TRAFFIC CHARACTERISTICS ON MOGHBAZAR-MOUCHAK FLYOVER

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ABSTRACT

There is little realistic regularity that is as worldwide as the following: no matter what the track of economic growth a country has followed, urbanization has been an inevitable consequence across the world. So, transportation system plays an important role in urbanization. Moreover, the major requirement for sustainable economic development of a city depends on its adequate and efficient transportation systems. Dhaka, the capital of Bangladesh, is one of the world's fastest developing cities, with a population currently around 15 million. The fast-growing migration rate to Dhaka has already put tremendous stress on transportation systems. As a result, traffic jam has become a consistent feature of Dhaka city. It not only puts negative effects on our trade and commerce but also acts as the source of air and sound pollution. So, reducing traffic congestion is the crying need of the citizen of Dhaka city. To reduce the traffic congestion a flyover has been constructed to over the Moghbazar-Mouchak road intersections in the center of Dhaka city. Although, this project, which connects the northern and southern portion of Dhaka city aims to reduce traffic congestion, the condition of the traffic below the flyover has not been improved. Throughout the study, total volume of traffic using the flyover in different days and time has been analyzed and the velocity of each vehicle along with the perceptions of the commuter towards the flyover has been revealed.

Keywords: *urbanization, migration, congestion, traffic volume, perceptions.*

1. INTRODUCTION

Dhaka is a diverse city situated in central Bangladesh along the Buriganga River. Not only is it the capital city, but it is also the largest and central official zone in the country. In 2016, the population is 18.237 million and the city has shown the population growth of about 4.2% annually in the Greater Dhaka Area according to World Population Review (2017). Most of the government offices are also situated at Dhaka. Thereby it has been found that the yearly growth of total traffic is about 21.03%, which is much complex than the factor presently used by transport authorities in Bangladesh according to ULLAH, HAQUE & NIKRAZ (Traffic Growth rate and Composition of Dhaka-Chittagong Highway (N-1) of Bangladesh: The Actual situation). Only 9% of roadways and 6% of pavement area are available, in which 62 km functional primary, 108 km secondary and 221 km connector road serve the city road network (Mahmud et. al., 2008). Citizens continuously face the unbearable difficulties of the traffic jam, which not only causes damage to our time, health and livelihood but also affects our earnings. People from subaltern economic area bear their heavy loss due to the excessive jam, due to congestion in Dhaka city, the excess fuel cost was estimated 178.55 million USD in 2013. The average traffic speed in Dhaka is 6.4 kph. But if vehicle growth continues at its current pace, without substantial public transport investment the average speed may fall to 4.7 kph by 2035 according to "The Daily Star" report on "The smartest ways to deal with traffic congestion in Dhaka". That is why reducing traffic jam of Dhaka city is the main concern of policymaker. To reduce the traffic congestion a flyover was constructed to over the MaghBazar road intersections in the centred of Dhaka city. This project, which will connect the northern (Malibagh, Maghbazar) and southern (Satrastha, kawranbazar), portion of Dhaka city. On the other hand, a huge congestion had been noticed in the ramp of the Flyover in front of a VIP zone of Hotel Pan Pacific Sonargaon Dhaka and

in the ramp of Banglamotor portion. As a result, the road user loses their valuable time at the starting and end portion of the ramp. Through the flyover was constructed to ensure continuous flow and moderate speed of the motorized vehicle, the speed of the vehicle was observed less than the standard. That's why, it is necessary to evaluate the traffic volume, velocity and perceptions of the flyover users.

2. DATA COLLECTION

In order to reach at the preferred aims, data has been collected from primary and secondary sources. Primary data has been collected through concentrated survey by manually and Video Camera method. Data was collected on Sunday, Tuesday, Thursday and Friday at the time 08.00AM, 10.00AM, 12.30PM, 05.00PM respectively for each an hour. Volumes were measured manually and with the help of video Recording. To find the instantaneous velocity speed gun was used. To find out the driver's perception a questionnaire survey has been designed. The secondary data has been collected from numerous published and authorized sources. All the data has been processed by SPSS PC software to build a discrete choice model.

