

Abstrak

Tahap *Detail Engineering Design* (DED) merupakan tahapan penting dalam proyek infrastruktur karena menjadi dasar pelaksanaan konstruksi serta berpengaruh terhadap pencapaian target waktu, biaya, dan mutu proyek. Pada praktiknya, perusahaan konsultan teknik masih menghadapi berbagai risiko pada tahap DED yang berpotensi memengaruhi kinerja operasional perusahaan, khususnya dari aspek waktu penyelesaian pekerjaan, biaya internal, dan pengelolaan sumber daya manusia. Penelitian ini bertujuan untuk melakukan kajian guna mengidentifikasi risiko yang muncul pada tahap DED, menganalisis tingkat probabilitas dan dampak risiko, serta mengklasifikasikan dan menentukan respons risiko berdasarkan matriks risiko, serta implikasinya terhadap kinerja operasional konsultan teknik.

Penelitian ini menggunakan pendekatan kualitatif dengan dukungan analisis kuantitatif sederhana melalui metode *Probability Impact Matrix* (PIM). Objek penelitian adalah PT Krida Pratama Adhicipta dengan studi kasus pada Proyek Jembatan Lewamori di Kabupaten Bima dan Proyek Jalan Tol IKN Segmen 4A (Sp. Tempadung–Inner Ring Road). Data diperoleh melalui telaah dokumen, *Focus Group Discussion* (FGD), dan *expert judgement* dari tenaga ahli yang terlibat langsung dalam penyusunan DED.

Hasil penelitian menemukan 15 risiko utama proyek pada tahap DED, meliputi risiko teknis, risiko data dan survei, risiko koordinasi, risiko regulasi, serta risiko operasional. Pada Proyek Jembatan Lewamori, risiko dominan berada pada kategori tinggi dengan respons *avoid*, *mitigate*, dan *transfer*. Pada Proyek Jalan Tol IKN Segmen 4A, risiko dominan juga terkonsentrasi pada kategori tinggi dan sedang dengan respons risiko yang serupa. Implementasi respons risiko diharapkan mampu menurunkan tingkat risiko sebesar 6%–85%, sehingga sebagian besar risiko sisa berpindah dari kategori tinggi ke kategori sedang dan rendah. Temuan penelitian menunjukkan bahwa pengelolaan risiko yang sistematis melalui matriks risiko diharapkan dapat membantu konsultan teknik memprioritaskan penanganan risiko, mengendalikan keterlambatan pekerjaan, mengurangi potensi peningkatan biaya internal, serta meningkatkan efektivitas pengelolaan sumber daya manusia pada tahap DED.

Kata kunci: manajemen risiko, *Detail Engineering Design* (DED), matriks risiko, konsultan teknik, kinerja operasional, proyek jalan tol, proyek jembatan.

Abstract

The Detailed Engineering Design (DED) phase is a critical stage in infrastructure projects because it serves as the foundation for construction and influences the achievement of project timelines, costs, and quality targets. In practice, engineering consulting firms still face various risks during the DED phase that have the potential to affect the firm's operational performance, particularly in terms of project completion time, internal costs, and human resource management. This study aims to conduct a review to identify risks that arise during the DED phase, analyze the probability and impact of these risks, and classify and determine risk responses based on a risk matrix, along with their implications for the operational performance of engineering consulting firms.

This study employs a qualitative approach supported by simple quantitative analysis using the Probability Impact Matrix (PIM) method. The subject of the study is PT Krida Pratama Adhicipta, with case studies on the Lewamori Bridge Project in Bima Regency and the IKN Toll Road Project Segment 4A (Tempadung–Inner Ring Road). Data were obtained through document review, Focus Group Discussions (FGDs), and expert judgement from specialists directly involved in the preparation of the Detailed Engineering Design (DED).

The study identified 15 major project risks at the Detailed Engineering Design (DED) stage, including technical risks, data and survey risks, coordination risks, regulatory risks, and operational risks. In the Lewamori Bridge Project, the dominant risks fall into the high category, with responses of “avoid,” “mitigate,” and “transfer.” In the IKN Toll Road Project Segment 4A, the dominant risks are also concentrated in the high and medium categories, with similar risk responses. Implementing these risk responses is expected to reduce risk levels by 6%–85%, thereby shifting most residual risks from the high category to the medium and low categories. The research findings indicate that systematic risk management through a risk matrix is expected to help engineering consultants prioritize risk mitigation, control project delays, reduce the potential for internal cost overruns, and improve the effectiveness of human resource management during the DED phase.

Keywords: risk management, Detailed Engineering Design (DED), risk matrix, engineering consultant, operational performance, toll road projects, bridge projects.