International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 04 Issue: 05 | May -2017 www.irjet.net p-ISSN: 2395-0072

"CONGESTION MODELLING IN URBAN CORRIDORS"

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ABSTRACT: In this project we propose a new model based on traffic parameter estimation approach at Rajiv Gandhi IT Park, Hinjewadi, and Phase 2 which is most congested route. Traffic congestion occurs when a volume of traffic generates demand for space greater than the available road capacity i.e. when demand approaches the capacity of the road. There are various congestion indices that specify the intensity of congestion like delay rate ratio, travel rate ratio, congestion index. In our study, an attempt is made to minimize the traffic congestion by suggesting various alternatives and initiate free flow of traffic.

Keywords: Traffic congestion, road capacity, delay rate ratio, travel rate ratio, congestion index.

INTRODUCTION:

Traffic Congestion would be stated as, where the demand exceeds the supply. Traffic congestion has been one of sever issues that most metropolitan cities are facing and thus, many measures have been taken in order to minimize the congestion. While motorists may find congestion annoying, many of them make a choice to sit in congestion rather than avoiding the trip, they prefer use of another travel mode, take a different route or change their trip pattern. But these are not the final alternatives to reduce congestion, so we need to make analytical study to eliminate these issues. It is important to identify the characteristics of congestion, as these characteristics help in computing the respective measures for the concern issues. .Congestion - both in perception and in reality has a huge impact on regular movement of people. Traffic congestion tends to wastes time and energy and causes pollution and stress, decreases productivity and imposes costs on society.

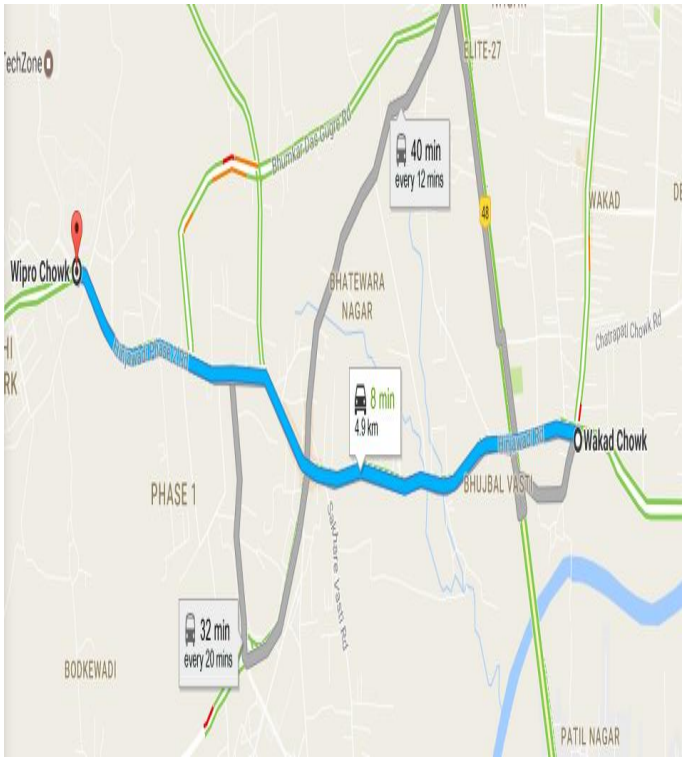
As many people move to the same place at the same time, due to minimum road width there is excess flow of vehicles which gives rise to traffic congestion. Travel time delay generally takes place due to frequent and irregular changes, either due less signal time, vehicle breakdown, less road width, speed breakers turnings. There is heavy flow o the proposed site i.e from waked to wiprochowk at Hinjewadi, Pune in mornings and vice-versa in evenings. To minimize the congestion we need to study the congestion indices. Following are the quantified congestion indices applicable on the proposed site those are :

travel rate ratio – It is the rate of change of congestion travel rate to free flow travel rate.