3. LITERATURE REVIEW

Peiris & Fernando (2011) have studied the suitability of a flyover as a traffic management measure. They found that 67% of accidents were happening on the flyover. Buses and heavy vehicles add to 74% of accidents at the ends of the flyover and also mentioned about an abrupt speed drop at the flyover. They have acknowledged that the disruptive design of the flyover at the method level blocks the graphical path of the users and the lack of overtaking chances occur under weighty traffic condition. Finally they have suggested that the land use compatibility be estimated with the transport system before hosting expensive traffic management implements such as flyovers. Meadows (2010) have mentioned that the insufficient width of both sides of the road and trading events on the footpaths are reasons for the matters. He has also mentioned that the "Marine Drive" project from Moratuwa to Dehiwala would be a good solution for the existing issue; here he suggests using water road instead of roadway. From Li, et al., (2013), they revealed that the probability of rear-end impacts is highest when traffic impending from upstream is at capacity state while traffic down-stream is highly congested. Md. Majumder and Islam found that two flyovers at Mohakhali and Khilgaon intersections of the city could not bring blameless outcome as it were expected before, as real field experience is not good-looking. In their study they took opinion from 80 businessmen from Mohakhali and 110 businessmen and 30 landowners from khilgaon and found that monthly revenue of businessmen has reduced after construction of the flyover. Job prospect has also been reduced on the neighbouring shops. But no study has been conducted on Moghbazar-Mouchak flyover.

4. DATA ANALYSIS

The field data and the questionnaire data has been analyzed through pie chart, bar chart which have been shown below:

4.1   Percentage of Different Vehicles Using the Flyover

A traffic survey was arranged to assess the percentage of different vehicles using the flyover. It was done using video camera. The data was collected on Sunday, Tuesday, Thursday, Friday and the time was 08.00AM to 09.00AM, 10.00AM to 11.00AM, 12.30PM to 01.30PM, 05.00PM to 06.00PM. So, the total four hours in each day was selected to count the vehicle. The average volume for different vehicles has been shown in the following table 4.1:

Table 4.1: Average Volume for Different Vehicles

Types of Traffic	Volume
BUS	303
PICKUP	541
CNG	2831
CAR	6404
MOTORCYCLE	3457

From the table it is seen that total five types of vehicles uses the flyover and the maximum number of vehicle using the flyover was private car and it is 6404 per four hour. The lowest number is 303 and it is for bus. The details of the survey have been demonstrated in the following pie chart in figure 4.1:
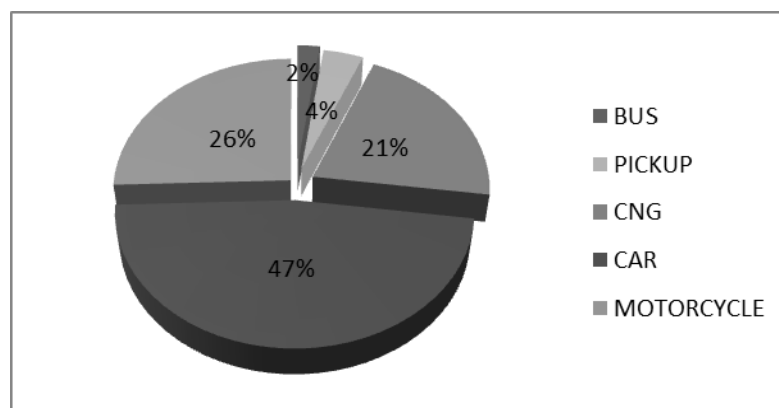

Figure 4.1:
Average Volume for Different Vehicles

From the pie chart it is found that the maximum portion of the pie has been covered by private car and it is 47% of the total vehicle and the lowest portion is for the bus and it is only 2% of the total. It is concluded that maximum beneficiary of the flyover is private car user.

