

DEVELOPMENT OF CONDITION PREDICTION MODEL FOR BITUMINOUS ROADS TO ENHANCE ROAD MAINTENANCE MANAGEMENT SYSTEM (RMMS) AT TANROADS: The Case of Dar es Salaam Region.

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ABSTRACT

Road Maintenance Management System (RMMS) currently used by TANROADS cannot predict road condition on its own. To facilitate road condition prediction, RMMS has been integrated with Highway Development and Management System(HDM-4) which requires much calibration of its input data and professionalism for its application. These challenges can be overcome by developing an alternative simplified pavement condition prediction model that might be inbuilt into RMMS to enhance its prediction capability.

This study aimed at developing condition prediction model for bituminous roads in Dar es Salaam region to enhance Road Maintenance Management System(RMMS) at TANROADS. It was guided by three specific objects which were to identify types of pavement surface distresses on bituminous roads, to assess types of maintenance treatments adopted for bituminous roads and to develop condition prediction model for bituminous roads in Dar es Salaam region.

Through observation and extraction of data from the database, five types of pavement surface distress were identified and represented by International Roughness Index (IRI) which was used as dependent variable in this study. Routine and periodic maintenance were also identified as the types of maintenance treatments performed on the investigated roads. However, during the sampled years, only routine maintenance was adopted as the said roads were still within the design life.

Excel software package and SPSS were used to determine mean, variance, standard error, kurtosis, scatter plots and develop regression equations. Multiple linear regression procedure was applied to develop condition prediction models. The International Roughness Index (IRI) data were used as the independent variable while the age of pavement, routine maintenance, traffic loading and rainfall intensity were used as independent variables.

Five prediction models were developed to predict road pavement condition in Dar es Salaam region. Significance tests were used to determine whether the developed models met the given boundary conditions. Results indicated that age of pavement surface, routine maintenance and traffic loading had effect on dependent variables(IRI) at 0.05 significance level for all investigated pavements. However, rainfall intensity had no effect on dependent variable(IRI) for all investigated roads.

The developed model equations were validated by comparing predicted and actual IRI (m/km) and found to be statistically sound.

Recommendations were made on improvement of pavement maintenance management database to improve subsequent models and further studies were recommended to incorporate other variables such as pavement temperature, material properties and structural number to refine the developed models.

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