Effect of Traffic Composition on Capacity of Two Lane Roads under Mix Traffic Condition

K.D.Y. Kaushalya[1], J.M.S.J. Bandara[2]

Abstract

The analysis of traffic performance on two-lane roads is important for planning, design, maintenance, rehabilitation, and operation. Performance evaluation is typically carried out with the capacity analysis for various highway facilities. There are various factors that affect the capacity of a road; lane width, lateral clearance, vehicle composition, existence of intersections, flow speed, drivers and vehicular characteristics, etc. Evaluating the performance of the two-lane roads is not an easy task because of these distinct characteristics associated with these roads. The majority of the Sri Lankan urban and suburban roads have only two lanes. The vehicle composition in Sri Lanka consists of various types of vehicles such as car, three-wheeler, motorcycle, bus, etc. Due to that reason, mixed traffic conditions prevail and it is a major concern in Sri Lanka with respect to highway planning. Thus, determining capacity under the heterogeneous condition is a challenging task.

This research is conducted in order to identify a relationship between vehicle composition and the capacity of two lane roads in Sri Lanka. Ramanayya (1988) designed speed-flow models by running a simulation model, named MORTAB, for different volumes and percentage compositions of vehicle types in India. In order to conduct this research data is collected in nine different two-lane roads within Colombo city and suburbs. The infrared traffic lodger was used to collect traffic data. PCU values for the vehicles were obtained using Chandra's method [*Dynamic PCU and estimation of capacity of urban roads*, Indian Highways, pp. 17-28, (1995)]. The analysis is conducted road wise and vehicle percentage wise. After a regression analysis conducted on speed density curves of several locations, it was identified that Greenshield's model is the optimum model since it generates higher R^2 values which are close to 1 in all the selected locations. The results are then analysed to identify a generalized relationship in vehicle composition and the capacity on two lane roads when all or few of the vehicle types are present.

It is observed that the capacity increases when the car percentage increases. Capacity decreases when the three-wheel percentage increases. The presence of slow moving vehicles reduces the

capacity of a two-lane road. Further evaluation needs to be carried out in the same location for different compositions at the same flow rate also at more locations to evaluate the effect of other vehicle types. More accurate results can be derived in further research.

———————————————

1. Undergraduate, Department of Civil Engineering, University of Moratuwa, yoshitha.kaushalya@gmail.com
2. Senior Professor, Department of Civil Engineering, University of Moratuwa, Sri Lanka, bandara@uom.lk