4.2 Vehicles in Different Days

The survey data was processed to find out the daily variation of the total traffic using the flyover. The details finding has been shown in the following table 4.2:

Table 4.2: Vehicular Volume in Different Days

Day	Volume
Sunday	13308
Tuesday	13202
Thursday	18482
Friday	9138

From the table it is found that on Thursday, maximum number of the traffic used the flyover and on Friday the number is lowest. One of the reasons for highest number of vehicle on Thursday may be that it is the day before weakened that day the total commuter is high on that day. The data from the table has been shown in the following bar chart in figure 4.2:
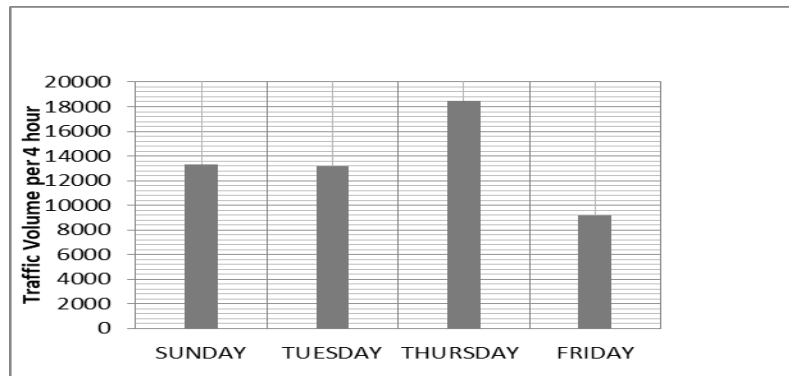
Figure 4.2: Variation of volume shown by the bar chart

From the bar chart it is shown that top of the bar is for Thursday and it is just upper than 18000 vehicles per four hours and the lowest bar is for Friday and the total vehicle per four hour is about just upper than 9000. As Friday is weekend in Bangladesh, the total road users are very low on that day.

4.3   Vehicle in Different Times

Traffic volume study is time dependent that's why, traffic survey was conducted to find out the total vehicles in different time. As we conducted the survey for four days. The average data of four days in different times in given below in the table 4.3:

Table 4.3: Total Vehicles in Different Times

Time	Volume
8.00AM -09.00AM	2848
10.00AM-11.00AM	3447
12.30PM-01.30PM	3068.5
05.00PM-06.00PM	4167

From the table, it is found that from 05:00PM to 6.00PM the road was occupied the highest number of vehicles and it is 4167. The second highest number of vehicle was found between 10.00AM to 11.00AM. The data was illustrated in the following figure 4.3:
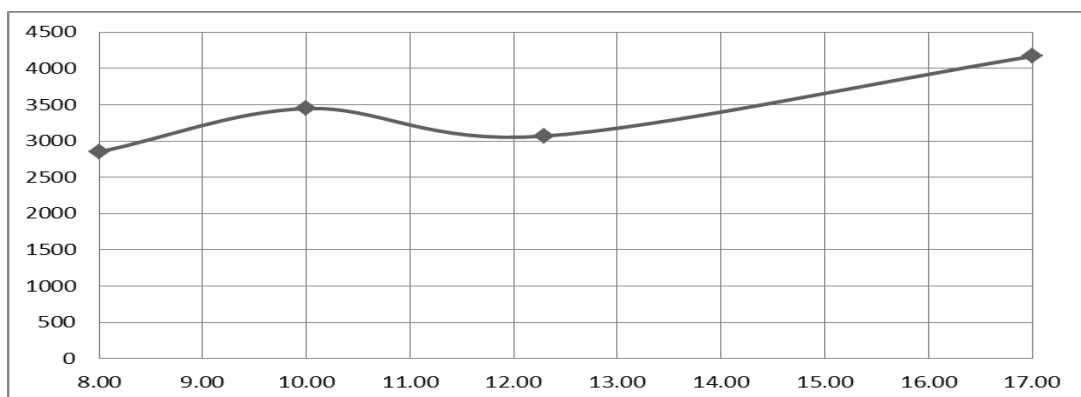

Figure 4.3: Total Vehicles in Different Times

Volume of traffic is increasing from 08:00AM to 10:00AM and then it's started to decrease up to 12:00PM and the highest pick is noticed at 05:00PM and the lowest pick is on 08.00AM.

The reason is for the highest pick for 05:00PM is that a large number of offices are closed at 05:00PM and the ramp of the flyover is just near the industrial zone.

