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Effects of Non-Motorized Vehicles on Mixed Traffic- A Review

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Abstract: In India, almost all the road traffic consists of mixed traffic like cycles, rickshaws, auto, pull cart and so on. Non-motorized transport (NMT) plays a dominant role as an affordable, but sometimes unpleasant and dangerous. The study is to assess the effect of Non-motorized vehicles on traffic density.
The mixed traffic affects the characteristics of the traffic stream like speed, density and flows during peak hours when the flow of NMVs is high.
The traffic characteristics like speed, density, and flow get affected as it is difficult to understand the behavior of traffic stream, the traffic behavior has to be understood carefully in order to design a traffic facility. In this paper, an attempt is made to study the highlights of the non-motorized vehicle and the impact on mixed traffic.
Keywords: Mixed traffic, mixed stream, traffic stream, non-motorized transport, and non-motorized vehicles

I. INTRODUCTION

In developing countries like India Non -motorized transport plays the important role as they are cheap transport mode and helps to meet the demand for door-to-door in moving people and goods safely and efficiently in the absence of mass transport system. Nonmotorized transport system runs with the power of human beings or animals as they are essential elements in multi-modal transport chains**.**

Non-motorized transport (NMT) has a favorable environmental impact. Non-motorized vehicles are the main transportation mood for a poor as it provides the work journeys for them and in some a significant source of income for them. And therefore, it has a very significant poverty impact.

In India, a Non-motorized vehicle covers 70% of vehicles trips. The maximum number of trips generated during peak hours is due to non-motorized vehicles like the bicycle, rickshaws, and hand-drawn vehicles. The presence of non-motorized vehicles on road traffic had affected the capacity of the section.

As the capacity of the non-motorized vehicle is increased, the total capacity of the section will be reduced, and it will affect the safety of the traffic stream. So proper study has to be conducted on Non-Motorized Vehicles and the problem faced by non-motorized transport on mixed traffic.

II. PAPERS REVIEWED

1) Raman et al. (2005) conducted a study on "The Effect of Rickshaws and Auto Rickshaws at Signalized Intersections" in Dhaka city. A data were collected from four signalized intersections where there is the minimum proportion of turning vehicles and high traffic volume, and then he developed a model for finding passenger car equivalents of rickshaws and auto rickshaws at signalized intersections which do not affect the PCE of rickshaws and auto rickshaws. An auto rickshaw in the mixed traffic lane affects the traffic stream a lot. The conclusion was the outcome as the green light time, the width of the signalized intersection and the number of rickshaws is more the effect is less and vice versa.

2) Raman et al. (2003) conducted an analysis of the "Effect of Non-Motorized Vehicles on Urban Road Traffic Characteristics." All the data were collected at the mid-block sections located in Dhaka by using a portable video camera and the data was decoded using a time code reader software. The data were recorded in the five-minute interval. The results square measure shown within the speed-density, speed-flow, and flow-density diagrams. He develops a model of passing, surpassing and lane utilization for heterogeneous traffic flow. With the rise of non-motorized vehicles, the speed, density, and flow reduce significantly at a certain rate.

3) Raman of Bangladesh and Fumihiko of Japan (2004) conducted research on “Passing Overtaking Characteristics and Level of Service of Heterogeneous Traffic Flow. This study was conducted in the city of Dhaka, Bangladesh. He developed a passing-overtaking model on heterogeneous traffic flow in urban cities. He attempted to provide the level of service (LOS) for this type

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of roads. He classified the level of service into six classes (A, B, C, D, E, and F). Based on the traffic characteristics of the road. The traffic characteristics considered in this study are the average speed of the passenger car and the number of passing and surpassing vehicles in the traffic stream along the section.

4) T. Oketch (2003) developed a model on the "Performance Characteristics of Heterogeneous Traffic Streams Containing Non-Motorized Vehicles." He classified the vehicles into 2 types especially, normal vehicles and non-standard vehicles. The model to investigate the impact of various non- conventional vehicles in traffic stream performance including lane capacity. The presence of non-motorized vehicles affects the traffic stream performance because of speed capabilities, poor acceleration, etc., for heterogeneous traffic streams have the reduced link capacities and saturation flows for traffic stream containing homogeneous flow with private cars. This model was used in the study of speed flow relationships of the traffic stream. It was found that the presence of these vehicles results in traffic density and volume.

5) Todd Litman © 1997-2009 conducted the study on "Quantifying the Benefits of Nonmotorized Travel" Containing Non-Motorized Vehicles to help achieve transportation planning objectives such as congestion reduction, road and parking facility value savings, consumer cost savings, and various environmental and social benefits. The study was done on non-motorized transportation tends to leverage proportionately larger reductions in vehicle travel. It discusses strategies for evaluating the advantages of improved walking and cycling conditions, accumulated non-motorized travel, and shifts from motorized to non-motorized modes. This analysis indicates that non-motorized travel provides important edges and that these benefits can increase with cost-effective incentives.

6) Herbie Hu and Robin Liggett "The Highway Capacity Manual's Method for Calculating Bicycle and Pedestrian Levels of Service:" This paper concerns the methods for calculating Pedestrian Level of Service and Bicycle Level of Service (PLOS and BLOS) as they are presented in the 2010 Highway Capacity Manual (HCM). To calculate PLOS or BLOS is to assign a grade, A through F, to a portion of roadway. PLOS and BLOS comprise a portion of the HCM's Multimodal Level of Service methodology (MMLOS). For each of these and each of the modes (pedestrian and bicycle), The details are included and the process, definitions, and formulas that produce the final score. The relative contribution of every variable in determinative the final score beneath a spread of cases and to grasp what drives the PLOS and BLOS scores and therefore to better interpret the final grade.

