

An Overview of the Traffic Congestion in Dhaka City: Its Causes and Consequences

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Abstract - *The mega city, Dhaka cannot afford the burden of 14.54 million people on its 815.8 sq. kilometers of land. It is lengthy in south and northern directions while its width consisting of east and western directions is few kilometers only. Traffic congestion stands as the number one problem of Dhaka city and becomes the most intolerable one for the city dwellers. All most all city dwellers are directly allied with this problem. Besides, traffic congestion leads to other problems such as air pollution, noise pollution etc. Although several research have been conducted to deal with this problem, but still people are being adversely affected by it. Therefore, this study attempts to explore the hidden causes of traffic congestion of Dhaka city as well as to shed light its overall consequences. This study is based on the survey of 400 people who were directly associated with this problem. The researchers have also drawn information from the existing literature and various reports of the Government of Bangladesh to clarify the different causes of traffic congestion and its overall effects. The major finding of the study is that there are several factors liable for traffic congestion of Dhaka city and it has adverse effects on the different socio- economic aspects, but still these issues are not emphasized considerably to minimize it.*

Key words: Traffic congestion, Causes & Consequences, Socio-economic aspects, Dhaka city, Pathways.

JEL Classification: L90; R41

1. INTRODUCTION

Traffic jam is a common phenomenon in our country especially in Dhaka being one of the mega cities in the world. It is not a problem rather it is something more than that because problem has some solutions but this type of traffic jam has got no solution. No doubt, time is the most valuable thing in the twenty first century (Downie A. 2008). And traffic jam is killing the most productive time of the people of Dhaka city. Time is passing rapidly and we are lagging behind. The world is becoming faster everyday where as we are becoming slower.

Everybody is losing their most valuable productive time due to this unnatural kind of traffic jam. The sufferings of common people before the occasion of Eid, Durgapuja etc. are unbelievable. Huge of labor time are being wasted in the jam. These labor hours can contribute a lot to the national economy if these loss hours can be used in production. Uncontrolled and unplanned driving of motorized and non-motorized vehicles, insufficient road and lack of transport facilities are the major factors behind the traffic congestion (Nagel K. and Schreckenberg M. 1992). Kerner B.S. (2009) clarified that lack of coordination among transport agencies, illegal occupation on roads, lack of sufficient footpaths, unscientific signal system, haphazard parking and inadequate parking facility and frequent intersections are among many other issues responsible for the traffic gridlock of city. Private cars are the main culprits here. Although this big problem has a great effect on our social life and national economy but no government has been seen promising to solve this problem.

2. LITERATURE REVIEW

Dhaka has 1,868 kilometres (1,161 mi) of paved roads (Ahmed S.U, 1986). It is connected by highways and railway links to Chittagong, Khulna, Mymensingh, Rajshahi, Faridpur and Sylhet. Highway links to the Indian cities of Kolkata and Agartala have been established by the BRTC which also runs regular bus services to those cities from Dhaka. The Kamalapur Railway Station and the Airport (Biman Bandar) Railway Station are the main railway stations providing trains on suburban and national routes operated by the state-run Bangladesh Railway (McAdam, M. 2004). The Sadarghat Port on the bank of the Buriganga River serves the transportation of goods and passengers upriver and to other ports in Bangladesh (Economic and Social Commission for Asia and the Pacific, 2005). The Zia International Airport is the largest and busiest in the nation (Alam, J. B. 2003).

Traffic and public transport conditions in Dhaka have seriously deteriorated, characterized by daily traffic jams, traffic congestion, long delays and high incidence of road accidents (Zohir S.C. 2003). Now Dhaka city's traffic system is considered to be one of the most chaotic ones in the world. The residents are compelled to undergo

physical stress and suffer financial losses in terms of man-hours lost on working days (Mahmud K., Gope K. & Chowdhury S.M.R. 2012).

