

Analisis Hubungan Hasil Penilaian Safety Maturity Level dengan Kinerja Keselamatan Pertambangan Pada Perusahaan Pertambangan Batubara di Indonesia

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Abstrak

Kecelakaan tambang di Indonesia menunjukkan beban yang perlu dikendalikan secara sistemik, melalui efektivitas pengukuran awal Safety Maturity Level (SML). Penelitian ini bertujuan menganalisis hubungan antara SML dan kinerja keselamatan pertambangan yaitu indikator kecelakaan (Frequency Rate dan Severity Rate), sekaligus menjelaskan faktor konteks yang memengaruhi kekuatan hubungan tersebut. Penelitian menggunakan desain mixed methods - explanatory sequential. Fase kuantitatif memanfaatkan data sekunder dari Kementerian ESDM (KESDM) tahun 2024 di 52 perusahaan tambang batubara tahap operasi produksi sesuai kriteria inklusi, yaitu skor SML berbasis KepDirjen Minerba nomor 10.K/MB.01/DJB.T/2023 dan data statistik kecelakaan tambang 2024. Uji normalitas data menunjukkan tidak terdistribusi normal, sehingga analisis menggunakan pendekatan nonparametrik Spearman rho (ρ) dan GLM gamma. Hasil kuantitatif mengindikasikan bahwa SML secara total (agregat) berkorelasi negatif dan signifikan dengan kinerja keselamatan (indeks kecelakaan tambang), namun kontribusi tiap dimensi SML tidak seragam. "Upaya Pengendalian" merupakan indikator yang paling konsisten bersifat protektif terhadap indeks kecelakaan, sedangkan "Partisipasi Pekerja" tidak menunjukkan hubungan yang signifikan namun korelasi negatif; sementara itu, "Tanggung Jawab Pimpinan" dan "Analisis Statistik" menunjukkan hubungan negatif (bivariat) dan positif (multivariat), serta signifikan terhadap indeks kecelakaan tambang. Selanjutnya, temuan kualitatif dari data sekunder KESDM terhadap sub-sampling perusahaan menegaskan bahwa SML tinggi tidak selalu diikuti penurunan kecelakaan ketika terdapat kesenjangan implementasi pengendalian, terutama pada tata kelola kontraktor, kompetensi, dan konsistensi eksekusi di lapangan. Penelitian menyimpulkan bahwa SML berdampak pada penurunan kecelakaan terutama jika diwujudkan dalam pengendalian risiko yang nyata dan pembelajaran berbasis data yang ditutup dengan tindakan (closed-loop learning), bukan sekadar pemenuhan administratif.

Mining accidents in Indonesia indicate a burden that must be controlled systemically through the effectiveness of early measurement of the Safety Maturity Level (SML). This study aims to analysis the relationship between SML and mining safety performance represented by accident indicators (Frequency Rate and Severity Rate) while also explaining contextual factors that influence the strength of this relationship. The research employs a mixed-methods design with an explanatory sequential approach. The quantitative phase utilizes secondary data from the Ministry of Energy and Mineral Resources (KESDM) for 2024, covering 52 coal mining companies at the production operation stage that met the inclusion criteria, namely SML scores based on the Director General of Mineral and Coal Decree No. 10.K/MB.01/DJB.T/2023 and 2024 mine accident statistics. Data normality tests showed non-normal distributions; therefore, analysis was conducted using nonparametric Spearman's rho (ρ) and a gamma Generalized Linear Model (GLM). Quantitative results indicate that overall (aggregate) SML is negatively and significantly correlated with safety performance (the mining accident index), but the contribution of each SML dimension is not

uniform. “Control Measures” emerged as the most consistently protective indicator against the accident index, whereas “Worker Participation” showed no significant relationship, although the correlation direction was negative. Meanwhile, “Leadership Responsibility” and “Statistical Analysis” demonstrated negative (bivariate) and positive (multivariate) relationships, and both were significant with respect to the mining accident index. Furthermore, qualitative findings derived from secondary KESDM data on a subsample of companies confirm that a high SML does not always translate into reduced accidents when gaps in the implementation of controls persist—particularly in contractor governance, competency, and consistency of execution in the field. This study concludes that SML contributes to accident reduction primarily when it is translated into tangible risk controls and data-driven learning that is closed with corrective action (closed-loop learning), rather than merely fulfilling administrative requirements.