Impact of Roadside Commercialization on Transportation Performance: A Case of Satmosjid Road, Dhaka

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Abstract

Dhanmondi is the first planned residential area in the history of Bangladesh; developed in early fifties to provide accommodation for high and higher middle income groups with good environment in Dhaka City. After liberation character of this area were being changed and gradually being invaded by non-residential uses like commercial, institutional, etc. Now the City expanded more than six times bigger than Dhaka of that fifties. Its economic activities and improvements in transport, routes and mode altered the relative locational advantages and prompted changes in the uses and intensity of uses of this area. This resulted the more demand for new spaces for new urban activities and provoked more traffics of various modes leaded to create unpleasant environment on residential character and vast negative impacts on different roads especially the main road named Satmosjid Road. The more the roadside commercialization, the less the transportation performance of the road is occurring. This study tried to investigate the transportation performance of this road due to roadside commercialization.

Keywords: Commercialization, transportation performance, traffic volume.

Introduction

Dhaka is the 26th mega city in the world, which is facing rigorous transportation problem along with its huge population. According to World Bank, only for the traffic congestions in this city, Bangladesh is counting a loss of Tk.1600 million per year. Several attempts have been made to facilitate the traffic movements addressing the transportation problems. But a good policies and sustainable planning still waits to be found out. The factors that are liable to cause these problems must be incorporated in that good plan. Total family incomes appeared as a very important factor of them in determining its member to choose the appropriate transport modes for different trip purposes. It was found that in high income area like Dhanmondi about 44% trips were made by car and jeep, 31% trips were made rickshaws, 8% trips were made by walking for different purposes (Ara, 1983). In some areas of the city, this problem is very acute. Dhanmondi is one of them, the once planned residential area, is gradually transforming into a district of mixed use with more transition of land uses to commercial activities in the last one decade. This is due to the prominence of the area in respect of its location, accessibility and wide road network. The area is connected with rest of the city through two major local collectors: Satmosjid road and Dhanmondi 27 no. road and these have encouraged the initiation of commercial and institutional activities in the area, especially adjacent to these two roads. But

due to lack of proper regulatory framework, this development has boomed in a haphazard way reaching the inner portions of the area and ultimately leading to chaos, traffic congestion and environmental pollution. The study therefore, attempts to identify the consequential effect of the untidy and unplanned roadside commercialization on the transportation performance of Satmosjid road as it is considered as the main connector between Dhanmondi and the rest of the Dhaka city. However, several transport surveys have been carried out to explore the relationship between the transportation performance and roadside commercialization of the study area along with some limitations. However, the study has been tried to be accurate rather than being precise in the survey and analysis period.

Methodology

The target of this study is to determine the impacts of road side commercialization on transportation performance. In order to reach the goal through collecting necessary data, field surveys like measurement of cross sectional elements of different parts of the road and seven major intersections and land use survey, several transportation surveys like traffic volume survey and speed survey, parking survey and a users' opinion Survey have been conducted. Through the land use survey, a detailed land use map of the study area has been prepared. Transport surveys have been conducted in different periods of the day considering the peak and off peak issue. To get the parking scenario, parking survey has been carried out in that whole area. Users' opinion survey has also been conducted to get the satisfaction level of the people. Help from the secondary sources has also been drawn to support the study. For the analysis of data collected from primary and secondary sources, Microsoft Excel and SPSS were used efficiently.

Role of Satmosjid Road on Transportation System of Dhaka City

A system is an entity of some interrelated components and so is the transportation system with roads, vehicles, and pedestrians etc. as its components. Among these components road is the fixed and the major influencing component of transportation system. It performs its function as collector road and collects vehicle and pedestrian into Mirpur Road. Besides it is used as by pass road to go into Mohammadpur and Lalmatia. After all in respect to the communication of whole Dhaka city Satmosjid Road plays very important role. This road starts from Rifles Square to Dhanmondi 27 no. road. It plays a vital role in the Grid Iron Pattern of Dhanmondi residential area. The road width is average 80 feet and divided into two ways. Each way is subdivided into two lanes. Each lane is average 20 feet wide. The road is almost straight and has pedestrian path in two side, having width average 6 feet. Most of the commercial buildings in Dhanmondi area are situated along both sides of the road. There is a median of 3 feet in the road. Several local streets are generated from the road.

Roadside Land Use Pattern and Its Impact on Travel Behavior of Satmosjid Road

Land is one of the most important tools for development (physical development) activities. For proper and integrated development a clear idea about the concept of land-use is a must. This idea should reflect how a particular land use pattern could change a particular system. Transportation is a system that is greatly influenced by the land-use pattern. Overall situation of the transportation system of Satmosjid Road are being affected by the following six major land use categories and their subsequent building height respectively.

