

“REVIEW - DYNAMIC EQUIVALENCY FACTOR STUDY”

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Abstract— The Dynamic Equivalency Factor (DEF) is used in order to make the heterogeneous traffic stream into homogeneous traffic stream so it becomes very necessary to compute it. The numerous factors influencing the DEF is the Traffic volume, Traffic composition, Speed, Roadway conditions etc are considered in the various papers studied over.

Keywords — Passenger Car Unit, Traffic Flow, Traffic Capacity, Traffic Volume, Dynamic Passenger Car Unit.

I. INTRODUCTION

In Indian traffic condition the traffic greatly varies in terms of the of geometrical and dynamical features. So it becomes very necessary to convert variation of the traffic unit into homogenous considering all the factors possible. The traffic consists of a large variation from the very slow moving vehicle to very fast moving vehicle. Due to large variation in the traffic it becomes very difficult to estimate the traffic capacity, traffic volume etc. So the unit which converts all the traffic into a single unit in comparison of passenger car only is required to develop considering all local factors possible.

The capacity estimate of the road, traffic flow, traffic volume and the level of service (LOS) is greatly affected by the equivalency factors and it also vary greatly as the local traffic conditions and roadway condition varies.

So the equivalency factor considering all possible roadway and traffic condition is to be developed.

TABLE I
PCU VALUES OF DIFFERENT VEHICLES AS PER
IRC SP 106-1990

Vehicle type	PCU Value
Car	1.0
Motor Cycle	0.5
Auto Rickshaw	1.0
Tempo	1.0
Truck	4.5
LCV	1.5
Bus	3.0



Figure 1: Mix Traffic Condition in India.