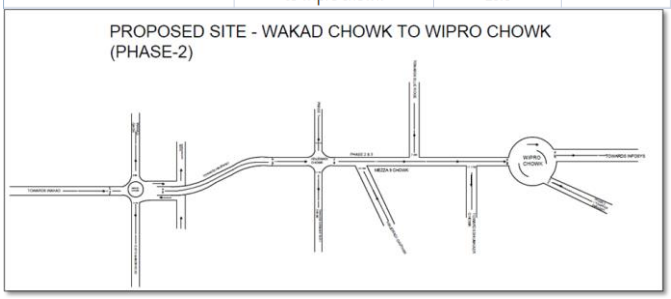
delay rate index – It is the ratio of delay rate to congestion travel rate.

level of service (LOS) – It is the ratio of volume to capacity.

The study can be similarly be applicable to the places with same issues. The contributions by individuals and methodologies for measurement of the congestion along with the critical review of the methods.



road stretch	sub- roads	width(m)	avg width
Wakad chowk to hinjewadi chowk	to hinjewadi(over bridge)	10.6	14.88
	to hinjewadi chowk	19.16	
Hinjewadi chowk toWipro chowk	towards phase 1	24.45	15.28142857
	to bhumkar vasti	14.15	
	towards phase 2&3 road	19.16	
	hinjewadi gavthan road	10.14	
	towards blue ridge	7.3	
	towards bhumkar chowk	11.17	
	to wipro chowk	20.6	



Problem statement: Now a day's traffic is the main problem in all over world. Rajiv Gandhi IT Park Hinjewadi is the biggest IT hub in pune. There are around 300 to 400 companies. This includes Infosys, wipro, cognizant, tech Mahindra, persistent and many more bigger and smaller companies over there. Total around 1.5 lacs employees work over there. So due to this community, Hinjewadi is facing problems such as traffic congestion, travel time delay and irritating noisy surrounding. On daily basis 1.5 lacs employees are travelling through that route by different modes. The route covers three intersections of total length of 4.9 km. Two alternate bypasses have been constructing over there but people are not utilizing it due to their inconvenience. In last two years various residential projects has also been proposed so that heavy vehicles carrying construction materials and equipment had ultimately lead to traffic congestion.

Objective:

- To evaluate traffic volume count.
- To find out pcu (Passenger car unit) of vehicles.
- To Estimate the LOS (level of service) of each link of selected stretch.

LITERATURE REVIEW :

Joseph. O. Ukpata, Anderson A. Etika, et al.,[E] Their study has highlighted some remedies to improve traffic congestion in Nigeria. Good road network, encouragement of mass transport system, proper traffic planning/management, regular road maintenance, construction of interchanges and regular education of road users are among the recommendations to reduce traffic congestions. The various state governments controlling most of these cities affected by congestion should encourage the use of reliable mass transit buses to reduce the number of vehicles on their urban roads. Proper and consistent bus stops which are not too far apart should be sited across each city, including provisions for enforcing compliance by bus drivers. The Federal and State governments should initiate plans for the introduction of other forms of urban transportation such as Metro and Trains which supports mass movement of people.

Olusina, J.O. and Samson, A.P., et al., [G]studied that Traffic congestion always have negative effects on lives and environment. This work has been directed at identifying causes of congestion on some selected routes in Lagos Metropolis. Questionnaires were administered. Results revealed that bad access road is the highest cause of traffic congestion, and that cars are the highest mode of transportation. For Recurrent Congestion the data on traffic volume were used to develop a generalized polynomial of n order. From the generalized model, a response (dependent) variable y for any route can be determined for any predictor (independent) variable x. Spatial queries of the various volume of traffic on these roads revealed more routes are congested between 7.00 – 8.00hrs in the morning peak period and between 16.00 – 17.00hrs and 18.00 – 19.00hrs in the evening peak period

Babitha Elizabeth Philip, Jaseela K. H, et al., [C]stated that Traffic congestion is a serious problem facing today. The causes, effects and solutions of traffic congestion vary according to the location. In this paper a model is developed to eliminate the traffic congestion to a considerable extent. Different samples are selected for the study and traffic survey was conducted. From the survey data, it was analyzed whether the selected samples are congested or not and hence the samples were finalized. A study on traffic congestion was conducted. The general causes, effects and solutions for the traffic congestion were discussed. The model as a solution for traffic congestion and to obtain an efficient movement of traffic was developed. The model for a straight link is developed in this paper.

