

Consideration of Traffic Congestion by Using Traffic Flow Analysis in Bogura, Bangladesh

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Abstract – In late time, traffic blockage issue has gotten one of the most expensive, both money related and ecologically, issues in numerous urban communities everywhere throughout the world. It additionally causes important time loss of residents. Numerous specialists proposed that the chief advance to relieve the clog issue is to recognize traffic blockage attributes. This examination has been directed to gauge the force of traffic blockage of Bogura town. Traffic volume study and spot speed study were the fundamental methodological ways to deal with direct the investigation. The information gathered has been broke down using diverse measurable PC bundles. Diverse traffic stream hypotheses and models have likewise been utilized to ascertain traffic stream parameters that uncover traffic attributes. The examination has investigated that auto-rickshaw, cycle-rickshaw, bike, and cruiser are the famous traffic mode and traffic stream turns out to be so escalated during the morning, early afternoon and night hours. It has likewise uncovered that College street is the most blockage inclined course than Thana road and the degree of administrations of all crossing points is F aside from traffic junction which gave a relatively better degree of administrations to the voyagers of the town. The examination has likewise distinguished the serious issues related to various street areas having a poor degree of administrations.

Keywords – Traffic Congestion, Traffic Flow Analysis, Traffic Volume Survey, Bogura Town.

I. INTRODUCTION

Environmental change, regular catastrophes, and urban patterns quicken urban movement which is in since quite a while ago run answerable for the making of genuine urban traffic blockage. In creating nations, urban relocation is expanding so quickly which makes pressure on traffic streams bringing about traffic clog. As indicated by Gwillian (2011), every year around 3 to 5 percent populous development has happened over the previous decade in African urban areas because of urban relocation. This is colossal for surpassing street organize limit. Traffic clog is characterized as a circumstance when vehicles are eased back down beneath sensible speed as the quantity of vehicles on a street surpasses the limit of the street arrange. In late time, traffic blockage issue has gotten one of the most exorbitant issues in numerous urban areas everywhere throughout the world. It seriously undermines the economy just as the earth. In 1997 rush hour gridlock clog delivered a yearly \$75 million worth Economic Wastage in Bangladesh Past research proposed that expanded degree of traffic clogs assists with improving street security which makes a progressing banter among transport organizers and wellbeing policymakers. But an ongoing report has uncovered that street security isn't influenced by the degree of traffic blockages. Traffic clog is the consequence of the hole between the transportation requests and supply. Urban

occupants invest a large portion of their energy to wander among work environment and home. The development of mechanized vehicles made their wandering simple however on opposite, it likewise makes inconvenience as concerned authority neglected to adapt harmony to the exorbitant interest of framework for various mechanized vehicles for additional populace, activated by urban relocation. accordingly, traffic clog has become a typical situation in pretty much every city on the planet. That is the reason traffic blockage is overall perceived as a major torment of city life. However, the chief advance to alleviate this issue is to recognize traffic clog attributes. Traffic clog is a typical issue in each city of Bangladesh alongside significant metropolitan urban areas like Dhaka, Chittagong, Khulna and Rajshahi. Thus, this investigation has been led to gauge the force of traffic clog inside Bogura town by utilizing traffic stream examination with thickness and limit count.

II. METHODS

Research on transient traffic conditions forecast has been to a great extent worried about parameters, for example, stream, inhabitants, and speed, overlooking simultaneously expectations during blockage, a period when expectations are required the most. Originating from the viable need to anticipate traffic parameters during blocked periods, it is proposed an approach for assessing the term of blockage on a given street segment

and the likelihood that, given its beginning, clog will end during the accompanying timeframe. The logistic utilitarian structure best depicts clog length, and that the likelihood of blockage finishing inside a predefined time span is likely on the off chance that it has kept going up to roughly 12 min (with a top at 6 min). Further, if clog kept going more than 21 min it was presumably brought about by something outer to the traffic framework occasions. In request to survey the traffic blockage, traffic stream has been investigated by estimating traffic stream variety, traffic arrangement, normal hourly traffic, thickness and limit the figuring of chosen streets.