4.4   Vehicular Variation in Per Hour

As volume of different vehicles have been collected for days average of four days data have been used to show the variation of volume of different vehicles on different times is given below in Table 4.4 :

Table 4.4: Vehicular Variation in Per Hour

Type of Vehicle	08.00am-09.00am	10.00am-11.00am	12.30pm-01.30pm	5.00pm-06.00pm
Bus	74	59.5	58.5	110.5
Pickup	160	171.5	120	89
Cng	522	808.5	699	801
Car	1296.5	1638.5	1446	2022
Motocycle	795.5	769	745	1144.5

From the table, the highest numbers of buses were noticed on 05:00PM to 06:00PM and the lowest number was seen on 08:00AM to 09:00AM. The highest volume has been seen by car on 10:00AM to 11:00AM. The data of the table has been illustrated in following figure 4.4:

4.5   Velocity of Different Vehicles

Instantaneous velocity of different vehicles in the mid portion of the flyover has been collected by using speed gun. The details finding regarding speed has been shown in the following table 4.5:
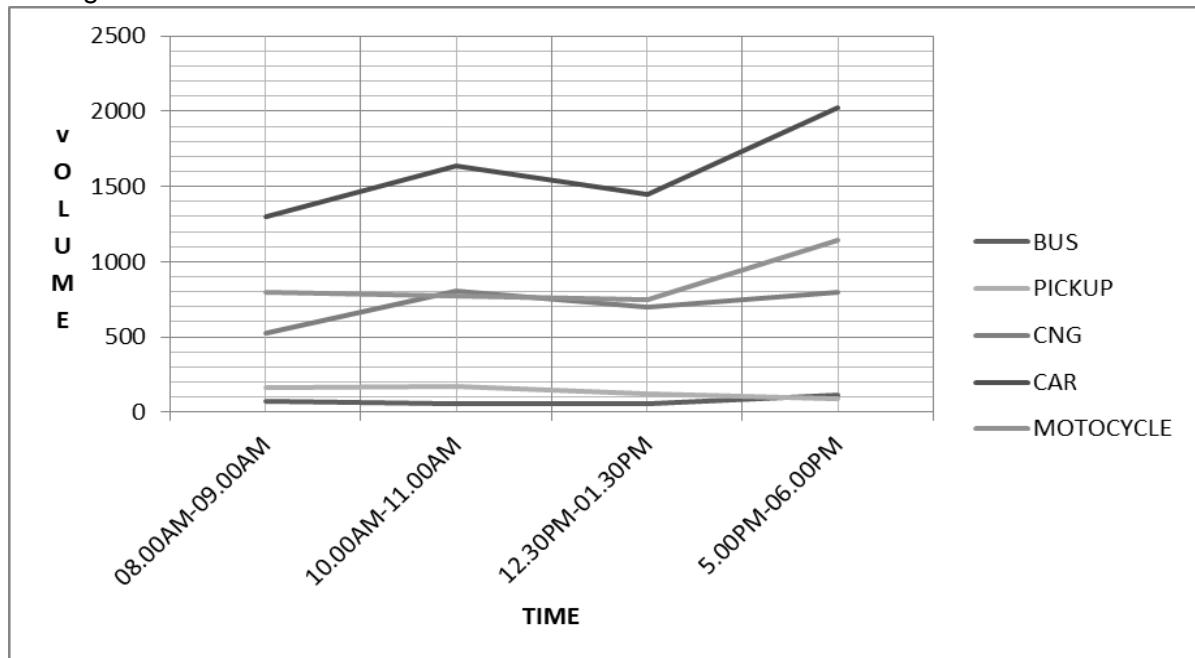