Dr. Benjamin O. Uwadiegwu, et al., [D]stated that Traffic problems along route ways in Nigerian cities cannot be adequately addressed without proper identification of the factors responsible for the problem. For the purpose of identifying factors responsible for traffic congestion along city roads in Nigeria, 20 variables organized into 4 factors suspected to be relevant factors were articulated in a questionnaire. Relative Factor Index (RFI) for the 230 respondents across their responses was computed which yielded variable loadings which determined the relevant factors. Factors identified include physical, technical, land use and human factors. Some management measures were

recommended which include improvement in terminal facilities, land use relocation, traffic education and traffic personnel improvement.Apart from making reference to some secondary sources, data for this study were mainly primary in origin. Two major methods were adopted for data sourcing. This includes fieldwork and questionnaire administration.

Saleem-ullahLar, Xiaofeng Liao and SongtaoGuo, et al.,[J]stated that TCP steady-state Performance is affected by the congestion in the network and to select an appropriate data for the available capacity (bottle-neck link) is an open issue. This congestion is mainly arises when a large amount of flow (FTP transaction) is to be sent. The aim of this paper is to solve these issues up to the maximum level using simulation approach in already defined algorithms. The simulation result shows that the proposed schema can achieve higher throughput and lower delay, full and always link utilization with minor packet loss which will be controlled by using some TCP New Reno already defined mechanism and modifying slow start and congestion avoidance algorithms.

Amudapuram Mohan Rao1, KalagaRamachandra Rao, et al.,[A]published a CRRI journal 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 factor. 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. The 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. This paper gives an overview and presents the possible ways to identify and measure metrics for urban arterial congestion.

Prof.Gopal R. Patil, et al.,[H] studied They studied the traffic flow entering and leaving the IIT Bombay campus, a traffic volume count survey was conducted on 29th January 2015. A classified traffic volume count survey was performed at all three gates (Main gate, Market gate and lakesidegate) IIT Bombay campus from 7 AM to 10 PM. Classified volume count survey was also conducted at many locations inside IIT Bombay from 7:00 AM to 11:00 AM.

Ashish Padshala, et al., [B] studied Traffic has grown in recently years. As vehicular traffic began to increase, the congestion on the streets began to hamper the safe and efficient movement of traffic. More and more accidents were caused, and serious problems of parking and environmental pollution began to felt. Therefore its necessary to give attention towards transportation and study the need for better geometric design, capacity, signals, roadway marking, street lighting etc. In this parametric study, level of service(LOS) of different segment has been practically carried out for stretch path of Pragatinagar to Akhbarnagar & Akhbarnagar to Ranip Cross Road between destination points facing heaviest traffic problems. Expected solution we get from outcome is lead to potential improvement of traffic in the form of either expansion of width of roads, construction of fly over or by-pass, improvement of signal design.

M. AbsarAlam and Faisal Ahmed, et al., [F]studied Traffic congestion is a public policy issue and solicits a policy response which can strike a balance between urbanization and urban mobility.The average level of ownership of cars in India, currently 13 per 1,000 population, is expected to grow exponentially. Estimating the average level of ownership in 2025 at 35 per 1,000, this article points out that the growing number of cars has serious implications for energy security, air pollution, road safety, and equitable allocation of road space, and argues that there is an urgent need for India to learn from the experiences of cities that have decoupled car ownership from economic growth, and reduce the rate of growth of car ownership in India.

Prof. S. T. Patil, Prof.ShitalPatil, Prof. Prakash Singh, et al.,[I] studied Traffic jams is one of the factor which happens due to poor transportation system. Due to increased idling, acceleration and braking in traffic jams the wastage of fuel increases which ultimately leads to air pollution and carbon dioxide emission. Blocked traffic may interfere with the passage of emergency vehicles going to their destinations where they are urgently needed and the worst cases can be seen with ambulances. Thus, before starting a new infrastructure for roads and providing new facilities it is necessary to do proper planning as huge investments are involved in it. As we know that population and the intensity of traffic has increased considerably in the past 10 years it is our prime concern to do planning on the basis of sustainable future prospect for next 15-20 years.