A.H. Jaffor Ullah (2001) admits this fact that traffic hardly moves in Dhaka's main artery during rush hours. Many folks from mercantile community would prefer to leave their houses late in the morning to simply avoid the all too familiar rush hour traffic jams. But their number is few and far between. Most Dhaka folks who work in government offices, schools, and other offices have no choice but to hit the road during the morning rush hour. These folks obviously take the brunt of rush hour traffic jam. If one thinks that it is an exaggerated statement, then one should climb up to one of those over bridges near Farmgate, Karwan Bazaar, or Bangla Motors to take a peek at any of the ubiquitous traffic jams. One could see the crawling vehicles, as far as the eyes would allow one to see, lining up the avenues near the bustling intersections. Come to think of it, there are quite a few intersections near Farmgate. This clearly indicates that Dhaka's road system is unplanned from the very beginning.

Md. Masud Karim (1997) found that limited resources invested for the development of transport facilities, such as infrastructure and vehicles, coupled with the rapid rise in transport demand, existence of a huge number of non-motorized vehicles on roads, lack of application of adequate and proper traffic management schemes are producing severe transport problems in almost all the urban areas of Bangladesh. Worsening situation of traffic congestion in the streets and sufferings of the inhabitants from vehicle emissions demand extensive research in this field.

Bangladesh Inland Water Transport Authority (BIWTA) conducted a research on "Water way around Dhaka City" (Desh Upodesh Ltd., 2001). According to them, if alternative water way can be introduced around the Dhaka city, traffic jam can be reduced. Government has tried that. But due to some environmental and seasonal factors of weather and lower level of water in water ways, this project failed.

Khaled Mahmud and others (2012) suggested that to reduce traffic jam, government can consider construction of roads through east-west connection of Dhaka city, construction of circular embankment-cum-road along the periphery of Dhaka city, grade separated road network system, Bus Rapid Transit (BRT) system, and Metro-Rail system. By reducing traffic jam, this city can play a very important role by ensuring healthy environment free from noise and pollution.

Shuichi and Hironao (2003) have shown in their study that by improving traffic signaling strategies can improve the traffic situation of the street cars. According to them, their proposed signaling strategy improves the traffic situation of the street cars. Same signaling system can be implemented in Dhaka City to improve our traffic system.

Although previous Governments took different initiatives including special meeting with the agencies concerned to devise means to help reduce the intensity of traffic problem in Dhaka city, but in fact nothing has happened with the traffic police remaining indifferent, in many cases, to their usual duty. The drivers of buses and trucks and the rickshaw-pullers continue to be as defiant as before. In the past politicians were often blamed partially for the chaotic traffic because of their alleged involvement in billion-taka toll collection from bus and truck owners and bus terminals. The advisers of the caretaker government were believed to be clean in this respect. Yet, there was no improvement in the traffic situation (Mahmud K., Gope K. & Chowdhury S.M.R. 2012).

3. OBJECTIVES OF THE STUDY

The general focus of this research is to unearth the hidden causes of traffic congestion of Dhaka city and to shed light its overall consequences. To supplement the achievement of the general objective of this research paper, the following specific objectives are being pursued spontaneously:

1. To identify factors affecting the traffic congestion of Dhaka city;
2. To analyze the overall effects of traffic congestion on the different socio-economic aspects;
3. To identify probable solutions from the respondent's opinions about traffic congestion.

4. METHODOLOGY OF THE STUDY

The main objective of this exploratory research is to reveal the different causes of traffic congestion of Dhaka city as well as to shed light its overall effects on the different socio-economic aspects. In order to achieve the research objectives, the target group was those people who frequently tripped to different places for different purposes and thereby, they were directly allied with this problem. This study was conducted in total 400 people. This sample size has been selected through convenient sampling method. Among which 280 male and 120 female people were involved. This study is based on both primary and secondary data. The theoretical part of this study is formalized from secondary information collected from different newspapers, journals and publications of thesis. A structured questionnaire has been used for collecting primary data. This questionnaire was prepared by using a five point Likert scale, where 1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree, 5= strongly agree. A comprehensive personal interview was conducted to explore individual perception about the different causes of traffic congestion as well as its effects on the different socio-economic aspects. Finally, the researchers used Statistical Package for Social Science (SPSS), Microsoft Excel and scientific calculator to analyze and interpret the data.

