

Finding AADT Thresholds for Upgrading Low Volume Roads in Sri Lanka (Using HDM-4 Model)

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The Highway Development and Management Tool (HDM-4) is a powerful system for the analysis of road management and investment alternatives and it is used to prepare road investment programmes and to analyze road network strategies.

In this study, the HDM-4 tool is used to find the AADT thresholds based on traffic, subgrade and climate for upgrading low volume roads to maximize economic benefits in Sri Lanka.

Several road sections were defined based on different possible traffic, subgrade and climatic conditions for Gravel, Penetration Macadam (PM), Surface Dressed (SD), Portland Cement Concrete (PCC) and Asphaltic Concrete (AC) pavement types. Altogether more than 120 sections were modeled in HDM-4. Level-1 calibration was done in HDM-4 to harmonize with the Sri Lankan condition. Using HDM-4 strategy analysis, different rehabilitation and improvement alternatives were analyzed. Maintaining existing pavement considered as the base case. Analysis was done for a 20-year period and optimized for maximum NPV.

The outcomes of the analysis EIRR was compared in tabular and graphical forms in order to identify the AADT thresholds for traffic, subgrade and climate for upgrading each pavement type. This shows that traffic volume and growth rate are significantly affected and whereas the effect of climate and of sub grade condition are negligible.

Upgrading threshold of low volume road can be decided based on traffic volume in AADT with a fair assessment of the number of heavy vehicles, traffic growth rate and climate condition. According to the study, AADT ranges were defined to get maximum economic benefit for different pavement types of low volume roads in Sri Lanka.

Furthermore it can be concluded that low volume roads (AADT less than 1000) in Sri Lanka can use Gravel, PM or SD pavement type with proper maintenance and it is more economical than upgrading to AC or PCC.

Keywords: HDM-4, Low volume roads, Pavement upgrading, Road maintenance

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