaran organisasi berbasis sistem. <hr /> Hauling activities in the coal mining industry constitute a complex, non-linear work system involving interactions among operators, haul dump trucks, supervisors, procedures, monitoring technologies, and environmental conditions. Although PT X has implemented the Root Cause Analysis Technique (RCAT) in incident investigations, the fatal Haul Dump Truck (HD) collision that occurred in 2025 indicates the need for an analytical approach capable of explaining system interactions more comprehensively. This study aims to analyze the differences between Work as Imagined (WAI) and Work as Done (WAD) in the HD collision case using the Functional Resonance Analysis Method (FRAM). This research employed a qualitative case study design, using primary data from interviews with operators, supervisors, and Safety, Health, and Environment (SHE) personnel, as well as secondary data from the Incident Investigation Report, standard operating procedures, work instructions, and company investigation documents. The findings reveal WAI–WAD gaps in operator readiness, fatigue detection, communication, visual controls, ICC/FCW/fatigue alert systems, and the monitoring of unsafe conditions. Variabilities in human, technological, procedural, and environmental functions were found to be interconnected and generated functional resonance that contributed to the collision. This study concludes that the incident cannot be adequately understood as the result of a linear causal chain, but rather as an emergent outcome of interacting variabilities within the work system. FRAM

provides added value by identifying critical functions, hidden risks, and opportunities to strengthen system-based organizational learning.