ANALYSIS OF TRAFFIC CONGESTION IN SRINAGAR CITY.

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ABSTRACT

The increasing imbalance between the volume of traffic on the urban streets of developing countries and their physical capacities is resulting in severe congestion scenario. The disparity between demand and supply is the result of fast improving socioeconomics of the people resulting in steep rise of vehicle ownership, accompanied by slow development of transportation infrastructure. Srinagar in India is one such city wherein the streets have lately experienced sudden rise of traffic volumes, catching the concerned departments unawares. The scenario is made worse by occupation of street space by hawkers, mobile shops and standing vehicles. The present study primarily focuses on analysing the traffic congestion scenario of the city streets and determining the influence of on-street parking on the same. It divides the study area (Srinagar City) into five broad zones. Twenty-two arterials and sub-arterials of road network are considered for the study. Data are collected for traffic volume count, road geometry, pedestrian count, free flow and average travel speed, varying travel speed, travel time and travel cost at different links and major intersections. Household interview survey is also conducted. Roadway congestion index is the indicator used to quantify congestion. Roadway congestion indices are separately determined for arterials and sub-arterials. Both the width and length of the street space occupied by parked vehicles have an influence on traffic flow and hence volume to capacity ratio. The relationship between the ratio of volume to capacity and the ratio of street area occupied by parked vehicles to total area of street-space is also being modelled. The study also reports the levels of congestion on various links of both arterials and sub arterials. The results are expected to help the authorities in framing and prioritising the improvement schemes.

KEY WORDS: Congestion, level of service, roadway congestion index

INTRODUCTION

In urban areas,traffic congestion is a major issue.Heavy traffic flow on national highways with high speed,when mixed up with local traffic at crossings,traffic congestion is likely to occur.This results in many negative problems like pollution,delay,accidents and congestion at intersectios.Traffc congestion in

urban and sub urban areas has emerged from mere annoyance to a severe problem.Road congestion is spreading,movement of goods and people are slowing to a crawl and transportation cost escalating.

Most of the cities in Asian countries are experiencing such problems as a result of rapid urbanisation.Urban congestion is one such problem afflicting urban agglomerations in Asia and has multiple effects on urban economies.Urban congestion is broadly defined as excess demand for travel over it's supply.Infact,the reason why governments are forced to revisit their policies for urban mobility is because of growing demand for travel with limited supply of services.The presence of urban congestion affects free movement of traffic.

In many respects, rapid urbanization is an indicator of economic growth in Asia,and it is expected to continue if the scenario remains same.As per an estimate by the Asian Development Bank(ADB), about 44million people are added to Asia's urban population every year.Asian cities are also characterized by high population density.For instance,Dhaka,Bangladesh,grew rapidly during the last decade and became the most densely populated city in the world,whereas Mumbai stands at number two.

As per situation in India,road traffic conditions are getting worst day by day.The average number of vehicles in India is growing at the rate of 10.16% annually,since last five years.Spending hours in traffic jam has become part and parcel of city lifestyle which leads to health and environmental hazards.Traffic congestion is a major problem for the transportation professionals 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 the faster rate,in general car ownership and usage has remained at much lower level in Indian context.The poor roadway condition,non uniform roadway features in terms of carriageway and shoulder width,abutting land use,pedestrian activities,poor lane discipline,improper bus stop location and design,vehicles of wide ranging characteristics of the technology and operating condition,heterogenity of traffic,unauthorized parking etc,indicate that the nature and cause of congestion in India might be substantially different from that in developed countries.As traffic congestion on urban and sub urban roads in India is due to only volume of traffic but also other casual influences,the problem of traffic congestion is more complex in nature and measures for congestion mitigation are also likely to be different from those in developed countries.

The migration of rural population to urban areas in search of better job prospects has made cities densely populated.

CONGESTION DEFINITION

The travel time or delay in excess of that normally incurred under free flow traffic condition.

OR

The travel time or delay in excess of agreed upon norm which may vary by type of transport facility, travel mode, geographical location, and time of day.

TYPES OF CONGESTION

Recurrent congestion: It generally occurs at the same place, at the same time every weekday or weekend day.

Non-recurrent congestion: It results due to incidents such as accidents or roadway maintenace.