4.1 . Hypothesis Formulation

In order to find out the different factors affecting the traffic congestion of Dhaka city, the following hypotheses are emerged for this study:

- a. H_0 : There is no relationship between unplanned establishment of bus counters and traffic congestion.
 H_1 : Unplanned establishment of bus counters increases traffic congestion.
- b. H_0 : There is no relationship between centralized establishment of different offices and traffic congestion.
 H_1 : Centralized establishment of different offices increases traffic congestion.
- c. H_0 : There is no relationship between availability of educational institutions in a commercial areas and traffic congestion.
 H_1 : Availability of educational institutions in a commercial areas increases traffic congestion.
- d. H_0 : There is no relationship between poor car parking facilities in the market place and traffic congestion.
 H_1 : Poor car parking facilities in the market place increases traffic congestion.
- e. H_0 : There is no relationship between pedestrian walkways and reluctance to use of foot over-bridge and traffic congestion.
 H_1 : Pedestrian walkways and reluctance to use of foot over-bridge increases traffic congestion.
- f. H_0 : There is no relationship between unplanned construction work nearby road side and traffic congestion.
 H_1 : Unplanned construction work nearby road side increases traffic congestion.
- g. H_0 : There is no relationship between overcrowded population in Dhaka city and traffic congestion.
 H_1 : Overcrowded population in Dhaka city increases traffic congestion.

- a. H_0 : There is no relationship between the establishment of huge natural gas (CNG) refueling stations and petrol pumps nearby road side and traffic congestion.
 H_1 : The establishment of huge natural gas (CNG) refueling stations and petrol pumps nearby road side increases traffic congestion.
- b. H_0 : There is no relationship between huge numbers of unregistered vehicles and traffic congestion.
 H_1 : Huge numbers of unregistered vehicles increases traffic congestion.
- c. H_0 : There is no relationship between unplanned rail way crossing bar and traffic congestion.
 H_1 : Unplanned rail way crossing bar increases traffic congestion.
- d. H_0 : There is no relationship between collapse of road and traffic congestion.
 H_1 : Collapse of road increases traffic congestion.
- e. H_0 : There is no relationship between cramped road and traffic congestion.
 H_1 : Cramped road increases traffic congestion.
- f. H_0 : There is no relationship between unplanned establishment of market and traffic congestion.
 H_1 : Unplanned establishment of market increases traffic congestion.
- g. H_0 : There is no relationship between lack of bypass road and traffic congestion.
 H_1 : Lack of bypass road increases traffic congestion.
- h. H_0 : There is no relationship between spending more time on traffic signal and traffic congestion.
 H_1 : Spending more time on traffic signal more is the traffic congestion.

5. RESULTS AND DISCUSSION

5.1 Hypothesis Testing and Interpretation of the Results

To test the aforementioned hypotheses, the researchers have computed (t) values by applying one sample 'T' test technique. Following Table-1 contains the hypotheses test results.

The researchers have computed the t-values to prove all the hypotheses by using the hypothetic mean value or test value 4. This is because the hypothetic mean value or test value 4 represents 'agree' about the factors liable for traffic congestion of Dhaka city in the statement. Therefore, it helps to judge whether the average number of population was significantly agreed with all the factors increasing traffic congestion of Dhaka city. The Table-1 shows the overall hypotheses test results which are being explained below.

In case of hypothesis A, the Table- 1 shows that at 5% level of significance (one tail test), calculated t-value (30.512) is greater than table value (1.645). So, the null hypothesis is rejected and hence, we conclude that unplanned establishment of bus counters increases traffic congestion of Dhaka city. Similarly, the researchers also found that at 5% level of significance (one tail test) the calculated t-values of 39.950, 9.987, 55.420, -8.362, 125.002, 30.512, 83.123, -16.882, 39.950, 30.512, 20.458, 39.950 and -8.362 for the hypotheses B, C, D, F, G, H, I, J, K, L, M, N and O are greater than t-table value (± 1.645). So the null hypotheses for all variables are rejected and thereby, we conclude that centralized establishment of different offices, availability of educational institutions in a commercial area, poor car parking facilities in the market place, unplanned construction work nearby road side, over-crowded population in Dhaka city, the establishment of huge natural gas (CNG) refueling stations and petrol pumps nearby road side, huge numbers of unregistered vehicles, unplanned rail way crossing bar, collapsed road, cramped road, unplanned establishment of market, lack of bypass road and more time spent on traffic signal increase traffic congestion of Dhaka city. But pedestrian walkways and reluctance to use of foot over-bridge does not influence in the increase of traffic congestion in Dhaka city. Because the observed value of t is (-.032) which falls in the acceptance region ($A -1.645$) and thus, the null hypothesis for the E is accepted at 5% level of significance (one tail test).

