

A REVIEW PAPER ON STUDY ON EFFECT OF NON-MOTORISED VEHICLES IN MIXED TRAFFIC MOVEMENT

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Abstract - In countries like India we generally can find a mixed traffic i.e. a traffic flow constituting of all type of vehicles like cycle, rickshaw, car, bus etc. In Indian cities the share of non-motorised vehicles at peak hours is high. Every public transport mode of transport involves access trips by non-motorised vehicles at each end. Non-motorized vehicles provide door to door service in congested parts of the cities. Thus, non-motorized mode of traffic plays a very important role in meeting travel demand in countries like India. To design a traffic facility it is necessary to understand the behavior of traffic stream. Understanding the behavior of a traffic stream with mixed traffic is quite complex. In this work an attempt has been made to study the effect of non-motorized vehicle on mixed traffic movement is made. Study area selected for this work is Majri Crossing and Zirakur-Patiala Crossing. It was found that presence of high volume of non-motorised vehicles adversely affects the traffic flow parameters like flow, density and speed. High volume of non-motorised vehicles also affects the capacity of the road.

problems. So in that case a proper study of non-motorized vehicle characteristics should be done along with study of how these NMV affects the mixed traffic.

According to United Nation's Millennium Development Goals (MDG) programme 270 million or 21.9% people out of 1.2 billion of Indians lived below poverty line of \$1.25 in 2011-2012. And these people depend on non-motorized vehicles for transportation of goods. These people depend on non-motorized mode of traffic for entire trip (for example, commuting, shopping). The demand for bicycles and rickshaws is therefore considerable at present and is likely to continue to be so. Cycle rickshaw is a popular para-transit mode that provides door-to-door service in congested parts of most Indian cities. The requirements of this mode need to be studied and better understood in relation to the socioeconomic environment. Hence to study behavior and characteristics of non-motorized vehicle and how they affect the whole traffic is concerned in this work.

1. INTRODUCTION

In traffic engineering, speed is considered to be crucial part as it is directly or indirectly related with the geometric speed, traffic operations, congestion and capacity. If traffic is heterogeneous or mixed traffic, speed is affected as there is dependence of the variation and proportion of non-motorized vehicles like cycles, tricycles, cycle rickshaws, bullock carts and hand driven carts. Non-motorised vehicles referred to different types of pedal powered vehicles used on the road. In developing countries like India, we generally can find heterogeneous or mixed traffic i.e. a traffic flow constituting of different types of vehicles like cart, cycle, rickshaw, car, bus etc. In Indian cities the share of non-motorized vehicles at peak hours is almost more than 50 per cent. This share is even higher in medium-sized and small-sized cities. Different cities have different patterns of non-motorised vehicles use. Every public transport mode of transport involves access trips by NMT at each end. Thus, non-motorized mode of traffic plays a very important role in meeting travel demand in countries like India. The flow of mixed or heterogeneous traffic is quite complicated. This mixed flow of vehicles leads to many problems like conflicts at intersections when number of non-motorized vehicle increases, when number of non-motorized vehicles increases it affects the speed and flow of other vehicles. It significantly lowers or reduces the capacity also leads to various safety

1.1 Non-Motorised Vehicles

In India, there is heterogeneous or mixed traffic where motorized and non-motorized vehicles flow together, so it is essential for traffic engineer to understand some of the characteristics of these non-motorized vehicles. The non-motorized vehicles are slow moving vehicles consist of cycles, cycle rickshaws, hand carts, horse carts and bullock carts. Non-motorized vehicles are generally pedal powered vehicles, having different shape and size which are used to transport passengers as well as goods.

1.2 Basic Parameters of Traffic Movement

Basic parameters of traffic flow to be studied are as follows:

1. Flow: It is the number of vehicles passing a specified point during a stated period of time. It is also known as volume. Flow of traffic is usually to express in vehicles/time.
2. Density: It is also known as concentration, it is the number of vehicles present in a stated length of road at an instant. Density of vehicles can be measured by counting the number of vehicles in chosen length. The number of vehicle in this length is counted on each series of frames and the mean value of density can be found by

averaging out the density in a number of frames. The density is generally averaged over certain duration of time. Density can be expressed in vehicles/distance.

3. **Speed:** In traffic engineering language speed is rate of movement of traffic or of specified components of traffic and is expressed in Km/h. In actual practice it is not possible to calculate the speed of every individual vehicle. Due to this the average speed is taken into consideration.

2. LITREATURE REVIEW

- 1) **A.C. Sarna (1990)** discussed the importance of non-motorized transport in India. According to her, cycle rickshaw is a popular para-transit mode that provides door-to-door service in congested parts of most Indian cities. According to the author, to improve the transport infrastructure, transportation studies should be conducted in Indian cities of all sizes so that more realistic transportation plans could be prepared in keeping with the prevalent socioeconomic environment. Greater attention was needed to be paid to non-motorized modes, pedestrians, and poorer sections of society, which formed a majority of the urban residents.
- 2) **T. Oketch (2003)** developed a special model to investigate the effects of various non-conventional vehicles on stream performance including lane capacity and saturation flows. He concluded that such heterogeneous streams have peculiar flows that may not confirm fully to the basic traffic theories. In addition, heterogeneous flows are generally associated with higher number of lateral movements as the faster vehicles try to overtake the slower ones.
- 3) **Md. Mizanur Rahman (2005)** stated that, the non-motorized vehicles (i.e. rickshaws) and small size motorized vehicles (i.e. auto-rickshaws) are popular para-transit modes that provided door-to-door service in congested parts of Dhaka metropolitan area. The objective of his study was to analyse the effects of rickshaws and auto-rickshaws on the capacity of signalized intersections. The results indicated that the estimated PCE value of rickshaws and auto rickshaws of this study are different from the assumed PCE values that were then used by traffic engineers of Bangladesh. He concluded that, at a higher proportion of the rickshaws discharge rate of mixed flow at signalized intersections was smaller than that at a lower proportion of rickshaws.

- 4) **Fei Shi and Haiyuan Li (2008)** conducted a study in China, on "The Influence of Non-Motorized stream on Capacities of Vehicular Streams at Un-signalized Intersections." Usually un-signalized intersections consist of Two Way Stop Controlled (TWSC) and All Way Stop Controlled (AWSC) intersections. According to author TWSC and AWSC intersections the capacity of vehicular movements reduces gradually with the increase of volumes of bicycle movements.
- 5) **S. Yamuna (2014)** studied the fundamental characteristics of speed and flow. Time-headway distribution of urban heterogeneous traffic was also studied. The result of the study had shown that, the headways of urban heterogeneous traffic could be modelled for vehicles over a wide range of traffic flow levels. According to the author more case studies and data sets were necessary to obtain further insights on headways and flows.

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