1.2 SCOPE OF THE STUDY

The study aims at bringing to the fore the extent and causes of congestion. It also models the effect of on-street parking on the volume by capacity (V/C) ratio and hence level of service (LOS). The study is dedicated to the central area (CBD and periphery) of the SMR which the most congested area is. The study area in Srinagar City has been divided into five zones. Seventeen arterials and five sub-arterials are selected for the said study from within the study area. Data are collected for traffic volume count, road geometry, pedestrian count, free flow and average travel speed, varying travel speed, travel time and travel cost at different links. Household interview survey is also conducted. Roadway congestion index is separately determined for arterials and sub-arterials. The relationship between the ratio of volume to capacity and the ratio of street area occupied by parked vehicles to total area of street-space is also being modelled. It also locates the peak traffic volume so that people can change route during that time.

Fig. : *Showing traffic congestion at Jehangir Chowk, Srinagar*

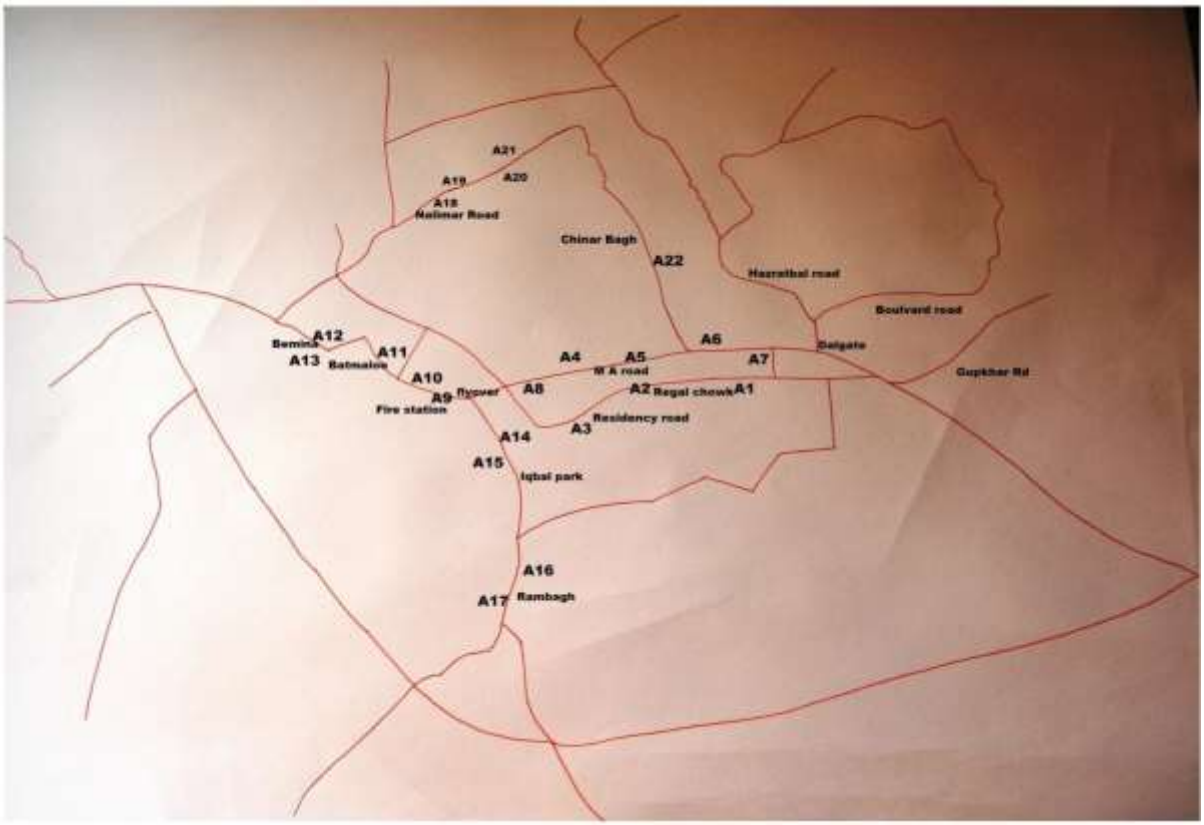

Fig. : *Map of Srinagar city with arteries and sub arteries from A1 to A22*

2 METHODOLOGY

2.1 SELECTION OF STUDY AREA

The study is dedicated to the central area(CBD and periphery) of the SMR region which is the most congested area.The study area has been divided into five zones.Seventeen arterials and five sub arterials are selected for study within the study area.The selection of study area was done in first 10 days where traffic density was seen maximum.It was seen links from A1 to A22 were having maximum traffic congestion.Peak hour was seen after calculating flow for 2 consecutive days and thus determining the peak hour flow.It was seen morning and evening times at 9am and 5pm were peak hour period,but peak flow was slightly greater in the evening than in the morning.