Table 1. Computation of (t) values and the hypotheses test results

Different factors liable for traffic congestion of Dhaka city	N	Mean	Standard Deviation	Standard Error of Mean	Calculated 't' Value
A) Unplanned establishment of bus counters	400	4.70	.46	.023	30.51**
B) Centralized establishment of different offices	400	4.80	.40	.020	39.95**
C) Availability of educational institutions in a commercial areas	400	4.40	.80	.040	9.99**
D) Poor car parking facilities in the market place	400	4.89	.32	.016	55.42**
E) Pedestrian walkways and reluctance to use of foot over-bridge	400	3.98	1.55	.078	-.03ns
F) Unplanned construction work nearby road side	400	3.61	.93	.047	-8.36**
G) Over-crowded population in Dhaka city	400	4.98	.158	.01	125.00**
H) The establishment of huge natural gas (CNG) refueling stations and petrol pumps nearby road side	400	4.70	.46	.023	30.51**
I) Huge numbers of unregistered vehicles	400	4.96	.236	.012	83.12**
J) Unplanned rail way crossing bar	400	3.00	1.19	.06	-16.88**
L) Collapse of road	400	4.80	.406	.020	39.95**
M) Cramped road		4.70	.46	.023	30.51**
N) Unplanned establishment of market	400 400	4.67	.60	.033	20.46**
O) Lack of bypass road	400	4.80	.40	.02003	39.95**
P) More time spent on traffic signal	400	3.61	.93	.047	-8.36**

**Significant at 1% probability level, NS: not significant at 5% probability level

The following Table-2 represents the overall frequency and percentage of the respondents' opinions on the several causes which are playing dominant role in increasing traffic congestion of Dhaka city. From this table it is clearly visible that unplanned establishment of bus counters, centralized establishment of different offices, poor car parking facilities in the market place, over-crowded population in Dhaka city, the establishment of huge natural gas (CNG) refueling stations and petrol pumps nearby road side, huge numbers of unregistered vehicles, collapse of road, cramped road, lack of bypass road get hold of highest priority from others in creating traffic congestion of Dhaka city. Approximately 98% of the respondents were either agreed or strongly agreed with these factors (See Table-2).

Table 2. The overall frequency and percentage of the respondents' opinions on the several causes of traffic congestion.

Different factors liable for traffic congestion of Dhaka city	Overall frequency and percentage of the respondents				
	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
A) Unplanned establishment of bus counters	280(70%)	120(30%)	-	-	-
B) Centralized establishment of different offices	320(80%)	80(20%)	-	-	-
C) Availability of educational institutions in a commercial areas	240(60%)	80(20%)	80(20%)	-	-
D) Poor car parking facilities in the market place	357(89.2%)	42(10.5%)	1(0.2%)	-	-
E) Pedestrian walkways and reluctance to use of foot over-bridge	279(69.8%)	1(0.2%)	-	80(20%)	40(10%)
F) Unplanned construction work nearby road side	99(24.8%)	73(18.2%)	201(50.2%)	27(6.8%)	-
G) Over-crowded population in Dhaka city	396(99%)	2(0.5%)	2(0.5%)	-	-

A) The establishment of huge natural	280(70%)	120(30%)	-	-	-
B) Huge numbers of unregistered vehicles	390(97.5%)	6(1.5%)	4(1%)	-	-
C) Unplanned rail way crossing	80(20%)	-	200(50%)	80(20%)	40(10%)
D) Collapse of road	320(80%)	80(20%)	-	-	-
E) Cramped road	280(70%)	120(30%)	-	-	-
F) Unplanned establishment of market	313(78.2%)	44(11%)	43(10.8%)	-	-
G) Lack of bypass road	320(80%)	80(20%)	-	-	-
H) More time spent on traffic	99(24.8%)	73(18.2%)	201(50.2%)	27(6.8%)	-