surface, in the ward of various organizations like Bogura Municipality, Roads and Highway Department and Local Government Engineering Department. Both mechanized and non-mechanized vehicles are seen in the town. As of late designed Auto rickshaw passed through charger battery dominant in the rush hour gridlock scene of the town. Other than cycle rickshaw passed through both physically and charger battery, bike, CNG, bike, transport, minibus, microbus, truck is likewise seen on the district streets. Significant streets of Bogura Municipality are – Kobi Hamid Road, Ataikula Road, Thana Road, College Road, Gashpara Road, By-pass Road, Bogra-Kahalu Road, Police Line Road, D.C. Street, and Stadium Road. Among these Thana Road and Stadium Road are the busiest streets in the town. Traffic blockage on these two streets has become a typical day-to-day situation. These on the grounds that five significant convergences of Bogura town are situated inside the two streets which are – Raja Bazar crossing point, Sathmatha Junction, Eiqubia School Junction, Foteh Ali Bazar Junction, and Shapla Chottor Junction. This examination has been led to dissecting traffic blockage on these five convergences.



Fig.1. Study Area Location. (Red Marked).

III. SELECTION OF THE RESEARCH AREA

Bogura is an auxiliary town in Bangladesh. It is arranged at the northern part in Bangladesh. It is a town of Bogura locale under Rajshahi division, one of eight divisions of Bangladesh. The town is the regulatory capital of the northern region. Bogura region has a zone of around 69.56 square kilometres and a populace of 540,000. It has a street system of 357.50 km, among 85% has bitumen

IV. RESULTS AND ANALYSIS

4.1 Existing Traffic Flow

Each street of Bogura town circles having two-way traffic. There is no guideline to control stream course even at the crossing points. Right separating and cross-development of traffic make struggle to inverse traffic and starts woeful blockage.

In Figure 2 the hue course speaks to the considered streets. The figure shows that privilege veering at Sathmatha junction and both right separating and cross-development of traffic at Raja bazar junction makes strife bringing about blockage out and about. Right separating traffic at Eiqubia convergence likewise makes strife at the crossing point. The figure likewise shows that the privilege veering and cross traffic from and to College street is liable for making clog on Thana Road.

4.2 Traffic Flow Trait

Traffic stream attributes, for example, hourly variety of traffic stream, normal hourly traffic (AHT) and traffic organization help to comprehend the traffic conduct of a city. It additionally assists with deciding the pinnacle hour in which the quantity of vehicles on street arrives at its pinnacle point and travel request gets expanded. For understanding traffic stream attributes of Bogura town traffic volume review has executed independently for the chosen streets for example College street and Thana Road. Traffic stream attributes are talked about underneath.

4.2.1 College Street

To get the traffic variety situation on College street number of vehicles went through Raja Bazar Junction to Sathmatha Junction segment in consistently has changed

over in PCU qualities and it has plotted against the quantity of hours in a day [Figure 3]. The quantity of vehicles going through the segment in the middle of 05.00 pm and 07.00 pm has thought to be debatable.

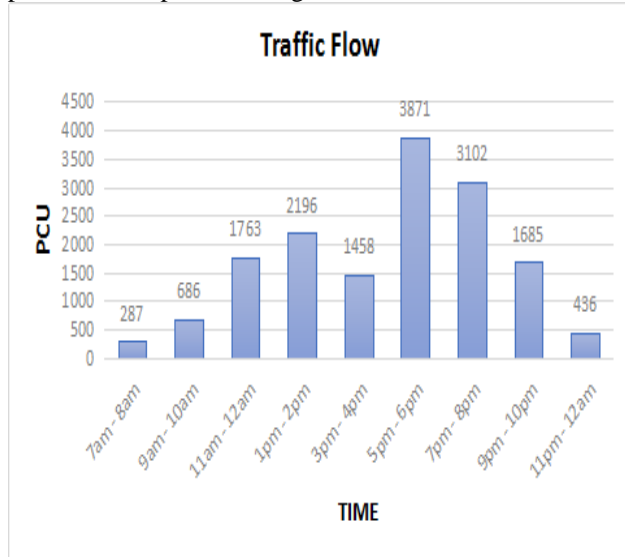


Fig.3. Traffic flow variation over a day for Raja Bazar – Sathmatha Section of College Street.