2.2ZONES OF THE STUDY AREA

Table 1: Shows link name of various zones of the study area

Zone No	Zone name	Classification	Link Names
1	M A Road	Arterial	A1,A2,A3
2	Residency Road	Arterial	A4,A5,A6,A7,A8
3	IG Road	Arterial	A14,A15,A16,A17

4	Batmaloo road	Arterial	A9,A10,A11,A12,A13
5	Nallah Mar road	Sub-Arterial	A18,A19,A20,A21,A22

Table 2: Population Growth of Srinagar Metropolitan Region (SMR) from 1961 to 2021

Year	1961	1971	1981	1991	2001	2011	2021 (estimated)
Total Population (Lakhs)	3.178	4.477	5.844	8.500	12.000	17.000	23.500
Decadal Growth, %	---	27.00	31.00	45.40	41.18	41.67	38.24

2.3 IDENTIFICATION OF STUDY LINKS

For the purpose of study 22 links are considered,17 are arterials and 05 are sub arterials. These links are the most congested ones.

2.4DATA COLLECTION

2.4.1 TRAFFIC VOLUME COUNT

The extent of variation of traffic flow and the identification of peak hour was done by carrying our traffic volume study, on 4 identified links, from 7am to 7pm for three weekdays.The peak hours were at 9:30-10:30am and 4-5pm.Evening peak was seen to be more congested,on all links,compared to morning peak.Traffic volume count(PCI/h) was taken at 22 identified links of study during the identified peak hour only.

2.5 QUANTIFYING CONGESTION AND LEVEL OF SERVICE

$$RCI = \frac{\sum \frac{volume\ per\ peak\ hour}{link\ capacity} \times (vehicle\ per\ peak\ hour \times link\ length)}{\sum (vehicle\ per\ peak\ hour \times link\ length)}$$

The Roadway Congestion Index(RCI) was selected to quantify congestion for this study.RCI can be calculated by the following equation:

The Highway manual capacity manual(HCM) defines the level of service as a semi qualitative measure for describing the operating conditions for a traffic stream as it is felt and perceived by drivers/passengers from the use of roadway section. Qualitative classification of traffic is often done in the form of a six level A-F level of service(LOS) scale defined in the Highway Capacity Manual, a US document used worldwide.

It is seen that majority of the links have F level of service, followed by E having average RCI equal to 2.35.

