

Comparative Analysis of Methodologies for In-built Network-wide Road Safety Assessments

Elvis Chia Ngwah^{a*}, Steffel Ludivin Feudjio Tezong^a, Stephen Kome Fondzenyuy^a, Brayan González-Hernández^a, Davide Shingo Usami^a, Luca Persia^a.

^aResearch Centre of Transport and Logistics, Sapienza University of Rome, Italy

*Corresponding Author, Sapienza Università di Roma,

Via Eudossiana 18 – P.O. 00184 Rome, Italy; Tel: +39 3517652428; E-mail: chiangwah.elvis@uniroma1.it

Abstract

In-built Road Safety Assessment (IRSA) consists of evaluating the safety performance of the sections within the road network based on the design, operation and maintenance characteristics of the road. This is a proactive assessment method that can identify, evaluate, and classify risks on the network even before a crash occurs. It is the most widely accepted approach for road network assessment. The new EU network-wide IRSA methodology differs from existing methodologies in terms of network segmentation, risk index, and safety ranking. As a result, the objective of this study is to compare the efficiency of this novel methodology to the simplified methodology proposed by the World Bank for IRSA. Both assessments are conducted on the same road network, considering the same road attributes and safety quantities. Findings indicate that the EU proactive approach identified more critical road sections than the World Bank methodology, which is very significant at this moment as road practitioners engage in performing network-wide assessments to meet-up with the European Commission deadline. This study informs road engineers and practitioners on the efficiency of IRSA methodologies in evaluating the safety performance of road networks, resulting in the proper identification of high-risk sections.

Keywords: Road safety assessment, network-wide analysis, in-built systems, comparative analysis.

1. Introduction

The recent global status report on road safety indicates that over 1.19 million people continue to lose their lives on the world's roads annually (WHO, 2023). Among the three main contributory factors to crashes, road infrastructure is responsible for over 30 -40% of all the fatalities. The optimum solution to improving the road infrastructure is by assessing the safety performance of road networks to identify the critical road sections in the network. These assessments can be carried out based on historical crash data which is known as the reactive approach, or based on the design characteristics of the road, which is known as the proactive approach. Proactive approach is widely accepted among researchers since critical sections can be identified and treated even before crashes occur. Proactive methods that rely on the design characteristics of the road are also known as in-built road safety assessment methods. Many existing in-built assessment methods are risk-based, meaning they consist of the three risk components - exposure, probability and severity. On the other hand, new methods like the scoring method proposed by (Dragomanovits 2023), diverts from the risks concepts to assigning safety quantities directly to road parameters as reduction factors. As a result, this study seeks to comparatively appraise the efficacy of these methods in the identification and classification of critical road sections.

2. Methodology

The two methodologies selected for comparative analysis in this study include:

- The World Bank Simplified Methodology (Antonino et al., 2018). which is risk-based, and
- The new EU Proactive Network-wide IRSA methodology by (EC 2023), which is score-based.

All the methodologies are applied on the same road network to determine the safety performance of the sections in the entire road network.

3. Results

Initial findings indicate that the EU proactive approach identified more critical road sections than the World Bank IRSA methodology, which is very significant at this moment to road practitioners as they engage in performing network-wide assessments to meet-up with the European Commission deadline, come December 2024.

4. Discussion and conclusion

Road infrastructure improvements can contribute in reducing road fatalities and serious injuries on the roads. The optimum solution is by identifying and eliminating high risk sections. IRSA methodologies are accepted worldwide as the best approach in safety assessment of road networks. It is also very important to understand the potentials of existing IRSA methodologies as the choice of method varies depending on the level of comprehension of the practitioner.

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