Figure 3 shows that monstrous traffic streams in the middle of 5 pm and 6 pm. The PCU esteems get its most noteworthy point during this hour (for example 3871 PCUs) and subsequently this hour is resolved as pinnacle hour for College street. Shopping applicants, representatives, authorities, day works and different explorers produce mass outings for which the movement request goes higher in the pinnacle hour. Notwithstanding, understudies, representatives, authorities, and different explorers additionally produce outstanding excursions between 1 pm to 2 pm toward the beginning of the day. Once more, a noteworthy volume of traffic has seen from 7 pm to 8 pm. Then again, moderate traffic stream happens in the middle of 9 pm and 10 pm and in the middle of 11 am to 12 pm. It has been discovered that serious traffic clog happens during these hours. Traffic blockage turns out to be progressively intense because of the absence of guidelines, inadequate parking spot and pathway, pick and drop off explorers to a great extent via auto rickshaws. Right wandering and consolidating and cross development of both cycle rickshaws and auto rickshaws at Raja Bazar junction and Sathmatha junction is additionally answerable for making long lining of vehicles from Bogura Zilla School to Foteh Ali Bazar crossing point. Normal Hourly Traffic (AHT) For Raja Bazar junction to Sathmatha junction area of College street, the all-out traffic has discovered 15484 PCUs for a day. Along these lines, AHT is determined 1720(average) PCUs for the segment. It implies that by and large volume of 1720avg. PCUs of traffic go through the street area in every hour of a day. Traffic arrangement examination gives a thought regarding the level of various sorts of vehicles existing in the road stream. It assists with

distinguishing the prevailing and best traffic mode out and about. Traffic arrangement for College street has investigated from traffic volume overview and appeared as a pie outline in Figure 4.

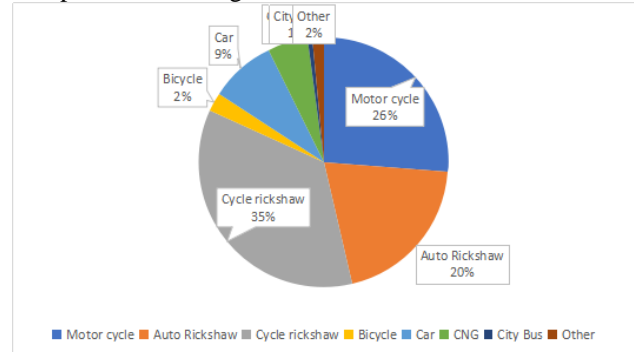


Fig.4. Traffic Composition on Raja Bazar – Sathmatha Junction of College Street.

Figure 4 shows that cycle-rickshaw, bike, auto rickshaw, and car represent the significant rate as a method for traffic mode for College street. There is cycle rickshaw-stand closer to the Sathmatha junction and College street goes towards Bogura focal transport terminal from the midtown. Along these lines, most extreme voyagers incline toward autorickshaw or cycle rickshaw as open traffic mode. Then again, CNG, bicycle, city bus and so forth hold not many bits of traffic organization on College street.

4.2.2 Thana Road

To get the traffic variety situation on Thana Road number of vehicles went through TM to IM segment in consistently has changed over in PCU qualities and it has plotted against the quantity of hours in a day [Figure 5]. The quantity of vehicles going through the area in the middle of 12.00 am and 6.00 am has thought to be debatable.

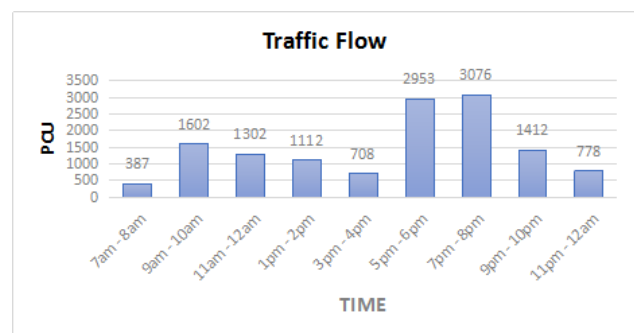


Fig.5. Traffic flow variation over a day for Sathmatha – Foteh Ali Bazar Section of Thana Road.

