

ABSTRACT

The construction sector serves as a primary driver of infrastructure development in Indonesia, yet remains one of the most hazardous industries with high potential for workplace accidents. BPJS Employment Social Security Agency data (2022) indicates that the construction sector accounts for 24% of total work accidents nationwide. This study aims to identify Occupational Health and Safety (K3) risks, analyze risk levels, map priority risks, and estimate the cost of risk materialization at the Faculty of Dentistry Building Construction Project of Andalas University. The research employs a dominant quantitative case study approach using a 5×5 Risk Matrix (AS/NZS 4360:2004) and cost analysis based on the 4:1 ratio framework (Manuele, 2011). Data collection was conducted through field observation, questionnaires administered to 10 respondents across project hierarchy levels, structured interviews, and document analysis. The study identified eight dominant K3 hazards aligned with Permen PUPR No. 10 of 2021. A significant disparity emerged between field risk perception and theoretical standards: the actual average Severity (2.28) was 45% lower than theoretical Severity (4.13), indicating the "normalization of deviance" phenomenon (Vaughan, 1996). Following theoretical Severity calibration, five priority risks were identified in the High category ($R \geq 5.5$): struck-by heavy equipment ($R=9.6$), unstable/scaffold collapse ($R=7.5$), excavation collapse ($R=7.0$), electric shock ($R=5.6$), and falling from height (>2 m) ($R=5.5$). Cost estimation revealed potential financial losses of IDR 746–896 million (2.86–3.44% of contract value), while the proactive K3 budget allocation was only IDR 68 million (0.26% of contract value), yielding a cost-benefit ratio of 11.3:1—significantly exceeding the minimum threshold of 1:3 (Pham et al., 2020). These findings empirically validate that a proactive K3 approach delivers substantial economic value and serves as a strategic solution to mitigate long-term financial losses while supporting the implementation of the Construction Safety Management System (SMKK) in accordance with national regulations.

Keywords: Risk Analysis; K3 Cost; Risk Matrix; Occupational Health and Safety (K3); Construction Project

ABSTRAK

Sektor konstruksi merupakan penggerak utama pembangunan infrastruktur di Indonesia, namun juga dikenal memiliki potensi bahaya dan risiko kecelakaan kerja yang sangat tinggi. Data BPJS Ketenagakerjaan (2022) menunjukkan sektor konstruksi menyumbang 24% dari total kecelakaan kerja nasional. Penelitian ini bertujuan mengidentifikasi risiko Keselamatan dan Kesehatan Kerja (K3), menganalisis tingkat risiko, memetakan risiko prioritas, serta mengestimasi biaya materialisasi risiko pada Proyek Pembangunan Fakultas Kedokteran Gigi Universitas Andalas. Metode penelitian menggunakan pendekatan studi kasus kuantitatif dominan dengan Risk Matrix 5×5 (AS/NZS 4360:2004) dan analisis biaya berbasis rasio 4:1 (Manuele, 2011). Pengumpulan data dilakukan melalui observasi lapangan, kuesioner terhadap 10 responden dari berbagai hierarki proyek, wawancara terstruktur, dan studi dokumen. Hasil penelitian mengidentifikasi delapan jenis bahaya K3 dominan sesuai Permen PUPR No. 10 Tahun 2021. Terdapat disparitas signifikan antara persepsi risiko lapangan dan standar teoritis: rata-rata *Severity* aktual (2,28) 45% lebih rendah daripada *Severity* teoritis (4,13), mengindikasikan fenomena "*normalization of deviance*" (Vaughan, 1996). Setelah kalibrasi *Severity* teoritis, lima risiko prioritas teridentifikasi dalam kategori Tinggi ($R \geq 5,5$): tertabrak alat berat ($R=9,6$), perancah tidak stabil/rusak ($R=7,5$), keruntuhan galian pondasi ($R=7,0$), sengatan listrik ($R=5,6$), dan jatuh dari ketinggian (>2 m) ($R=5,5$). Estimasi biaya materialisasi menunjukkan potensi kerugian finansial Rp746–896 juta (2,86–3,44% nilai kontrak), sedangkan alokasi anggaran K3 proaktif hanya Rp68 juta (0,26% nilai kontrak), menghasilkan rasio cost-benefit 11,3:1 yang jauh melampaui threshold minimal 1:3 (Pham et al., 2020). Temuan ini membuktikan bahwa pendekatan K3 proaktif memberikan nilai ekonomi signifikan dan menjadi solusi strategis untuk mengurangi kerugian finansial jangka panjang serta mendukung implementasi SMKK sesuai regulasi nasional.

Kata Kunci: Analisis Risiko; Biaya K3; Risk Matrix; Keselamatan dan Kesehatan Kerja (K3); Proyek Konstruksi