Table1: Distribution of land use on both sides of Satmosjid Road

Type of Land Use	Percentage (%)
Residential	22.03
Commercial	35.60
Mixed	25.42
Institutional	9.32
Under Construction	6.78
Vacant	0.85
Total	**100**

Source: Field Survey, 2005

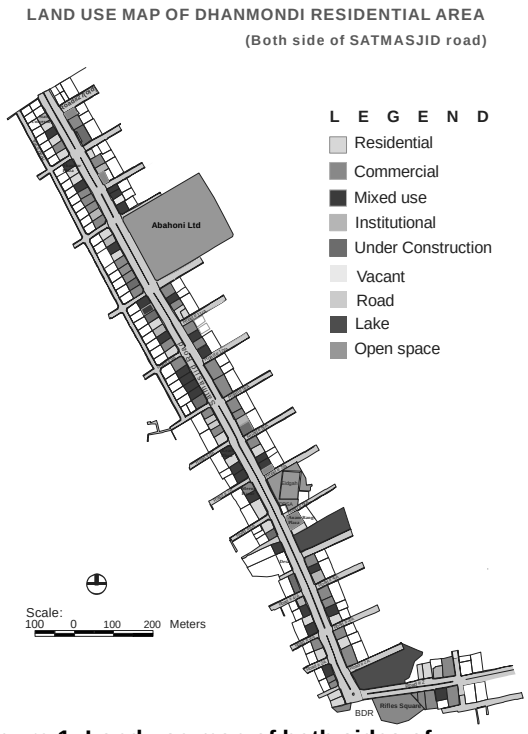


Figure 1: Land use map of both sides of Satmosjid Road

To find the travel behavior, it is necessary to identify some the components that can influence the travel behavior of the concerned area. Among these influencing components land use is one of them. In case of Satmosjid road the roadside land use pattern seriously influence the travel behavior of the Satmosjid road. In case of any road to understand the travel behavior trip generation is a very important and complex phenomenon. On the basis of number of trip generated over the road the travel behavior of the road can determined. The cause behind the trip generation is a very complex phenomenon. To generalize this problem on the basis of land use there introduced two types of trip generation. One is production trip and another is attraction trip. In transportation study it is assumed that all residential zones produce traffic and all non-residential zones attract trip. This concept has a real value in this connection.

Nonresidential land uses have different types of effect on the transport system. As a commercial, office and educational uses there is a huge number of vehicles are playing during the peak period. This condition causes unwanted traffic jam. The shopping mall and commercial buildings are built up with or without any approach bay or proper parking facilities. The chaos is at its peak on occasions like Eid and Puja. Many of the shopping centers or commercial buildings do not have any parking facilities. People have to park on the road, which ultimately narrows down their effective widths to a great extent. Before getting building permission, many building projects show that they will provide parking facility in the basement. But after getting the authorization, the builders or owners usually do not follow the proposed plan properly. The traffic pressure varies with the disruption of through movement. Traffic signals were not found in any congestion points (7) what are identified by the survey. Not only this when these parked vehicle going to start they require the maneuver spaces for running. During this time the condition reach in the worse position. On the other hand various educational establishment increases the traffic on the road in a certain period of time. These educational institutes as usual have no enough parking facilities. As a result before and after the working hours there creates unwanted jam. Beside this, Private schools, colleges, coaching centers, IT and law training centers, clinics, medical labs, hospitals and shops etc. are situated on both sides of the road. All of the components have made Dhanmondi as a diversified functional area and affects the transportation performance of the roads under the area. Because of the diversified land use pattern, pedestrians are seen almost all the time of a day. General problems which are identified by the survey are as follows

- Pedestrian traffic is discontinued at some areas for broken pedestrian paths occurred due to the lack of proper management of the authority.
- Seven conflict points are identified throughout the Satmosjid road. But there is no provision of signalized intersection.
- Provision of passing pedestrian traffic is remained at different points throughout the traffic island. But there is no marking like zebra crossing, signals on roads.

- It is true that both sides of Satmosjid road have been brought up as a commercial area and it is expected to have sufficient parking place. But some commercial complexes have not their own parking place. As a result, the vehicles of their customers are parked on the street by which traffic jam is created.
- Although the width of Satmosjid road is wide enough and there would be marked three lane (30 ft.) but lanes are not marked.
- No separations of motorized vehicles and non-motorized vehicles.
- Satmosjid road was developed to provide access to Dhanmondi residential area and have many access roads on both sides. These access roads inevitably interrupt the mobility function of the road after occurring commercialization on both sides of it.
- Linking characteristics of the road (linked Mohammadpur) along with frontal commercial uses educational uses attract heavy volume of traffic and on street parking by the shoppers.
- Slow non-motorized vehicular traffic constitutes a major portion of total traffic and occupies greater portion of the carriage way.
- Motorized fast moving vehicles and slow motorized vehicles operate in this road at the same time which implies reduction of desirable speed both of them.
- Disorderly movements of mixed vehicles illegal occupation stocked building materials and many other obstructions are some system deficiencies of the road.
- Local buses load and discharge the passengers on the street rather than in specific points and wait on the road way to compete with other buses to carry more passengers. As they wait on road way for a long time they create obstruction for other vehicles and reduced the width of the road. All types of mass transit load and discharge the passengers on street.