METHODOLOGY:

- A highly congested route was selected which starts from waked chowk and ends with Wipro chowk (phase 2). Simultaneously study of site locality has been done.
- Manual traffic count was done in mid block section by using tally method. Instruments used are stop watch, note pad, traffic count sheets.
- Conversion of tally data into numeric form has been done and Estimation of: Traffic volume count,

Pedestrian count, Peak hour identification, PCU-passenger car unit, Congestion indicators, done by using MExcel software.

- By using formula LOS (Level of Service) has been calculated.
- Considering all available data an analytical regression model has been developed by using MExcel software

Congestion is quantified using:

1.Congestion Index : It is the ratio of difference between actual travel time and free flow travel time to free flow travel time.

$$Congestion\ index = \frac{C - C_0}{C_0}$$

2.Travel Rate Ratio :travel rate ratio – It is the rate of change of congestion travel rate to free flow travel rate.

Travel Rate Ratio = Congestion travel rate / Free flow travel rate

3.Delay Rate Index : delay rate index – It is the ratio of delay rate to congestion travel rate.

Delay Rate Index = Delay rate / Congestion travel rate

CONCLUSION :

From the overhead study we can determine that the reason behind this capacity is increase in trips by personal mode of transportation by using two wheelers, three wheelers as well as personal cars. Some of the other reasons are decrease in width of road by BRTS (not completed its phase yet), improper management of traffic along the intersection, illegal parking along the carriage way, merging of traffic from different directions, lack of public awareness. The effect on congestion indices will specify the intensity of variation of congestion over the site so that various alternatives and suggestions can be given.

REFERENCES :

A. Amudapuram Mohan Rao, KalagaRamachandra Rao, Measuring Urban Traffic Congestion-A Review, International Journal Traffic and Transport Engineering, August 2012, 2(4): 286-305.

B. Ashish Padshala, Traffic Studies of Urban Mid Block Section: A Case Study of Pragatinagar to Akhbarnagar & Akhbarnagar to Ranip Cross Road, International Journal of Research in Engineering and Technology, June-2014, Vol. 03. Issue 6, ISSN: 2321-7308.

C. Babitha Elizabeth Philip, Jaseela K. H,Traffic Flow Modeling and Study of Traffic Congestion, International Journal of Scientific Engineering and Research, January 2016, Vol. 4. Issue 1, ISSN 2347-3878.

D. Dr. Benjamin O. Uwadiegwu, Factors Responsible for Traffic Congestion in Nigeria-A Case Study, Journal of Environment and Earth Science, 2013, Vol. 3, No.3, ISSN 2225-0948.

E. Joseph. O. Ukpata, Anderson A. Etika,Traffic congestion in Major Cities of Nigeria, International Journal of Engineering and Technology, August 2012, Vol. 2 No. 8, ISSN 2049-3444

F. M. AbsarAlam and Faisal Ahmed, Urban Transport System and Congestion – A Case Study, Transport and Communications Bulletin for Aisa and the Pacific,2013, No. 82.

G. Olusina, J.O. and Samson, A.P., Determination of Predictive Models for Traffic Congestion in Lagos Metropolis, International Journal of Engineering and Applied Science, July 2014, Vol. 5. No. 2, ISSN 2305-8269.

H. Prof.Gopal R. Patil, Traffic Volume Count Survey in IIT Bombay Campus, Indian Institute of Technology Bombay, February 2015

I. Prof. S. T. Patil, Prof.ShitalPatil, Prof. Prakash Singh, A Study of Problems and Possible Solutions for Better Pune Traffic Management, ASM's International E-Journal. 2015, ISSN 2320-0065.

J. Saleem-ullahLar, Xiaofeng Liao and SongtaoGuo, Modeling TCP NewReno Slow Start and Congestion-Avoidance using Simulation Approach, International Journal of Computer Science and Network Security, January 2011, Vol. 11. No.1.

K. IRC 102-1988 "Traffic Studies For Planning By-Passes"

L. IRC SP055-2014 "Guidelines on Traffic Management in Work Zone"

M. Dr. L.R. Kadiyali (Reference Book)

N. S.K. Khanna, C.E.G. JUSTO, "Highway Engineering".