7) Motorized User Safety: A Manual for Local Rural Road Owners (2012). The purpose of this guide is to assist local rural road practitioners in making effective use of resources addressing non-motorized mobility and safety. Thereby Local practitioners may be road supervisors, street superintendents, engineers, planners, local officials, law enforcement officers, or others who are responsible for the rural road transportation network. Creating a lot of accommodating and viable transportation system for all road users.

8) Shaik Shajiya, J.Supriya (2017), "Traffic characteristics of Non-motorized vehicles in mixed traffic", He observed that the speed of the section is increasing till 20% of NMV and then it starts decreasing. It is due to a reason that with the increase of NMV content in the stream, traffic congestion starts increasing and it reduces the overall speed of the section.

III. CONCLUSION

A. Distance headway of motorized traffic has more effect on velocity compared to distance headway of non-motorized vehicles.

B. Distance headway of forwarding traffic has a far greater impact on velocity than distance headway of backward-moving traffic.

C. Up to a certain limit of NMV in the traffic stream, there is no effect on the traffic parameters

D. The flow and density will decrease with the increase in NMV content.

E. In divided lanes, the effect is less as compared to the undivided lanes as there exists the effect of vehicles coming in the opposite direction.

F. The NMVs are occupying the left-hand side of the road. As we follow the left-hand side drive in India and the MVs try to overtake them from the right-hand side of the road.

G. In the left first strip or 1 m from the left edge, no vehicles are present as the vehicles try to keep away from road edges as far as possible.

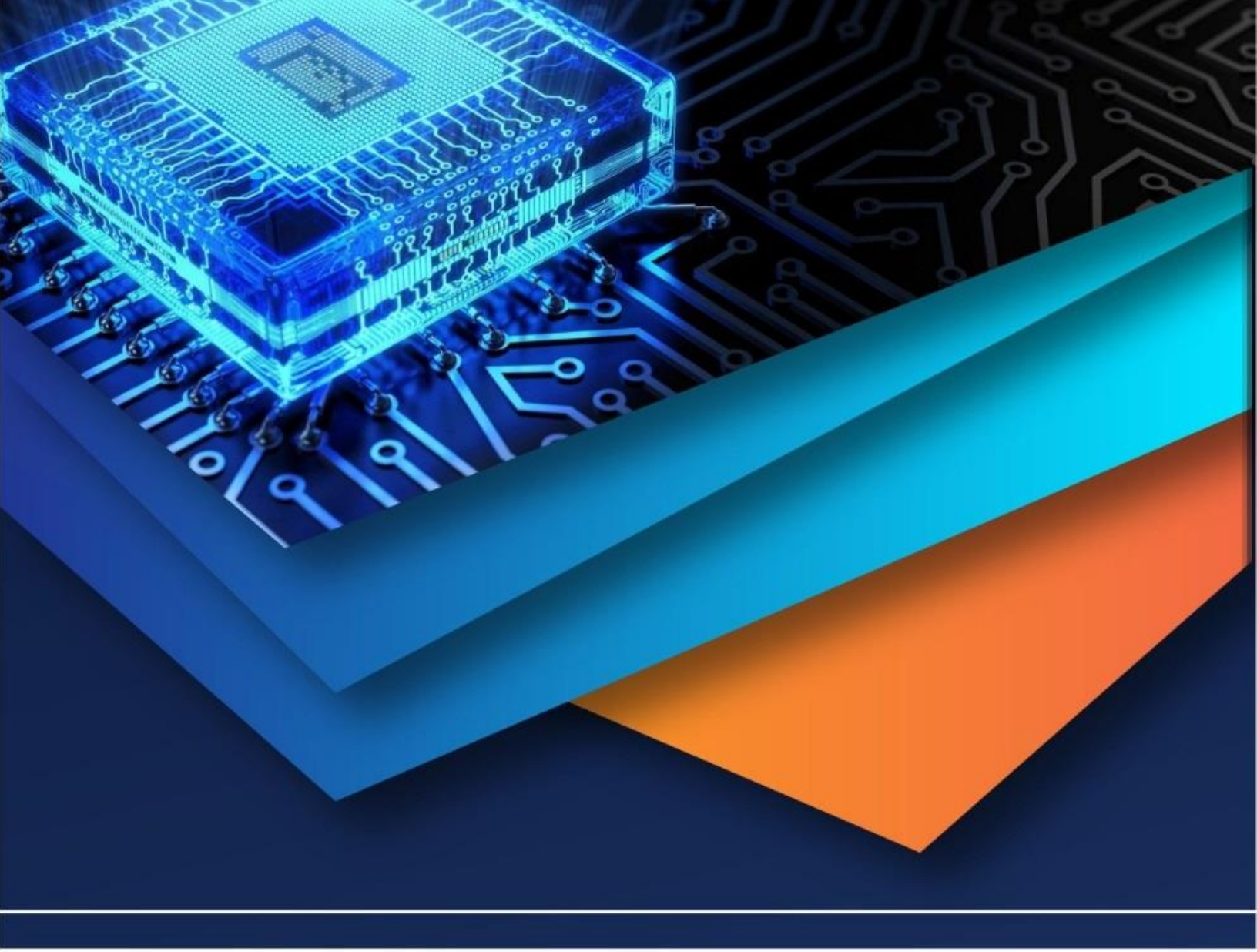
H. The psychological behavior of drivers, they try to avoid moving at the edge when there are no shoulders or raised kerbs.

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