Link No	Link name	Link Type	Actual volume (V)	Capacity (C)	Link Length (L) Km	Width (m)	(V×L)	(V/C)	∑(V×L) ×(V/C)	RCI	Level of service (LOS)	Avg. RCI
A1	From Radio Station to Kohli Brothers	Arterial	2421	1200	1.3	9.5	3147	2.01	6349	2.01	F	
A2	From Kohli Brothers to forest lane	Arterial	1906	1200	0.7	8.5	1334	1.58	2118.8	1.58	F	
A3	Fom Forest lane to Hari singh High street	Arterial	1853	2000	0.3	10.5	833.85	0.926	772.56	0.92	E	
A4	From UCO Bank toKohli Brothers towards dal lake	Arterial	2890	1200	0.7	9.5	2023	2.4	4872.05	2.4	F	
A5	From Kohli Brothers to Gupkar Road	Arterial	2953	1200	0.3	9.5	885.9	2.46	2180.05	2.46	F	
A6	From Gupkar Road to Radio Station towards Dal-Gate	Arterial	3422	2000	0.5	11.5	1711	1.71	2925.81	1.71	F	
A7	From Radio Station to Gupkar Road towards Lal Chowk	Arterial	2285	2000	0.5	11	1142.5	1.14	1302.45	1.14	F	
A8	From Forest Lane to Jahangir Chowk	Arterial	2589	1200	0.3	9.1	776.7	2.15	1669.905	2.15	F	
A9	From PDD Office to Pampori & Sons	Arterial	4112	1200	0.5	8.5	2056	3.42	7031.52	3.42	F	
A10	From Pampori & Sons to PDD Office	Arterial	1850	1200	0.5	9.1	925	2.38	2201.5	2.38	F	
A11	From Batamalo to Pampori & Sons	Arterial	2410	1200	0.7	6.7	1687	2.76	4656.12	2.76	F	2.35
A12	From batamalo to Bemina Crossing	Arterial	3146	2000	1	10.9	3146	1.57	4939.22	1.57	F	
A13	From Bemina crossing to Batamolo	Arterial	2986	2000	1	10.5	2986	1.49	4449.14	1.49	F	
A14	From PDD Office to Bakshi Stadium	Arterial	4598	2000	0.9	12.5	4138	2.29	9476.02	2.29	F	
A15	From Bakshi Stadium to PDD Office	Arterial	4010	2000	0.9	11	3609	2.005	7236.045	2	F	
A16	From Bakshi stadium to Rambagh	Arterial	3624	1200	1.4	8.5	5073.6	3.02	15322.272	3.02	F	
A17	From Rambagh to Bakshi stadium	Arterial	5269	1200	1.4	8.8	7376.6	4.39	32383.274	4.39	F	
A18	From Allandar market Chowk to Noor bagh	Sub-arterial	1055	1200	1	4.75	1055	0.87	917.85	0.87	E	
A19	From Noor bagh to Allandar Market Chowk	Sub-arterial	1151	1200	1	5	1151	0.95	1093.45	0.95	E	
A20	From Nawakadal to Allandar Chowk	Sub-arterial	1102	1200	0.7	5.2	771.4	0.91	701.97	0.9	E	
A21	From Allandar Chowk to Nawakadal	Sub-arterial	1041	1200	0.7	4.8	728.7	0.86	626.682	0.86	E	
A22	From Gupkar Road to Khanyar Police station	Sub-arterial	1221	1200	2.3	6.7	2808.3	1.01	2836.38	1	F	

Table: *(Shows V/C ratio and LOS of links from A1 to A22)*

CONCLUSIONS AND RECOMMENDATIONS

Traffic in Srinagar is reaching stupendous proportions with non-controllable migration from peripheral areas which aggravates the congestion scenario on the roads. On any day, on any road, one can always witness transport expanding its hydra deaded tentacles. The mess is only becoming unmanageable and there seems no plan from government to tackle the mess. Roads have not expanded commensurate with

the volume of traffic. The road deficit, as a result, is gaping. If no drastic measures are taken, the situation can explode. The roadway congestion of 2.35 manifests the severity of traffic congestion in Srinagar city.

The government by its policy of stressing horizontal expansion has only improved the traffic bearing capacity of our roads. Roads are being expanded as per the national standards, two to four lanes are in existence, but as soon as the road passes through a major town the traffic from bye lanes congests the main highway. The local transport has to mix with the highway transport to cross the highway and the result is slowing of traffic movement. National standards which require segregation of traffic tubes can only be achieved by overhead bridges and flyovers and in our case, both are missing. Roads have been expanded horizontally only and no efforts are made for vertical expansion. Vertical expansion of roads in the form of flyovers, metros, subways etc has proved helpful across the globe for traffic mobility. Among the major towns of Kashmir Srinagar has to face lot of traffic-oriented problems not just because of being the capital of the state but because of host of other peculiarities. The city of Srinagar is situated on both banks of river Jhelum and as such the river has to be navigated, negotiated, crossed by all the inhabitants as well as the visitors frequently. Besides the city has to be circumnavigated along the famous Dal lake banks by those living on its banks as well as by those intending to visit the Mughal gardens and Hazratbal shrine. Both these factors restrict the choice for expansion of roads as the roads have to be led towards the bridges which are few in number, narrow in expanse and old fashioned. The bridges are a vestige of the Budshah era and for the last 600 years no further bridges are constructed which speaks of the irony of the state we live in. Unless the city gets crises crossed with about half a dozen more bridges the traffic mess will continue to haunt. The uptown is burgeoning with business activities and shopping complexes are mushrooming on either side of every road. The, hospitals, schools government departments and every important establishment want a space in and around the Dalgate Batmaloo axis. The space is becoming shorter and government is trying to fill the deficit by culling the chinar trees around the Residency Polo Ground and squeezing the city parks like Pratap Park etc by including its boundaries for road expansion. The shopping complexes are not standardized as no guidelines for parking area are followed. The greed of businessmen who construct such complexes and the authorities who sleep over the issue only makes the roads congested with the vehicles of intending customers. There are only few parking spaces and people have no option but to leave their vehicles outside on roads with every risk of traffic cop towing the vehicles. Recently the government has taken away the parking space at Clock tower. The space was used by all the shopkeepers in the vicinity for parking of their vehicles. The government seems insensitive towards the parking spaces as if the vehicles are to be carried on our backs after you switch the engine off.