Source: Survey data Note: The response was multiple

5.2. Transport responsible to create traffic congestion of Dhaka city.

In this study, among the 400 respondents only 3% (See Table-3) respondents were strongly agreed that motor cycle creates traffic jam at large extents whereas, 8% respondents were agreed on this point. Therefore, it can be said that motor cycle does not highly responsible to create traffic congestion of Dhaka city. On the other hand, approximately 85% of the respondents were found agreed that motor car, rickshaw and mini-bus are highly responsible for traffic congestion. Furthermore, around 73% of the respondents were also believed on this point that micro-bus, auto rickshaw, truck create traffic jam at large extents in Dhaka city.

Table 3. Category of vehicles liable for traffic congestion and percentage of respondents

Name of the vehicles	Percentage of respondents				
	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
a) Motor car	69%	18%	10%	3%	-
b) Micro-bus	27%	35%	23%	13%	2%
c) Auto Rickshaw	48%	28%	15%	7%	2%
d) Truck	43%	32%	15%	10%	-
e) Motor cycle	3%	8%	29%	10%	50%
f) Rickshaw	32%	50%	18%	-	-
g) Mini-bus	52%	33%	15%	-	-

Source: Survey data Note: The response was multiple

5.3. Respondent's opinions regarding the consequences of traffic congestion

Traffic congestion has multidimensional effects on the different socio-economic aspects. All respondents (See Table-4) extremely said that unnecessarily passing time hour after hour on road drops them in to critical challenge to balance between the organizational work life and the family work life. In addition, they were also found highly agreed on this point that traffic congestion causes both the environmental and economic loss. Every day, huge amount of energy is being loosed by this problem. 76.5% of the respondents were strongly agreed that air of Dhaka city is highly injured by traffic congestion whereas, 23.5% respondents were agreed on this point. Moreover, 99.6% of the respondents strongly believed that it is one of the major causes of their physiological and psychological disarray. About 94.5% people

considered that, traffic jam is a curse to attract more foreign investment and thus it has a negative impact on our economy. On the other hand, this problem increases the cost of living of the city dwellers. Approximately 80% of the respondents seemed that traffic congestion reduces the number of trips of vehicles operated in Dhaka city. As a result, vehicles operators charge travel fare two to three times more than actual fare. Finally, it was found from this study that traffic congestion leads to aggressive behavior of people and exterminates human productivity. Around 96% of the respondents were in no doubt upon this concern.

Table 4. Statistics of the respondent's opinions regarding the consequences of traffic congestion

Particulars	Percentage of respondents				
	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
a) Traffic congestion confronts people with the critical challenge to balance between the organizational work life and the family work life.	100%	-	-	-	-
b) Traffic congestion creates physiological and psychological disarray.	99.6%	0.4%	-	-	-
c) Traffic jam is a curse to attract more foreign investment.	77.5%	17%	5.5%	-	-
d) Traffic congestion causes both the economic and environmental loss	100%	-	-	-	-
e) Air of Dhaka city is highly injured by traffic congestion.	76.5%	23.5%	-	-	-
f) Traffic congestion increases the cost of living of the city dwellers.	53%	27%	20%	-	-
g) Traffic congestion leads to aggressive behavior of people	68%	25%	7%	-	-
h) It kills human productivity	83.5%	16.5%	-	-	-
i) Traffic jam creates different kinds of difficulties like losing contract, delay in taking delivery of goods and services etc.	49%	33%	18%	-	-

Source: Survey data

Note: The response was multiple

5.4. Respondent's opinions regarding the ways of reducing traffic congestion of Dhaka city

Different suggestions have been emerged from the respondents' opinions to reduce and solve the traffic congestion of Dhaka city. Among the 400 respondents, 87% (See Table-5) were found well thinking-out about *Flyovers should be constructed at the important intersections in order to reduce traffic congestion* in the context of Dhaka city. Besides, majority of the respondents (93%) seemed that *Public transport should be encouraged* to reduce this problem. Moreover, 85% of the respondents believed that *Proper coordination among DCC, DESA, WASA, BTTB and TITAS* is required to decrease traffic congestion of this city. Finally, all respondents (100%) were found confident that *Corporate office, mill-factory, educational institutions, hospital should be more decentralized* in order to lessen the traffic congestion in Dhaka as this is a mega city.