Figure 4.4: Total Vehicles in Different Times

Table 4.5: Velocity Variation in Mile per Hour

Type Of Traffic	Velocity(Mile/Hr)
Bus	17
Pickup	18
Cng	18
Car	20
Motorcycle	24

The data has been demonstrated in the following bar chart:
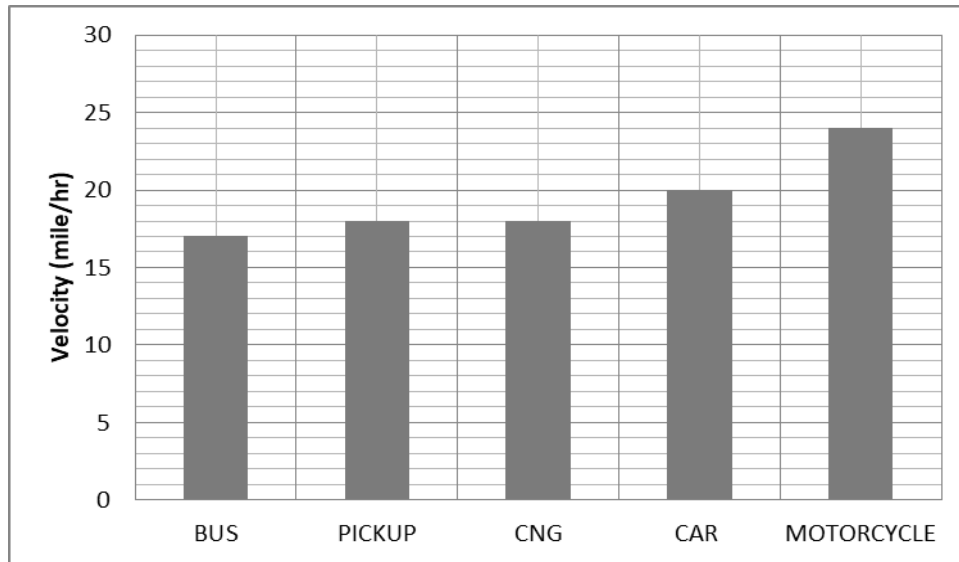

Figure 4.5: Velocity Variation with Type of Traffic (Mile/hr)

Among the vehicles, maximum speed was attained by motorcycle and it was 24 mile per hour and the operating speed of bus was only 17 miles per hour. Though the safe operating speed on flyover is 31 miles per hour, none of the vehicles could move with the maximum safe operating speed.

5. PERCEPTION ANALYSIS OF THE FLYOVER USERS

Three questions were designed and the respondents were the drivers of CNG, Bus and Car. Total sixty samples were collected.

5.1 Preferred Time

First question was designed for finding the preferred time for using the flyover. Three time ranges were selected for the questionnaire. The outcomes of the survey have been given in the following table and pie chart.

Table 5.1: Preferred Time and Respondents

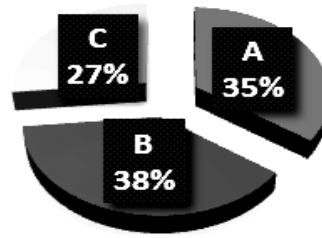|	Time	Respondents
A	8AM-12PM	21
B	12PM-4PM	23
C	4PM-8PM	16

Preferred Time

Figure 5.1: Preferred Time and Respondents with Pie Chart

A major number of respondents prefer the time 12.00PM to 04.00PM for using the flyover which is 38 % of the total. Drivers are interested to use the flyover at off peak hour as in this time flyover can help to reduce the travel time but at the peak hour it is not so much effective as congestion in the flyover kills their valuable time.

5.2 Fare Variations

Sometimes drivers demand extra charge for using the flyover especially the CNG driver. Total 56 answers regarding the extra fare were collected. These data have been processed to find out the fare variation in the following table and pie chart.

Table 5.2: Fare Variations and Respondents

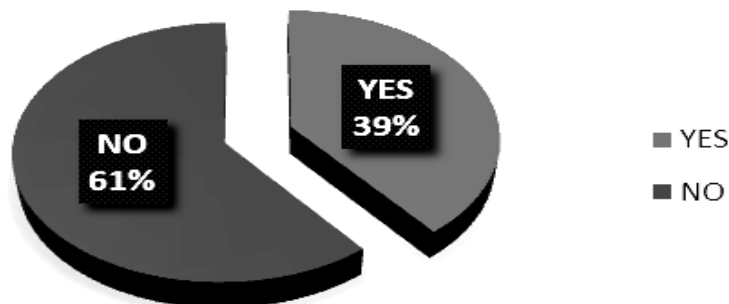| Fare variation	Respondents
YES	18
NO	28

Fare Variations

Figure 5.2: Fare Variations with Pie Chart

From the pie chart it is found that more than half (61%) of the drivers do not demand extra charge for using the flyover as it helps to reduce their travel time and fuel cost.