The parking spaces in place seem to be politically motivated. Parking space constructed near museum side adjacent to Foot Bridge is being used by Mallinson and Biscoe school buses for parking and similarly

horticulture department orchard land near Convent has been converted into parking space which is only used for parking of vehicles of parents of wards studying in the said school. Complete disregard is shown to the landscape while constructing parking places. Millions of rupees were lost in landscaping the Jhelum banks and the hard-bought beauty is allowed to be pock marked by vehicles being parked on its banks. The parking of vehicles on Dalgate Batmaloo axis is galore except near high court and secretariat for obvious reasons. Vehicles are parked on either side of the road which gets narrowed and makes traffic to slow down. The road which otherwise is 40 feet is narrowed down to 20 or 15 feet , first by outside display by shopkeepers, then by the static or mobile vendors , then by the parked vehicles with pedestrians walking in a zig zag motion between whatever space is left for them. The road management at this axis has to be done keeping this aspect in mind and the traffic has to hope to get not more than this space in the present context.

In order to remedy this axis of traffic mess the government has to think big. Think big in the form of thinning the government offices along this axis, the government establishments like the old secretariat. The Food and Supplies department, the Deputy Commissioner and Divisional Commissioner office, the Zonal Police Headquarters, the CID office etc have to be relocated and the space thus acquired need to be earmarked for parking and business establishments. The relocation of government establishment towards the Bemina and Sharifabad can help establish new city on the pattern of New and old Delhi, Hyderabad and Secunderabad, Gandhinagar and Ahmedabad. New cities have come up only when the offices and important public establishments have been shifted and we have the same opportunity in hand , as some of the offices like SDA office, BOSE, etc has already being relocated to Bemina. The land around the area is still available and if government does not rise to the occasions we will lose the same to shanty towns, and unorganized house building.

The Jhelum bank has been developed and beautified and the so-called bund constructed to hold the river during floods holds opportunity for laying narrow gauge rail track on which a city railway connecting Pantha-chowk to Sangam Eidgah can be laid. This can address the traffic mess and change the habits of people for roadside parking as commuter can take short distances on the said track in a speedy and cheap manner. This track can change the character of the city and will make commuting easier and fast. Delhi metros can be a guideline for constructing this track without having to deteriorate the landscape. A cheaper possibility can be the use of electricity driven trams in shorter circuits like Budshah bridge to Zerobridge, Budshah bridge to Habba Kadal, Zero Bridge to Shivpora and if the project succeeds the same can be extended to other routes. The intra Kashmir railways from Islamabad to Baramulla has been a great success. All said and done, the traffic management is a multifaceted problem and needs multipronged strategy with contribution from the multiple stake holders and it needs consistent and concerted efforts to tide over the problem. The suggestions' stated are just an effort to ruffle some feathers and prick the conscience of those involved.

The following are the recommendations:

1. The most vital task to improve traffic condition is to widen the roads because links are exceeding the capacity.
2. The parking facilities should be made possible through roof or basement parking.
3. Sufficient footpaths and footways should be constructed to facilitate free movement of pedestrians on major roads
4. Floating shops, mobile hawkers, artisans, and temporary traders should be removed from roads and roadsides.
5. Required number of speed breakers, zebra crossing, traffic signals, light posts with street light are to be constructed.
6. Parking for rickshaws, buses, trucks should be restricted on the road pavement by way of heavy fines.
7. Congestion charges should be introduced

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