

**FRAMEWORK TO INCORPORATE SAFETY
PERFORMANCE IN HIGHWAY ASSET
MANAGEMENT SYSTEM- CASE STUDY ON
PROVINCIAL ROADS**

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Degree of Master of Engineering

Department of Civil Engineering

University of Moratuwa
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DECLARATION OF THE CANDIDATE AND THE SUPERVISOR

I declare that this is my own work and this 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 Supervisor: Dr.H.R.Pasindu

Signature of the supervisor:

Date:

ACKNOWLEDGMENT

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ABSTRACT

According to the functional and management obligations, the road network in Sri Lanka is classified into national, provincial, and local authority roadways. Provincial roads in Sri Lanka are considered class C and D, which serve as connections between urban and rural areas to ensure social and economic necessities. Even though it is a developing country, the majority of these roads are in poor condition, and safety concerns are minimal. The lack of accurate accident data and a road condition monitoring program are frequently mentioned factors. This study proposes a methodology to determine a safety index to evaluate safety performance on provincial roads in Sri Lanka with the maintenance scheme using an optimization approach. A cumulative safety index (CSI) is computed with fundamental elements such as exposure, probability, and consequences. The Computed Cumulative Safety Index (CSI) is validated using available crash data. All severity levels in the crash data, such as fetal, grievous, and non-grievous, are translated to a single scale termed Equivalent Property Damage Only (EPDO) to validate the results. Once the actual EPDO is calculated, a multiple regression analysis tool is used to determine the relationship between the actual EPDO and a computed CSI composed of identified safety issues in the road segments. Actual EPDO and estimated EPDO were compared using Root Mean Square Error (RMSE). Safety treatments are implemented for the identified safety issues at the given location. All of the safety treatments are unable to be implemented in the area due to a lack of funds. A framework is proposed to include safety performance in the Highway Asset Management System, particularly in the optimization analysis, which comprises the objective of minimum average network CSI. The results from the study show that roads with safety concerns are prioritized in budget allocation with a feasible combination of safety treatments. This methodology provides a crucial analytical tool to the Highway Management System, which simplifies the process of including road safety performance in provincial road network management.

Key words: Provincial roads, Safety Index, Cumulative Safety Index, EPDO, Optimization

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LIST OF ABBREVIATIONS

Abbreviation	Description
SI	Safety Index
CSI	Cumulative Safety Index
EPDO	Equivalent Property Damage Only
HAMS	Highway Asset management System
NPRDD	Northern Provincial Road Development Department
PRDD	Provincial Road Development Department