5.3 Savings of Travel Time

Travel time along with the fuel cost saving is the major issue for constructing the flyover. A question was set to find the effectiveness of flyover in terms of travel time. The data has been illustrated in the following table and pie chart.

Table 5.3: Travel Time and Respondents

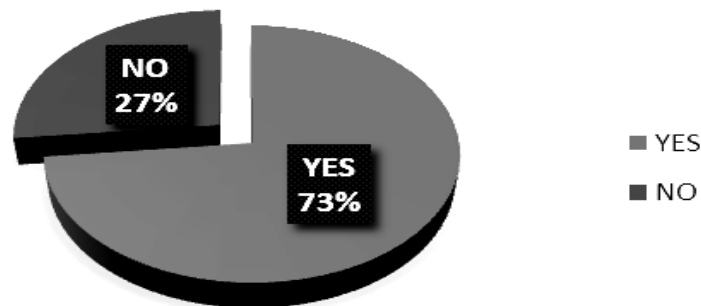| Reduction of Travel time	Respondents
YES	44
NO	16

Figure 5.3: Savings of Travel Time

About three fourth (73 %) of the respondents believe that this flyover can reduce their travel but a few drivers (27%) gave the negative answer by mentioning that they have to face the congestion in the ramp of the flyover due to signals.

6. CONCLUSION AND FURTHER RECOMMENDATION

Though flyover has been constructed for mass number of public transport, highest beneficiary of this flyover is private car. About 47 % of the total vehicles are private car. The highest number of vehicles was seen on Thursday comparing to other day and after the office hours from 5.00 PM to 6.00 PM was the peak hour on the flyover. There was no pedestrian and bicycle facility on the flyover which indicates that it is not a sustainable solution for the environment. Through our study, data was collected on regular interval but data on night was not collected. As a result, traffic behaviour on night was not examined. Traffic flow on below the flyover was not considered. Hence, impact of flyover on the road below it was not evaluated. So, there is a large potentiality of future research considering the impact of traffic flow on the linkage road of flyover.

REFERENCES

"World Population Review (2017)" report available at http://worldpopulationreview.com/world-cities/dhaka-population/ (Access date: 25.08.17)

ULLAH, HAQUE & NIKRAZ, "Traffic Growth rate and Composition of Dhaka-Chittagong Highway (N-1) of Bangladesh: The Actual situation" available at http://www.wseas.us/e-library/conferences/2013/Rhodes/ENVIR/ENVIR-35.pdf (Access date: 18.08.17)

S.M. KHAN & M.S. HAQUE (2013), "Traffic Flow Interruptions in Dhaka City: Is Smooth Traffic Flow Possible?" (Journal of PU, Part: B Vol.2 No.2, July 2013, pp. 46-54 PRESIDENCY UNIVERSITY ISSN: 2224-7610)

"The Daily Star" report on "The smartest ways to deal with traffic congestion in Dhaka" report available at http://www.thedailystar.net/op-ed/politics/the-smartest-ways-deal-traffic-congestion-dhaka-1220956 (Access date:02.09.17)

Peiris, O. V., & Fernando, K. D. (2011). An examination of the appropriateness of flyover as a traffic management measure to the road intersection of Sri Lanka. Town and Country planning, University of Moratuwa.

Meadows, W. (2010, 02 19). The awesome Dehiwala flyover. Retrieved from Daily mirror: http://print2.dailymirror.lk/features/features/4090.html

Li, Z., Ahn, S., Ragland, D. R., Chung, K., Wang, W., & Yu, J. W. (2013). Surrogate safety measure for evaluating rear-ends collision risk related to kinematic waves near freeway recurrent bottlenecks. Accident Analysis and Prevention, 52– 61.

Majumder, S. 2007. Impact of Flyovers of Dhaka City on the Affected People in the Adjacent Areas, An Unpublished Thesis, Submitted to the Department Geography & Environment, University of Dhaka.

Khan, T, & Rashedul, 1. (2013). "Estimating Costs of Traffic Congestion in Dhaka City. International Journal of Engineering Sciences and Innovative Technology", 2, 281-289