Figure 5 uncovered that traffic volume turns out to be high in the middle of 9 am to 10 am in the first part of the day and 7 pm to 8 pm toward the evening. The volume of traffic in top hour is practically 3076 PCUs. Concentrated traffic stream happens in the middle of 9 am to 10 am a direct result of beginning time of workplaces, schools, and universities. Then again, the stream turns out to be

high toward the evening because of the completion of workplaces, schools and universities and the outings that have been produced for shopping. There are a few business structures and the strip malls close by Thana Road. In this way, various excursions are pulled in and thus Sathmatha – Foteh Ali Bazar segment of the street is made the busiest street in Bogura town. Escalated traffic clog happens during top hours particularly from 5 pm to 8 pm at night. Traffic clog turns out to be progressively intense because of the absence of guidelines, deficient parking spot and trail and illicitly involved peddlers. Go across traffic from College street, right wandering and combining traffic at Sathmatha convergence and waving traffic at Foteh Ali Bazar junction point make traffic clog progressively intense on Thana Road.

For Sathmatha – Foteh Ali Bazar section, the total traffic has found 13330 PCUs for a day. So, AHT is calculated 1481.11 PCUs for the section. It means that on average volume of 1481.11 PCUs of traffic pass through the road section in each hour of a day. Figure 6 uncovers that cycle rickshaw is the most predominant method of traffic (32%) in the Sathmatha – Foteh Ali Bazar segment of Thana Road. The accompanying modes are separately Motor bike (18%), bicycle (3%), auto-rickshaw (20%), and CNG (17%). Not many parts of traffic structure on Thana Road is guaranteed by transport, truck, and van.

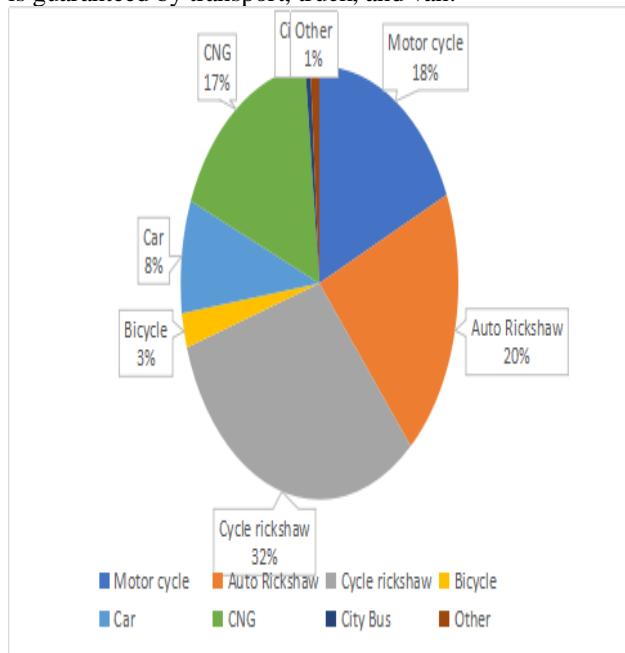


Fig.6. Traffic Composition on Sathmatha – Foteh Ali Bazar Junction of Thana Road.

4.3 Capacity & Density Calculation

Thickness determined for each segment of College street and Thana Road is given in the Table 1. Table 1 shows that the most elevated thickness happens at Raja Bazar convergence. The second most elevated grouping of traffic has found at Sathmatha convergence. It implies that the quantity of vehicles presents per unit length of this convergence is so high. Then again, the most minimal

traffic fixation has found at Eiqubia – Shapla junction segment of College street demonstrating that a smaller number of vehicles present per unit length of this segment.