II. REVIEW FOR DYNAMIC EQUIVALENCY FACTOR (DCE)

1. Probhat kr Paul (2013) {8} in this paper the four urban arterial roads of Delhi city were considered. The stretch was of 30 M section and data was collected by Videography and speed, lateral clearance, headway data were extracted from 3 hours of data collection. The PCU was calculated as the ratio of speed and space required for any type of vehicle to that of the car. The effects of area, volume, speed, composition etc on PCU was found. It was found that PCU of 2-W increases with increase in motor vehicle (MV) percentage and decrease with the non motor vehicle. There was no influence of percentage of motor vehicle on 3-W. The PCU of bus was increase with decrease in speed. The PCU of 3-W decreases with decrease in the speed.
2. A.R.Khanorkar (2014) {1} in this paper the study area was Nagpur city and six sections were selected. The factor considered was Lane width and shoulder condition to determine the capacity of the road & Passenger Car unit(PCU).Videography technique was used to collect the data for longer duration and the method used to estimate capacity was Chandra & Kumar method and speed/volume relation graph. The PCU obtained in this paper varies then that suggested in IRC. It was found that the PCU increases with increase in the lane width. The obtained PCU for motor cycle was 0.35, auto rickshaw 1.14, Truck 5.51, Trailer 6.29, and L.C.V 3.1. The capacity of the road was obtained 3348.48 PCU/Hour which is higher than that of suggested in HCM 2000.
3. A .Mehar (2014) {2} in this paper interurban roads were studied one four lanes and other six lanes. A mid block section of road was selected which wasn't having any influence of intersection, conflict points etc. Data was collected using Videography for 6 hours during peak hours and non peak hours. The volume count at every 5 minute interval was extracted from the data. The PCU and capacity was estimated using Chandra & Kumar method. The VISSIM software was used to consider the effect of traffic composition on capacity and speed flow curve was established. The capacity obtained for four lanes road was 4950 PCU/Hour and six lanes was 6700 PCU/Hour. The VISSIM software uses the parameters as geometry of road, dimension of vehicle, acceleration etc. And the results are very relative to the input parameter and it was found that PCU value decrease with the decrease in the Level of Service (L.O.S).
4. Prema Somanathan Praveen (2013) {7} in this paper micro stimulation method was used determine PCU for homogenous traffic condition and mixed traffic condition. The four lanes urban road was studied and the changes in PCU values with respect to traffic composition and volume were determined. HETEROSIM software was used to compute the PCU values and it was found that at low volume the PCU increases with the increase in traffic volume and for high volume the PCU value decreases with increase in traffic volume. I was also found the on lower value the PCU was greatly affected by traffic composition than that of higher value.
5. Ashish Dhamaniya (2014) {4} in this paper 12 urban roads with 8 six lanes divided and 4 four lanes divide were studied of the city Jaipur, Delhi, Chandigarh & Bangalore. The straight section free from effects of intersection, access point, parked vehicles etc was considered. Data was collected for 12 hours using Videography from 6 AM to 6PM and traffic volume and speed were estimated from it. PCU of the vehicle was estimated as the ration of speed to space requirement of that vehicle to that of the car. Regression method was used using Excel sheet. Graphs of traffic volume to PCU and traffic composition to PCU were obtained. It was found that PCU of vehicle increases with the increase in its own numbers in traffic composition. PCU value was higher for 10 % composition than that of 5 %.The capacity of four lanes road was 1500 PCU/Hour/lane to 2100 PCU/Hour/lane and for six lane 1556 PCU/Hour/lane to 2043 PCU/Hour/lane.
6. Gaurang Joshi (2013) {6} in this paper Dynamic Vehicle Equivalency factor (DVEF) and Dynamic Two wheeler unit (DTU) were estimated using homogenization coefficient method. The traffic data of 7 cities were collected Jaipur, Kanpur, Patna, Surat, Lucknow, and Thiruvananthpuram, Pune. Traffic Volume and spot speed was calculated for 1 minute interval. The DVEF is the ratio of speed to the area of the vehicle and it was compared to codal provisions. It was found that there were great effects of driver characteristics, loading condition, speed variations etc on DVEF and DTU as well.
7. Suhas Vijay Patil {10} in this paper the effects of traffic composition, speed and headway on the PCU values were studied. The speed, time headway, road width and lateral clearance were the data collected manually. Analysis of the data was done by using the following formulas Speed distribution: - $F_u = U_c / U_v$, Headway distribution: - $F_t = T_v / T_c$, Width and lateral clearance: - $F_w = W_v / W_c$, $PCU = F_w * F_v * F_t$. It was found that the PCU value cannot be taken as a constant for all roadways as there were greater effects of local traffic composition, level of service, volume to capacity ratio etc on the PCU values.
8. Shriniwas S. Arkatkar (2012) {9} in this paper it was found that for the vehicle bigger than the car at low volume the PCU value decrease with the increase in volume and at higher volume the PCU value increases with the increase in the volume. HETEROSIM software was used for the analysis of the PCU values. It was found that for the vehicles smaller

than the car at low volume the PCU value increases with the increase in the traffic volume and at high volume the PCU value decreases with the increase in the traffic volume. It was found that the PCU values were only influenced up to 1600m of the section.

9. Brooks R. (2010) {5} in this paper it was found that for particular volume to capacity ration the speed increases with the increase in road width. It was found that at low volume the PCU values increases with the increase in the traffic volume and for high volumes it was inverse as there is no wider space way between vehicles. The PCU value for the Bus 1.5, truck 1.7 & Recreational vehicle 1.6 were determined.

10. Amr Shalkamy (2015) {3} in this paper it was found that PCU values for the vehicle increases with the increase in the roadway width and horizontal curve. It was clearly defined in the consideration of heavy vehicles for the smaller area of the vehicles with respect to the lane width the effects of lane width were not found.

III. CONCLUSION

This papers concludes from the paper studied on the Passenger Car unit (PCU) that most of the papers studied considers the passenger car unit same as for all the traffic and roadway condition as there is a large variation in traffic and roadway condition place to place. Factors such as Traffic volume, Traffic Composition, Roadway width, Speed, Acceleration etc effects greatly.

So the Dynamic Passenger Car Unit considering a large variation in the dynamic characteristics and local roadway condition is required to be developed in context to traffic condition in India.

IV. REFERENCES

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