MEASUREMENT OF TRAFFIC CONGESTION ON HIGH DENSE URBAN CORRIDORS IN HYDERABAD CITY

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ABSTRACT:
Traffic congestion has been one of major issues that most metropolises are facing. It is believed that identification of congestion is the first step for selecting appropriate mitigation measures. Congestion - both in perception and in reality - impacts the movement of people. Traffic congestion wastes time, energy and causes pollution. There are broadly two factors, which effect the congestion; (a) micro-level factors (b) macro-level factors that relate to overall demand for road use. Congestion is 'triggered' at the 'micro' level (e.g. on the road), and 'driven' at the 'macro' level. Micro level factors are, for example, many people want to move at the same time, too many vehicles for limited road space. On the other side, macro level factors are e.g. land-use patterns, car ownership trends, regional economic dynamics, etc. is paper gives an overview and presents the possible ways to identify and measure metrics for urban arterial congestion. A systematic review is carried out, based on measurement metrics such as speed, travel time/delay and volume and level of service. e review covers distinct aspects like definition; measurement criteria followed by different countries/organizations. The strengths and weaknesses of these measures are discussed. Further, a short critique of measurement criteria is presented.
This study aimed to analyze traffic congestion in urban road networks. The speed performance index was adopted to evaluate the existing road network conditions of congestion, then road segment and network congestion indexes were introduced to respectively measure the congestion levels of urban road segment and network. Urban traffic congestion has different typical characteristics under the influence of different conditions, such as different day of week, holiday and weather etc. It is necessary to set up the relationships between traffic congestion patterns and those influencing factors, when we conducting macroscopic analysis on the causes of traffic congestion. Based on Traffic Performance Index (TPI), a dynamic macroscopic index showing the whole area congestion intensity.
Keywords: *Down Town Streets, Traffic Congestion, Capacity & Level Of Service, Multiple Regration Equation.*

INTRODUCTION:

TRAFFIC IN HYDERABAD CITY

Due to rapid urbanization, the tremendous rise in number of vehicles variably accompanied by ever increasing volume of traffic and causes of traffic congestion on road almost every city in India facing acute traffic congestion, delay ,pollution , accidents etc.

One of the main sources of the increased emission load from vehicles is the growing traffic congestion in the city. Evidence from numerous cases around the globe suggests that effective traffic management measures dealing with this problem should necessarily include both supply and demand based approaches. However, the existing traffic measures in Hyderabad only focus on the supply side: strategies that improve the physical aspects of roads by increasing the road capacity either by widening existing roads or by constructing new roads or flyovers.

Ideally, urban transport policies should be developed on the basis that congestion is related to both:

• The behavior of traffic as it nears the physical capacity of the road system.

• The difference between road users' expectations of the system's performance and how the system actually performs.

Urban traffic congestion must be understood in the wider context of city dynamics and agglomeration benefits. Traffic congestion in urban areas is often the outcome of successful urban economic development, employment, housing and cultural, policies that make people want to live and work relatively close to each other and attract firms to benefit from the gains in productivity thus derived. There are many indications that, even though they may not be thrilled by the prospect, urban road users are prepared to live with crowded roads so long as they derive other benefits from living and working in their cities.

MEASUREMENT OF CONGESTION

Measuring congestion is a necessary step in order to deliver better congestion outcomes. However, congestion should not be described using a single metric for policy purposes. Such an approach is sure to obscure either the quantitative aspects of congestion or its relative and qualitative aspects. These two aspects can not be disassociated and progress in managing congestion should be based on sets of indicators that capture both of these aspect.

OBJECTIVES OF THE PRESENT SURVEY

1. To conduct traffic volume study in the selected corridors in order to set the composition of traffic
2. To conduct speed studies in the selected corridors in order to set the speed of different types of vehicles
3. To develop capacity curves by correlative volume and speed an every selected corridor
4. To find out v/c ratio and level of service in order to arrive level of congestion on every selected corridor
5. To observe the point of congestions and duration of congestion on every selected corridor
6. To develop a multiple regression equation in order to correlate speeds of the vehicles with traffic volume and road width.

LITERATURE SURVEY

• In India most of the cities are suffering from medium to high level of traffic congestion .

• Although in some major cities the growth of private vehicle usage has increased at a faster rate, in general, car ownership and usage has remained at a much lower level in India context.

• The poor road way condition, non-uniform road way features in terms carriage way and shoulder width of road, abutting land is and resulting in pedestrian activities, poor lane discipline, in proper bus stop location and design, in major cities of India the level of service is 'D',E' in which speed of vehicles is 25-35 kmph.

