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Analysis of Congestion and Travel Time Delay of Pulwama Town in Kashmir, India

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ABSTRACT
Heterogeneous traffic is the backbone of the economy of any area. Life has been hampered very badly affected by unorganized traffic movement and parking habits along with the carriageway characteristics which have resulted in congestion, traffic jams and travel time delay. To overcome this peril of heavy congestion and travel time delay, analysis was carried out on five different locations (P1, P2, P3, P4 and P5) of Pulwama town by the help of questionnaire survey, stopwatch method and observational survey. The study revealed that the daily travel time along all the stretches was increased by half an hour during (8:00 am-10:00am) to (4:00pm-6:00pm) due to the fact that the intersections are not being properly designed with most of the roads along the selected stretch being either used for unauthorized parking of vehicles or being single lane having no or the least number of footpaths. It was also found that some locations have conflicting intersections which creates the grid lock and further congests the traffic. Some recommendations have been suggested in the paper which can be useful to overcome the traffic congestion and subsequent travel time delay.
KEYWORDS:*Traffic Congestion, Delayed Travel time, Pulwamastrech Analysis, Urbanization, vehicles, Roads.*

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I. INTRODUCTION:

Due to the rapid growth in urbanization over the last two decades, the demand for the transport has increased tremendously[1]. Moreover, the per capita income also increases leading to the greater use of one's own vehicle. But, the growth rate of the country's economic development rises faster than the infrastructure development leading to limited road space to deal with ever increasing demand of automobile travel[2]. Due to this expeditious growth innumerable problems have risen and one such problem is the traffic congestion and thus an increase in travel time. Traffic congestion can result from use of large number of vehicles, decreasing the speed of the vehicle than the corresponding speed limit of the road, on road parking, street vendors, and irregular intersections[3].There are many cities in India where the demand has overcome the road capacity and thus further increased the congestion and delay in the travel time. Hence, raising the number of the daily accidental deaths[4]. The chief reason being the imbalance in modal split and insufficient transportation infrastructure[5].Travel time delay has also been as a result of roads not being properly maintained due to poor design or faulty construction. The drainage problem results in seepage of water on road surface this damaging it which results in slowing of speed of vehicles by about 40%. [6]. Study done by [7] found thatIndian cities cannot facilitiestoonly to private cars and two-wheelers and there is need to increase in public transport both qualitatively as well as it's quantity by devising an effective strategy. This is because on a per passenger basis travel demand the public transport occupies less road space, consumes less fuel and emits lesser pollutants and thus works in a more sustainable manner[8].This strategy will be economical in every way. The other strategy is to plan the roads as per the Codal provisions and provide the sufficient parking spaces & footpaths[9].The problems of traffic Congestion especially in northern states like Jammu and Kashmir have been more so in order to overcome or detect the problem that leads to the heavy congestion of the traffic during the early forenoon hours and the last afternoon hours a study in this regard was conducted in Pulwama town on five different locations and accordingly recommend the necessary measures that could possibly negate this menace.

1.1. Study Area And Site Description

Pulwamadistrict falls India's northern state of Jammu and Kashmir at 33.88°N74.92°E. It is also known as "Anand of Kashmir" (the joy, the delight)and "DudhaKul of Kashmir" (milk city) with total area of 1,398km^{2}and populationdensity of 550/km^2.TheThe area is one of the most important economical hubs of the Kashmir valley. The strip of the road in consideration extends alongPulwama market via(Animal husbandry toRajporaChowk) (P1), (Post office to Rajporachowk)(P2),(Chat masjid to RajporaChowk)(P3), (RajporaChowk to Muranchowk)(P4)& (Murranchowk to District Hospital)(P5). The said strip is the busiest of the town in terms of business, shopping, governmental & nongovernmental departments, educational institutes & district hospital. The traffic volume is always very high during the peak hours and the width of the road is not sufficient to carry the whole traffic hence results in a large congestion over the whole stretch. Figure 1 shows the satellite image of selected Locations used in our study.

Figure 1 : Satellite image of Pulwama town showing different locations (Source: Goole Earth)

II. METHODOLOGY:

Questionnaire survey, moving car method, and observational survey was used in present study. Five major areas heading towards the traffic congestion and hence travel time delay were selected. The data was taken during the peak hours on Monday, Wednesday, and Friday between 7am to 7pm daily. The road was majorly being used by cars, small buses, goods vehicles, motorcycles. Road side survey was done by preparing a questionnaire about the journey and the stretch under consideration to know their point of view regarding the traffic congestion and the relative delay in the journey. The questionnaire was given to be filled by both the drivers and the commuters and the total of 412 questionnaires were collected on a weekly basis from both the drivers and the commuters. At the same time the traffic volume was being counted at all the selected junctions and the data was also taken by the moving car method using Santro car.

