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**DEVELOPMENT OF A RAILWAY NOISE MODEL FOR
SRI LANKA**

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Degree of Master of Science in Civil Engineering

Department of Civil Engineering

University of Moratuwa

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Thesis/Dissertation submitted in partial fulfilment of the requirements for the degree
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DECLARATION

I declare that this is my own work, and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Name of the supervisor: Prof. J. M. S. J. Bandara

Signature of the supervisor:

Date: 27.08.2025

Abstract

Railway noise poses a significant environmental concern in many countries. With the expansion of railway networks and increased train transportation for passengers and goods, the issue has been aggravated. Railway noise can have various adverse health impacts, and the lack of noise-related impairment data highlights the issue, emphasizing the need for more research and attention to mitigate the noise pollution's impact. Understanding the factors influencing railway noise is crucial for developing precise noise models and finding effective noise management strategies. Existing noise models have been developed to align with regional contexts and infrastructure, with different models considering varying sets of factors. However, many of these models lack compatibility with unique local conditions, such as those in Sri Lanka, where factors like braking systems, track characteristics, bridge effects, and maintenance variations play a significant role in railway noise generation and propagation. This study aims to develop a model predicting railway noise levels, incorporating distinctive elements. Key factors considered are speed, engine type, brake system, working principle, locomotive operational years, locomotive maintenance details, sleeper type, track alignment, environment type, distance, and the influence of bridge or level crossing. The model is tested using data from Sri Lanka and noise levels adjacent to railway lines were measured using a noise level meter. The analysis of pre-processed data through one-hot encoding, multicollinearity analysis and multiple regression analysis has revealed significant insights into the varying contributions of different factors to railway noise. The study has identified factors with substantial impact as well as those with minimal influence on the railway noise levels. Locomotive type, brake system type, working principle, bridge, track alignment, distance and speed exert a substantial impact on railway noise levels compared to other considered factors such as locomotive operational years and locomotive maintenance details. Using this mathematical model, a noise dispersion map for the coastal railway line was developed with ArcMap, providing a visual representation of noise impact in adjacent areas. The study's findings emphasize the need for targeted noise mitigation measures, including prioritizing the use of quieter Diesel Multiple Units (DMUs), speed regulations in noise-sensitive areas, and infrastructure modifications such as noise barriers and smoother track designs in critical zones like curved railway lines and bridge crossings. These measures aim to guide railway operators in implementing sustainable noise management strategies, ultimately improving the quality of life for communities near railway lines.

Keywords: Railway noise, Noise model, Noise mitigation

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