

Development of Road Safety Management System for the Road Network at National Level

L.M.K. Rathnayaka, H.R. Pasindu

Abstract

Road safety holds immense significance as it directly impacts the preservation of human lives, public well-being, and socioeconomic development. The inadequate attention given to road maintenance management and the insufficient actions taken regarding safety concerns poses significant challenges in ensuring road safety. Local authorities in Sri Lanka face significant challenges in effectively selecting the most critical safety issues, prioritizing road sections, and implementing targeted measures to address them within the constraints of allocated budgets. This study aims to develop an evidence-based framework for prioritizing road safety interventions on Sri Lanka's national road network, focusing on A and B-class roads. By addressing gaps in current road maintenance practices and enhancing decision-making tools, the study seeks to enable more effective identification of high-risk segments and targeted safety improvements.

To achieve this, the national road network is evaluated using a comprehensive approach involving three key

assessments: roadway environment (considering urban and rural contexts), road infrastructure (utilizing risk assessment tools and road safety indices), and crash severity (severity level of historical crash). For the purpose of analysis, the national road network will be segmented into 0.5 km sections using a static segmentation method and available crash data. High-risk road segments will be identified based on the frequency of accidents and the number of casualties. The analysis will utilize crash data from the Sri Lankan Accident Database System, covering the last five years. This data will be processed and analyzed using advanced machine learning techniques, specifically an extended version of the sliding window method, to determine the location and length of these high-risk segments. Subsequently, the three road safety risk assessments will be conducted on the selected high-crash sections, and the level of service (road safety performance) for each segment will be graded using a performance matrix. Based on the results of the three safety assessments (roadway environment, road infrastructure, and crash severity), a macro-level decision-making matrix will be developed to prioritize safety improvements across the national road network.

This matrix will categorize road segments by their risk levels and safety performance, enabling road development agencies to make informed decisions about resource allocation. It will also help to identify which segments need

immediate attention, ensuring that critical areas are addressed with greater priority.

Keywords: *Road Safety, National Road, Crash data, Road Segmentation, Risk Assessment, Safety Prioritization*

1. University of Moratuwa, Moratuwa, Sri Lanka.
malindulr@gmail.com
2. University of Moratuwa, Moratuwa, Sri Lanka.
pasindu@uom.lk