III. RESULTS AND DISCUSSION:

The analysis was carried out on the average daily traffic from both sides on the selected stretch for the selected five different locations from 7am to 7pm. It was found that the maximum flow of the traffic was from (8 am - 10am) and (4pm -6pm) and the congestion is the highest during these time at all the selected points especially along Murran-Chowk to the Rajpoachowk(P4)mainly because these are the peak hours due to office and school timings.This was followed by Post office to Rajpurachowk(P2)the problem here was the merging of different roads which increases the volume of traffic by creating grid lock.Murranchowk to district hospital stretch (P5) too have high traffic volume but was not as high as compared to first two as cleared from the graph shown in figure 2. The reason for high traffic here was the location of district hospital along this stretch. The stretches which were last and the second last as far as high traffic in Pulwama town among the selected locations were animal husbandry to rajporachowk stretch (P1) andchat masjid to rajporaChowk stretch.(P3) The analysis

shaped a non uniform graph(figure 2) for the variation in the average traffic which means there is not the uniform flow of the traffic throughout the day. The average daily traffic volume at these locations viz P1,P2,P3,P4 and P5 were 235 nos/hr, 342 nos/hr, 216 nos/hr, 830 nos/hr and 190 nos/hr respectively. The traffic volume here is directly influenced by the types of the road, their width, the type of the city. Daily travel time along all the stretches was increased by half an hour during (8:00 am-10:00am) to (4:00pm-6:00pm). Moreover these are no or the least number of footpaths along these stretches which hamper the travel time the most. The unspecified parking of the vehicles along the road side reduces the capacity by more than 50% and hence reducing the average speed along these stretches.

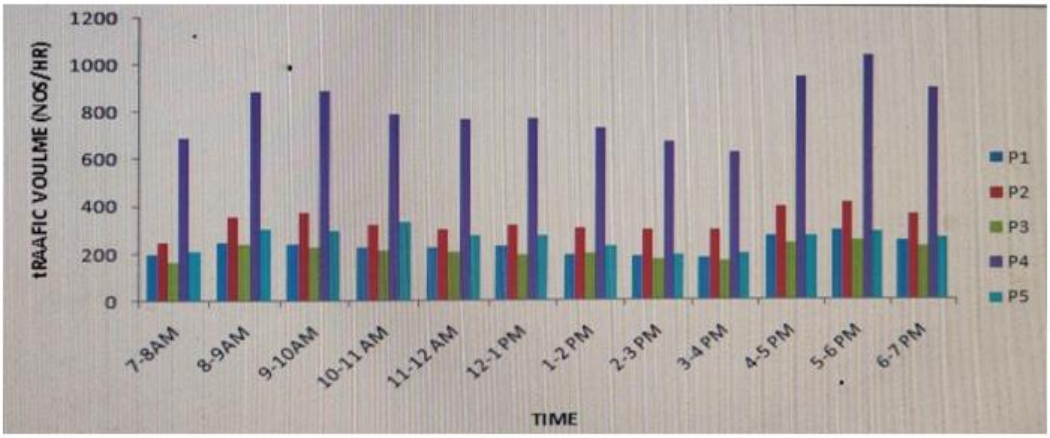

Figure 2 : Variation of traffic with time

Questionnaires were also given to both the drivers and the spectators while laying the emphasis on the age, gender, status, qualification & the possible cases of congestion from their view point. The survey found that most of the questionnaires were filled by the spectators and less by the drivers, among which most were the men. The questionnaire revealed that the 33.69% of females and 66.30% of males were using the road both in terms of driving and spectators. The questionnaire further found the views of general public for the possible causes of the traffic congestion and hence the delay of the travel time. Most of the views were of the negligence from the municipal committee to allow the venders and the parking of both private & public vehicles along the road side. Table 1 shows the demography of road users.

Table 1: Demography of road users

Description	**Frequency**	**Percentage**
Drivers	87	**31.52**
Commuters	189	68.48
Total	**276**	**00**
Gender	**Frequency**	**Percentage**
Female	93	33.69
Male	183	66.30
Total	**276**	**100**

1.2. Recommendations For Controlling Traffic Congestion

Since traffic volume and travel time delay is depended on the type of road and space available. The study conducted reveled the problem of traffic congestions and subsequent travel time delay can be controlled if drainage system of the town is improved which will keep the black topped surface of road free from ruts and as a result vehicles will move freely which will control travel time delay. Separate land should be made available for reducing the on-street parking of vehicles. One rotary each should be provided at the RajporaChowk intersection and Murran-Chowk intersection, which will reduce traffic significantly at one point as it will get distributed. The traffic signals should be placed at the junctions (main & sub main) of all the selected stretches. The magistrate should prefer the road expansion, this can be achievedby hiring a PWD department to demolish illegal structures (Shops/Buildings) which are falling within the zone of RibbonDevelopmentAct.Thetransport development programmes should also be organised to increase awareness among the public.

IV. CONCLUSION

The study revealed that the daily travel time along all the stretches was increased by half an hour during (8:00 am-10:00am) to (4:00pm-6:00pm)The study also revealed that the intersections are not properly designed and most of the roads along the selected stretch are single lane. Moreover these are no or the least number of

footpaths along these stretches which hamper the travel time the most. At theRajporaChowk and Murran-Chowk, there are the conflicting intersections which creates the grid lock and further congests the traffic. The unspecified parking of the vehicles along the road side reduces the capacity by more than 50% and hence reducing the average speed along these stretches. The efficient and well developed transport system is compulsory for the overall development of the city and the people in general. While the above listed problem will stymie the movement of the people and the transport and hence restrict the socio economic prosperity in general, lavish living of the people in the city, wastage of many resources (extra fuel consumption, less man hours, etc) and increase the travel time by a considerable amount. Different recommendations to minimise the effect in this regards have also been presented in this paper chief among them being following the ribbon development act and demolishing the illegal structures coming within the zone of 25 feet (7.62m) from centre of road carriageway.

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