

INTISARI

Rendahnya penerapan teknologi dalam manajemen keselamatan konstruksi di Indonesia menjadi tantangan tersendiri di tengah tuntutan peningkatan kinerja keselamatan. Meskipun transformasi digital telah berkembang pesat di sektor konstruksi global dan terbukti mendukung efektivitas pengelolaan keselamatan, penerapannya di Indonesia masih terbatas dan belum terintegrasi secara optimal. Penelitian ini bertujuan untuk: (1) menelaah teknologi digital keselamatan kerja yang paling potensial diadopsi pada industri konstruksi di Indonesia; (2) menelaah manfaat implementasi teknologi digital terhadap kinerja keselamatan konstruksi; (3) menelaah faktor penghambat dalam penerapannya; (4) mengevaluasi strategi implementasi yang paling relevan untuk meningkatkan keselamatan konstruksi; dan (5) mendeteksi perbedaan persepsi antara perusahaan BUMN dan swasta, serta antara responden bersertifikat dan tidak bersertifikat, terhadap faktor-faktor yang memengaruhi transformasi digital keselamatan.

Survei kuantitatif dilakukan menggunakan kuesioner kepada pemangku kepentingan konstruksi yang memahami isu keselamatan dan adopsi teknologi digital. Sebanyak 123 tanggapan profesional dinyatakan valid untuk dianalisis menggunakan teknik pemeringkatan skor rata-rata (*mean score ranking*) serta Uji Mann-Whitney untuk menilai perbedaan persepsi kelompok responden. Instrumen disusun berdasarkan kajian pustaka yang mendalam dan divalidasi melalui wawancara dengan lima ahli.

Hasil studi menunjukkan bahwa CCTV, BIM, dan aplikasi keselamatan merupakan teknologi yang paling menonjol dalam penerapan. Tiga manfaat utama yang dirasakan mencakup peningkatan pelaporan dan pengawasan, visualisasi kondisi lapangan, serta efektivitas pelatihan. Hambatan utama meliputi tingginya biaya, keterbatasan pelatihan SDM, dan kurangnya pengetahuan terkait teknologi. Adapun strategi yang dianggap paling efektif mencakup peningkatan pelatihan, pembagian tim tersegmentasi berbasis teknologi, dan penguatan regulasi. Selain itu, hasil analisis menunjukkan bahwa faktor utama dinilai serupa oleh semua kelompok responden, baik ditinjau dari jenis perusahaan (BUMN dan swasta) maupun kualifikasi profesional (bersertifikat atau tidak), meskipun terdapat variasi penilaian pada papan informasi digital, GIS, dan fotogrametri yang lebih diapresiasi BUMN, serta hambatan dukungan teknis dan ketersediaan staf terampil yang lebih dikhawatirkan oleh perusahaan swasta. Implikasi dari temuan ini diharapkan dapat memberikan dasar bagi perumusan strategi adopsi teknologi keselamatan yang lebih terarah bagi pembuat kebijakan, asosiasi industri konstruksi, dan pelaksana proyek, guna mendorong penerapan yang lebih efektif dan berkelanjutan di sektor konstruksi Indonesia.

KATA KUNCI: Manajemen risiko kerja, teknologi digital konstruksi, strategi adopsi teknologi, *mean score ranking*, industri konstruksi Indonesia

ABSTRACT

The low adoption of technology in construction safety management in Indonesia poses a unique challenge amid demands for improved safety performance. Although digital transformation has developed rapidly in the global construction sector and has been proven to support effective safety management, its implementation in Indonesia remains limited and has not been optimally integrated. This study aims to: (1) examine the most promising digital safety technologies for adoption in the construction industry in Indonesia; (2) examine the benefits of digital technology implementation on construction safety performance; (3) examine the barriers to its implementation; (4) evaluate the most relevant implementation strategies to improve construction safety; and (5) detect differences in perception between state-owned and private companies, as well as between certified and non-certified respondents, regarding factors influencing digital safety transformation.

A quantitative survey was conducted using a questionnaire targeting construction stakeholders who understand safety issues and digital technology adoption. A total of 123 professional responses were deemed valid for analysis using the mean score ranking technique and the Mann-Whitney test to assess differences in respondent group perceptions. The instrument was developed based on an in-depth literature review and validated through interviews with five experts.

The study results indicate that CCTV, BIM, and safety applications are the most prominent technologies in implementation. The three main benefits perceived include improved reporting and monitoring, visualization of field conditions, and training effectiveness. The main barriers include high costs, limited human resource training, and lack of knowledge related to technology. The strategies considered most effective include enhancing training, forming technology-based segmented teams, and strengthening regulations. Additionally, the analysis revealed that the primary factors were similarly evaluated by all respondent groups, regardless of company type (state-owned or private) or professional qualifications (certified or uncertified), although there are variations in assessments regarding digital information boards, GIS, and photogrammetry, which are more appreciated by SOEs, and technical support challenges and the availability of skilled staff, which are more concerning for private companies. The implications of these findings are expected to provide a basis for formulating more targeted safety technology adoption strategies for policymakers, construction industry associations, and project implementers, to promote more effective and sustainable implementation in Indonesia's construction sector.

KEYWORDS: *Work risk management, digital construction technology, technology adoption strategy, mean score ranking, Indonesian construction industry.*