From Greenshields model it has demonstrated that there is a direct connection among speed and thickness. It implies that space progress between vehicles increments with the speed up. Along these lines, if thickness would zero, rates would most extreme which is known as the mean free speed and it is multiple times of mean speed. Once more, if the speed of vehicles would zero, the thickness would greatest which is known as sticking thickness and it is multiple times of thickness at mean speed. Presently, the limit of a street area can be determined from the mean free speed and the stuck thickness utilizing the relationship-

$$1) \text{Density} = \text{Flow} / \text{Mean Speed}$$

$$2) \text{Capacity} = (\text{Mean free speed} \times \text{Jamming density}) / 4$$

Table-I: Density and Capacity calculation for various section

Sections	Flow (PCUs/hr)	Mean Speed (K.P.H)	Density (PCUs/Km)	Mean Free Speed (K.P.H)	Jamming density (PCUs/Km)	Capacity (PCUs/hr)
Sathmatha	1235	3.64	339	6.54	642	584
Raja Bazar	1328	3.82	348	7.82	448	428
Foteh Ali Bazar	1708	3.94	432	5.49	942	928
Foteh Ali Bazar – Sathmatha	1481.11	3.81	389	9.21	885	843
Raja Bazar – Sathmatha	1720	5.78	298	11.61	742	1072
Eiqubia Junction	1556	9.82	158	23.71	649	1594
Shapla Junction	1472.3	8.56	172	7.69	876	1875

In Table 1 the determined limit with respect to various segments is given. Table 1 shows that Shapla Junction has the greatest limit meaning the most extreme number of traffic can go through the convergence among all areas during top hour. Due to having rotating and traffic constrained by traffic police greatest limit has found at this crossing point. Then again, the base limit has found at Raja Bazar area where the relatively most minimal traffic can go during top hour.

4.4 Determination of Level of Service

Level of Service (LOS) is the subjective proportion of operational conditions inside a traffic stream. Speed drops down and the postponement and recurrence of stops increment when a street conveys traffic equivalent to its ability. Level of Service right now decided dependent on the excursion speed or generally travel speed for the two headings for the segments [Table 3]. Table-3 shows that degree of administrations for all segments from Raja Bazar – Sathmatha course and the area of Foteh Ali Bazar – Sathmatha are F demonstrating stuck conditions, unpredictable development and constrained stream. Separating and cross development of traffic at

convergences, absence of pathway, illicit stopping, unlawful involved peddlers close by the street and so on cause the low speed in the areas. The conditions bring about lines of vehicles.

so forth have impact on traffic stream of the town. It has additionally been discovered that College street is the most blockage inclined course than Thana Road and the degree of administrations of all crossing points is F with the exception of Shapla junction. There is a turning at Shapla junction which gives a relatively better degree of administrations to the explorers of the town. Single direction traffic stream might be a potential arrangement of clog for the town. Also, it has been seen that the vast majority of the business exercises of the town occur inside a tight space contrasting with its complete zone. In this way, development focuses ought to be created at various significant areas of the town to diminish trip age towards the midtown of the town.

Table –II: Determination of LOS

Sections	Travel Speed	LOS	Remarks
Sathmatha	3.64	F	No traffic control, diverging traffic from Zilla school
Raja Bazar	3.82	F	No traffic control, railway crossing, hawkers' encroachment
Foteh Ali Bazar	3.94	F	Illegal parking, auto stand, absence of grade separator
Foteh Ali Bazar - Sathmatha	3.81	F	On-street parking, street hawkers, no traffic control
Raja Bazar - Sathmatha	5.78	F	Railway crossing, no traffic control, on-street parking
Eiqubia Junction	9.82	F	Illegal parking, rickshaw stand, no traffic control
Shapla Junction	8.56	B	No traffic control, on-street parking, street market

V. CONCLUSION

Bogura is one of the antiquated towns in Bangladesh. Along these lines, loads of administration offices have been gathered in the town, for example, college, clinical school, clinical medical colleges, business exercises and so on. Therefore, populace of the town is expanding step by step. This expanded populace produces various outings in the town street. Be that as it may, transport offices have not been created in examination with the expanded populace. Subsequently, traffic blockage has become a typical situation in the town. Residents need to confront woeful car influx ordinary while going through the midtown streets of the town. Then again, traffic police, the unrivalled traffic controlling methods for the town, neglects to control traffic adequately, particularly during top hours, because of their human limitations. In addition, traffic clog examination of the town has uncovered that auto-rickshaw, cycle rickshaw, bike and engine cycle are the well-known traffic mode and traffic stream turns out to be so escalated during morning, early afternoon and night. Beginning and completion of office time for business and working time for various experts, tutoring time, shopping hours, celebrations and regular variety and

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