

Thesis title:

Development of Pavement Management System for Low Volume Roads in Sri Lanka

Abstract:

In Sri Lanka, there is about 119,490 km total length of roads and among those about 74% are considered as rural low volume roads (LVRs). These roads are playing a pivotal role in community development, transport of people, goods, and services in the rural areas by providing the connectivity between residential, agricultural areas and the national road network. Limited funding, subjective and ad-hoc maintenance decision making has resulted in suboptimal maintenance level for these road networks. Moreover, the inability to collect extensive data as needed to run most pavement management systems (PMSs) and extensive technical expertise required has resulted in the low usage of such systems by local road agencies. Therefore, there is a need to develop a cost-effective simplified approach for network-level decision making to assist in pavement maintenance management. The study explores the applicability of smartphone-based roughness data to assess the pavement condition of LVRs as a novel pavement performance evaluating criteria. Moreover, it is assessed whether roughness results represent pavement distress conditions in the LVRs. Furthermore, the relevant maintenance strategies are identified by establishing threshold and trigger values. In this study, socio-economic factors incorporated in the maintenance planning decision-making process and decision tree progression. A network-level maintenance strategy budget estimation tool will also be introduced by considering different road surface conditions and maintenance strategies used in LVRs. Further, a framework is to be proposed to incorporate safety performance in decision criteria especially in the multi-objective optimization process of the PMS. The core attributes of the proposed system are, reduced the data requirements, simplified the analytical tools and allowing users to customize considering the resource constraints in prioritization and optimization and that would allow road agencies to make objective decisions and optimize the road maintenance process.