

## ABSTRAK

Sugandi, H. (2025). *Pengembangan model manajemen risiko berbasis teknologi (Predictive Risk Intelligence Model) untuk proyek jalan tol: Studi kasus pembangunan Jalan Tol Serpong–Balaraja Seksi 1B* (Proposal Tesis, Institut Sains dan Teknologi Nasional).

Proyek jalan tol sebagai infrastruktur strategis nasional memiliki tingkat kompleksitas dan ketidakpastian yang tinggi, sehingga memerlukan pendekatan manajemen risiko yang mendukung pengambilan keputusan berbasis prioritas. Penelitian ini bertujuan mengembangkan *Predictive Risk Intelligence Model* untuk menganalisis dan memprioritaskan risiko pada *Proyek Jalan Tol Serpong–Balaraja Seksi 1B* melalui integrasi *Risk Severity Index* (RSI), matriks *Likelihood–Impact*, dan *Analytical Hierarchy Process* (AHP).

Penelitian ini menggunakan pendekatan *mixed qualitative–quantitative* dengan kerangka *Discover–Define–Develop–Deliver*. Data diperoleh melalui studi literatur, telaah dokumen proyek, serta wawancara dan kuesioner penilaian risiko terhadap tujuh informan kunci yang mewakili unsur pemilik proyek, kontraktor, konsultan, dan pemerintah daerah. Tahap analisis meliputi perhitungan RSI, pemetaan risiko, dan pemeringkatan risiko menggunakan AHP dengan pembobotan *Likelihood* sebesar 0,25 dan *Impact* sebesar 0,75.

Hasil penelitian menunjukkan bahwa risiko keterlambatan pembebasan lahan (RSI = 25) dan curah hujan ekstrem serta banjir (RSI = 20) merupakan risiko dominan. Pemeringkatan AHP menempatkan keterlambatan pembebasan lahan sebagai risiko prioritas tertinggi (skor 1,00), diikuti risiko lingkungan dan kegagalan struktur atau desain. Integrasi RSI dan AHP menghasilkan prioritas risiko yang lebih komprehensif dan mendukung penentuan arah pengelolaan risiko proyek secara sistematis.

**Kata kunci:** risiko, infrastruktur, RSI, AHP

## ABSTRACT

Sugandi, H. (2025). *Development of a technology-based risk management model (Predictive Risk Intelligence Model) for toll road projects: A case study of the Serpong–Balaraja Section 1B Toll Road Project* (Master’s thesis proposal, National Institute of Science and Technology).

Toll road projects as national strategic infrastructure involve high complexity and uncertainty, requiring risk management approaches that support priority-based decision-making. This study aims to develop a Predictive Risk Intelligence Model to analyze and prioritize risks in the Serpong–Balaraja Toll Road Project Section 1B through the integration of the *Risk Severity Index* (RSI), the *Likelihood–Impact* matrix, and the *Analytical Hierarchy Process* (AHP).

This research adopts a *mixed qualitative–quantitative* approach using the Discover–Define–Develop–Deliver framework. Data were collected through a literature review, project document analysis, and interviews combined with risk assessment questionnaires involving seven key informants representing the project owner, contractor, consultant, and local government. The analysis includes RSI calculation, risk mapping, and AHP-based prioritization with criterion weights of 0.25 for Likelihood and 0.75 for Impact.

The results indicate that land acquisition delay (RSI = 25) and extreme rainfall and flooding (RSI = 20) are the most critical risks. AHP prioritization ranks land acquisition delay as the highest-risk factor (AHP score = 1.00), followed by environmental risk and structural or design failure. The integration of RSI and AHP provides a comprehensive risk prioritization framework to support systematic risk management decisions in toll road projects.

**Keywords:** risk, infrastructure, RSI, AHP