Table 5. Statistics of the respondent's Opinions regarding the ways of diminishing traffic Jam.

Particulars	Percentage of respondents				
	Strongly Agree	Agree	Neither agree nor disagree	disagree	Strongly Disagree
a) Corporate office, mill-factory, educational institutions, hospital should be more decentralized.	47%	53%	-	-	-
b) More public transport system should be established.	45%	48%	7%	-	-
c) Flyovers should be constructed at important intersections to reduce traffic congestion.	87%	13%	-	-	-
d) The space of road in Dhaka city should be expanded.	50%	43%	7%	-	-
e) Bring the surrounding rivers under the transportation system	12.5%	16.5	12%	-	59%
f) Remove encroachment made by street hawkers and construct designated parking facility.	53%	27%	20%	-	-
g) Proper coordination among DCC, DESA, WASA, BTTB and TITAS.	60%	25%	8%	7%	-
h) Restructure railway crossing bar and bus terminals	73.5%	13%	13.5%	-	-
i) Roads should be freed from rickshaws	49%	33%	18%	-	-
j) Strategic Transportation Planning STP should be implemented phase by phase	45%	47%	8%	-	-
l) expressway should be introduced	55%	37%	8%	-	-

Source: Survey data Note: The response was multiple

6.CONCLUSIONS AND RECOMMENDATIONS

Traffic congestion-one of the top most problems in Dhaka city is not confined only in the individual level rather it becomes national malady. It is now a curse to all of the dwellers of Dhaka city. No doubt to say from this study that this problem generates other major problems like environmental pollution, individual problem, organizational problem as well as national problem and thus makes the lives of city dwellers excruciating. For that reason, it is the time to give highest precedence to resolve this problem. Therefore, following are the guiding principles could be followed along with the different suggestions emerged from the respondents opinions in this concern.

Bus counters should be modernized through efficient planning process and should be shifted into different outer surfaces adjacent to Dhaka city. This process will also help to minimize the abundance of vehicle in Dhaka city.

- Govt. of Bangladesh should take a strategic plan to ensure sufficient utilities that Dhaka city has in to different outer areas. This process will encourage corporations including health centre, educational institutions and other organizations to follow the principle of decentralization in setting their organizational establishment. Moreover, this process will also help to overcome the problem of over-crowded population in Dhaka city.
- Govt. of Bangladesh should approve and implement a law relating to mandatory car parking facilities for all establishments. This process will help to eliminate haphazard car parking on road and thereby helps to overcome the problem of cramped road which is a big cause of traffic congestion.
- Establishment of alternative roads or bypass roads, expansion of existing road, periodic checking and repair of collapsed road, and constant monitoring and coordinating system could be ensured to minimize traffic congestion.
- Scientific traffic signal system is very much essential to get rid of this problem. Because, this will help to maintain discipline on road and will less the bother of spending more time in traffic signal.
- Government should impose high tax rate on purchasing car. Besides, rickshaw should be prohibited highly in the risky zone for traffic jam.
- Different CNG refueling stations and petrol pumps in Dhaka city should have different operation schedules based on time and zone.
- Govt. of Bangladesh should allocate some specific areas for the street hawkers in Dhaka city.
- Government should provide monetary and nonmonetary benefits for the replacement of bad dated vehicles.
- Traffic training organizations should conduct applied training programs for both the traffic police and the vehicle drivers. This training system will not only help to implement traffic laws successfully, but also will help to pursue them.
- Public awareness has to be raised through mass media.

7.LIMITATIONS OF THE STUDY

To be fully representative, such type of study needs to cover wider areas covering whole Bangladesh. But due to financial and time constraints, the study was limited to Dhaka city and its suburb areas. This limited scope has affected the findings to some extent. But to have a general idea about the different sources of traffic congestion as well as its effects, such limited scope has not very much adversely affected the findings. Despite our best effort to bring out best result, followings are the several obstacles made this study confronted.

- Respondents did not want to be interviewed as they didn't have enough time because of their busyness.
- Some of the respondents were filling the questionnaire for the first time. So, they were somehow suspicious and confused about it.

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