Finding Thresholds Based on Traffic, Sub-grade and Climate for Upgrading Surface Type of Roads Using HDM-4 Model

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

In this study HDM-4 tool is used to find the thresholds based on traffic, subgrade and climate for upgrading minor roads 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. All together more than 300 sections were modeled in the HDM-4. Level-1 calibration was done in HDM-4 to harmonize with Sri Lankan condition. Using HDM-4 strategy analysis different rehabilitation and improvement alternatives were analyzed maintaining existing pavement as considering base case. Analysis were done for 20 years period and optimized to get maximum NPV.

The outcomes of the analysis, that is NPV and EIRR were compared in tabular and graphical forms in order to identify the thresholds of traffic, subgrade and climate for each pavement category for upgrading the surface type. This saws traffic volume is significantly affected and effect of subgrade condition and climate is less. It saws upgrading of Gravel road to PM is not feasible unless average daily traffic is greater than 150 vpd and it is not worthy to upgrade to PCC under considered conditions. Upgrade of PM road to SD is feasible if traffic is greater than 600 vpd and not worthy to upgrade to AC or PCC under the considered conditions. Upgrading of SD road to AC or PCC is not feasible under considered traffic and other conditioned. Furthermore it can conclude minor roads in Sri Lanka can used Gravel, PM or SD pavement type with proper maintenance under traffic volumes less than 1500 vpd and it is more economical than upgrading to AC or PCC. But AC or PCC roads can last long in good condition even without any maintenance.

Key words: *HDM-4, NPV, EIRR*

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