• Downs, defined congestion can be defined as the situation when traffic is moving at speed below the designed capacity of road way.

• Boarnet et al (1998) identified three issues addressed in measuring congestion

  • 1) reflect the full range of high way performance.
  • 2) based on widely available data.
  • 3) allow compression across metro polite areas.

• Korea highway corporation (KHC) identifies congestion spots where vehicles speeds fall below 30 km/h and traffic congestion countries longer than 2 hours a day with occurring 10 days a month .

• In japan the traffic congestion is determined if traffic speed falls below 40 km/h.
• California department of a transportation states that the freeway congestion is defined as traffic flowing below 45 miles/hr.
• In India, the congestion may be occurred when the average speed is below level of service 'D' 'E'.

METHODOLOGY:

TRAFFIC VOLUME:

Two methods are available for conducting traffic volume counts: (1) manual and (2) automatic. Manual counts are typically used to gather data for determination of vehicle classification, turning movements, direction of travel, pedestrian movements, or vehicle occupancy. Automatic counts are typically used to gather data for determination of vehicle hourly patterns, daily or seasonal variations and growth trends, or annual traffic estimates.

The selection of study method should be determined using the count period. The count period should be representative of the time of day, day of month, and month of year for the study area. For example, counts at a summer resort would not be taken in January. The count period should avoid special event or compromising weather conditions (Sharma 1994). Count periods may range from 5 minutes to 1 year. Typical count periods are 15 minutes or 2 hours for peak periods, 4 hours for morning and afternoon peaks, 6 hours for morning, midday, and afternoon peaks, and 12 hours for daytime periods (Robertson 1994). For example, if you were conducting a 2-hour peak period count, eight 15-minute counts would be required

The study methods for short duration counts are described in this chapter in order from least expensive (manual) to most expensive (automatic), assuming the user is starting with no equipment.

MANUAL COUNT METHOD:

Most applications of manual counts require small samples of data at any given location. Manual counts are sometimes used when the effort and expense of automated equipment are not justified. Manual counts are necessary when automatic equipment is not available.

AUTOMATIC COUNT METHOD:

The automatic count method provides a means for gathering large amounts of traffic data. Automatic counts are usually taken in 1-hour intervals for each 24-hour period. The counts may extend for a week, month, or year. When the counts are recorded for each 24-hour time period, the peak flow period can be identified.

PORTABLE COUNTERS:

Portable counting is a form of manual observation. Portable counters serve the same purpose as manual counts but with automatic counting equipment. The period of data collection using this method is usually longer than when using manual counts. The portable counter method is mainly used for 24-hour counts. Pneumatic road tubes are used to conduct this method of automatic counts. Specific information pertaining to pneumatic road tubes can be found in the users' manual.

VIEDO TAPE:

Observers can record count data by videotaping traffic. Traffic volumes can be counted by viewing videotapes recorded with a camera at a collection site. A digital clock in the video image can prove useful

in noting time intervals. Videotaping is not a cost-effective option in most situations. Few small jurisdictions have access to this equipment.

TRAFFIC SPEED

In recording its data, the TRAX Apollyon time-stamps every axle recorded during the count. With this time stamping, you can record one set of data and get traffic volume, speed, classification and gap data all from that one data set. What's more, the time stamp data actually lets you fix problems after the data has been collected.

ROAD WIDTH:

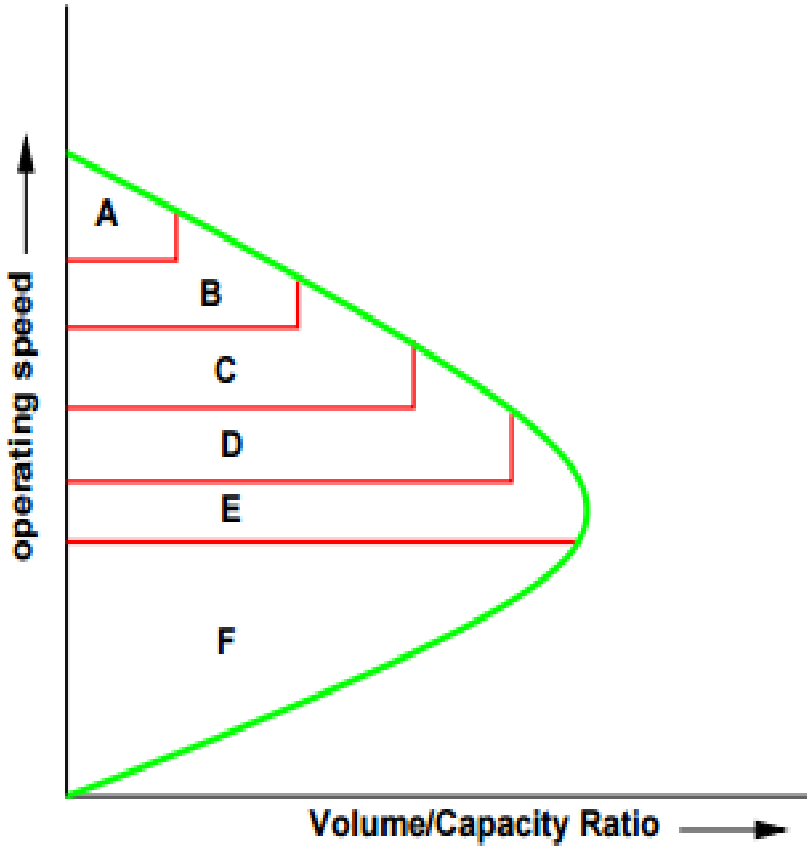
In a reduced-speed urban environment, the effects of reduced lane width are different. On such facilities, the risk of lane-departure crashes is less. The design objective is often how to best distribute limited cross-sectional width to maximize safety for a wide variety of roadway users. Narrower lane widths may be chosen to manage or reduce speed and shorten crossing distances for pedestrians.

CAPACITY AND LEVEL OF SERVICE:

LEVEL OF SERVICE

A term closely related to capacity and often confused with it is service volume. When capacity gives a quantitative measure of traffic, level of service or LOS tries to give a qualitative measure. A service volume is the maximum number of vehicles, passengers, or the like, which can be accommodated by a given facility or system under given conditions at a given level of service. For a given road or facility, capacity could be constant. But actual flow will be different for different days and different times in a day itself. The intention of LOS is to relate the traffic service quality to a given flow rate of traffic. It is a term that designates a range of operating conditions on a particular type of facility. Highway capacity manual (HCM) developed by the transportation research board of USA provides some procedure to determine level of service.

It divides the quality of traffic into six levels ranging from level A to level F. Level A represents the best quality of traffic where the driver has the freedom to drive with free flow speed and level F represents the worst quality of traffic. Level of service is defined based on the measure of effectiveness or (MOE). Typically three parameters are used under this and they are speed and travel time, density, and delay. One of the important measures of service quality is the amount of time spent in travel. Therefore, speed and travel time are considered to be more effective in defining LOS of a facility. Density gives the proximity of other vehicles in the stream. Since it affects the ability of drivers to maneuver in the traffic stream, it is also used to describe LOS. Delay is a term that describes excess or unexpected time spent in travel



FACTORS AFFECTING LEVEL OF SERVICE:

The level of service can be derived from a road under different operating characteristics and traffic volumes. The factors affecting level of service (LOS) can be listed as follows:

1. Speed and travel time
2. Traffic interruptions/restrictions
3. Freedom to travel with desired speed
4. Driver comfort and convenience
5. Operating cost. Highway Capacity Manual (HCM) used travel speed and volume by capacity ratio (v/c ratio) to distinguish between various levels of service.

The value of v/c ratio can vary between 0 and 1. Depending upon the travel speed and v/c ratio, HCM has defined six levels of service, level A to level F based on a graph between operating speed and v/c ratio as shown in the figure 35:1. Level of service A represents the zone of free flow. Here the traffic volume will be less, traffic will be experiencing free flow also.

LEVEL OF SERVICE CHARACTERSTIC FOR ARTERIAL STREETS

Level of service	Operating characteristics
A	Average speed 80 km/h or more ,v/c ratio 0.60 or less ,peak hour factor 0.70 or less
B	Average speed 40 km/h or more ,v/c ratio 0.70 or less ,peak hour factor 0.80 or less
C	Average speed 30 km/h or more ,stable flow ,v/c ratio 0.80 ,peak hour factor 0.85 or less
D	Average drops down to 25kmph , v/c ratio 0.90 or less ,peak hour factor 0.90 or less
E	Average speed 25 km/h ,unstable flow with congestion ,peak hour factor 0.95 or less
F	Average speed below 15 km/h ,v/c ratio exceed 1.0 ,force flowed with jam conditions

LEVEL OF SERVICE CHARACTERSTIC FOR DOWN TOWN STREETS

Level of service	Operating characteristics
A	Average speed 40 kph or more,free flow
B	Average speed 30 kph or more , stable flow with delay
C	Average over all speed 25 kmph ,stable flow with significant delays
D	Average over all speed 15 kmph ,unstable flow with tolerable delays
E	Over all speed below 15 kmph but moving , unstable flow
F	Forced flow ,jammed condition ,stop and go movement

DEVELOPMENT OF MULTIPLE REGRESSION EQUATION AND ANALYSIS:

Multiple Regression Equation:

In the present study, a multiple regression equation was developed by considering traffic speed of dependent variable and traffic volume and road widths as independent variables .In the present study, four corridors are selected with various road widths varying from 6.7m to 13.3m.the study is conducted keeping the view of variation of speed for variable road widths and traffic compositions

It is a fact that the speed of vehicles depends on the variable road widths and traffic composition and volume for a given road. Taking this into considerations, in the present study, multiple regression equation was developed considering traffic volume and road widths and observed how the traffic speed are varying for different variations that exist in the road width the above parameters

In development of regression equation different variables are taken into consideration. In developing equation there is a one independent variable and there are many dependent varaibles. In our independent and two dependent variables.

Speed is taken as independent variable and volume, road width are taken dependent variables.by considering three different roads we took different values from different road date and we have developed regression equation, the regression is occurred as below

Speed=33.01495-0.00684 volume+0.07355 road width

R2 value=0.9205

t-value=16.855

F-value=40.5734

P-value=0.000141

DEVELOPMENT OF MULTIPLE REGRESSION EQUATION AND ANALYSIS

In statistical modeling, regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables (or 'predictors').

More specifically, regression analysis helps one understand how the typical value of the dependent variable (or 'criterion variable') changes when any one of the independent variables is varied, while the other independent variables are held fixed. Most commonly, regression analysis estimates the conditional expectation of the dependent variable given the independent variables – that is, the average value of the dependent variable when the independent variables are fixed. Less commonly, the focus is on a quintile, or other location parameter of the conditional distribution of the dependent variable given the independent variables.

In all cases, the estimation target is a function of the independent variables called the regression function. In regression analysis, it is also of interest to characterize the variation of the dependent variable around the regression function which can be described by a probability distribution.

SUMMERY

Congestion is one of the major pre-occupation of urban decision-makers. A quick scan of policy statements from across cities highlights the importance of congestion to the public, elected officials and road and transport administrations in many urban areas. Yet, there is little

consensus across the member countries on the types of policies that are best suited to tackling congestion in cities. There is perhaps even less consensus on what precisely congestion is, whether or not it is a "solvable" problem and, in some locations and cases, whether it is problem at all.

Faced with such a divergence of views on approaches and policies for dealing with congestion, what advice can be given to policy-makers seeking to ensure the best possible transport policy outcomes? Congestion takes on many faces, occurs in many different contexts and is caused by many different processes.

Because of this, there is no single best approach to managing congestion – and the report is therefore not prescriptive about specific congestion management measures. However, there are many things that congestion management policies should take into account if they are to achieve the goals they set themselves.

CONCLUSION

In conclusion from the above equation ,it was observed that the road width is having less predominant as compared to traffic volume. On substituting the traffic volume without considering the percentage of buses, it was observed that the speed are considerably increased and reached to level of service B from level of service D.where as for constant volume, when the road width its substitutes ,the change in the speed is very less,which indicates that the road width is less predominant and increase inroad width will result in less changes in the speed. 70 We had taken the road alkapuri to kamineni between 10:00 to 11:00 am and eliminated the pcus of buses and developed the regression equation then the speed of the vehicles increases from 19.8 kmph to 27.3 kmph.so it is observed that by diverting the buses the speed of the vehicles on that road increases. The level of services moves from "D" to "C".

In the same way we had taken habsiguda to survey of India road between 05:00 to 06:00 pm and the pcus of buses are eliminated and regression equation is developed. The speed of the vehicles increases from 20.6 kmph to 31.3 kmph.The level of service moves from "D" to "B".

In now a days the extension of urban roads id difficult due to the development of large residential, commercial buildings and other structures. The widening of roads is difficult, so it is necessary to diver buses in other routes.so that we can reduce traffic congestion up to large extent in urban areas.

It is therefore concluded that on all the above selected four corridors, it is subsisted to divert the busses, which will increase the level of service and reduces consisting on the road and enable to increase the speeds of vehicles