Traffic Characteristics Related Problems

Different vehicles have different design, shape, operation and maneuvering characteristics. Thus they have diversified influence other system components of the characteristics. Transport fleet of the study road is composed of various types of modes of various speeds. The fleet ranges from motorized vehicles like bus, truck, station wagons, motor cars, auto rickshaws and motor cycles; to non-motorized type that include rickshaws, bicycles, push carts, vans etc. As a spectrum of slow and fast moving vehicles, with diverse operational and dimensional characteristics operate on the roads of Dhaka city, the resulting operational incompatibility aggravates system deficiencies and subsequent congestion situations. Again points of severe conflicts emerge when slow and fast moving vehicles move forward or turn in different directions. Constant stoppage, acceleration and deceleration and movement in low gears increase operational costs and wear and tear of vehicles. The severity of these problems caused by mixed operation, along with the rapid increase in the number of vehicles and pedestrians have exposed the inadequacy of the existing street system and traffic management. The ultimate result is low level of service with respect to mobility.

Measurement of Transportation System Efficiency of Satmosjid Road

For measuring the transportation efficiency of Satmosjid road, Traffic field survey was required to obtain vehicle volume data, travel time and delay data, spot speed data to supplement other information on the study road. This revealed useful information about the prevailing situation of the study area and by comparing this data with the similar sets of data available over the past number of years, the changes has been determined. Because of limitation of time all works of field survey could not be able to conduct in reasonably good weather conditions and on non rainy days. But extreme care was taken for getting most accurate results. For this survey was conducted only on the most normal days with typical traffic flow conditions.

Outcome from Volume Study

The survey was conducted at selected seven congestion points at the fixed time period. Manual method was used where observers were assigned at each congestion point to count every vehicle. A suitably designed survey form mentioning classification of vehicles, flow direction was used in the survey. When the traffic was composed of number types of vehicles, the flow is converted into equivalent passenger car unit (PCUs), by using certain equivalency factors.

For conducting Traffic volume survey and speed survey (Moving observer method), some congestion points are determined and these are given below

(i) Front of Star Kabab
(ii) Front of Kakoli school
(iii) Front of Rifles square
(iv) Zigatola Bus stop
(v) Front of Meena Bazar
(vi) Front of Anam Rangs
(vii) Front of Shankar Plaza

From the volume study it was found that all classes of vehicle move in this route except Double Decker. Vehicular flow in peak periods can be noticed in two periods. An abrupt and steep rise occurred in the north-south direction around 0930 and 1300 hours. Although all classes of vehicles contributed to flow variation, number of rickshaw is predominantly high. (Table 5) shows the traffic volume of different modes. In Figure 14, it has been demonstrated the composition of flow with respect to motorized and non motorized vehicles for each flow direction. The estimated figures indicate how non-motorized vehicles outnumber the motorized vehicles and occupy more space of the roadway pavements.

Table 2: Traffic Volume (working day) at different conflict points

Conflict Points	8 am-9am (peak)	10am - 11am (off peak)	7pm-8pm (peak)	Average (peak)	Average
Rifles Square	3264.8	3375.2	4249.6	3757.2	3629.87
Kakoli Intersection	6601.6	7512.4	8435.6	7518.6	7516.53
Anam Rangs Plaza	5711	7478.4	6575.6	6143.3	6588.33
Shankar Plaza	7371.2	7744	7307.6	7339.4	7474.27
Star Kabab	7824	7816.4	8637.6	8230.8	8092.67
Meena Bazar	3289.6	3524.8	5056.4	4173	3956.93
Zigatola Intersection	6907.6	7380.8	8907.2	7907.4	7731.87
Total	**40969.8**	**44832**	**49169.6**	**45069.7**	**44990.47**

Source: Traffic Field Survey, 2005

Table 3: Traffic Volume (weekend day) at different conflict points

Mode	Volume(Peak & Off Peak)	Percentage (%)
Bus	4190	3.15
Car/Micro-bus/Jeep/Pick up	22404	16.82
Minibus	1320	0.99
Truck	192	0.14
Auto-rickshaw/CNG	5202	3.91
Tempo/H.H	795	0.60
Motor cycle	686.8	0.52
Rickshaw/Van	97504	**73.22**
Bicycle	441.2	0.33
Pushcart	432	0.32

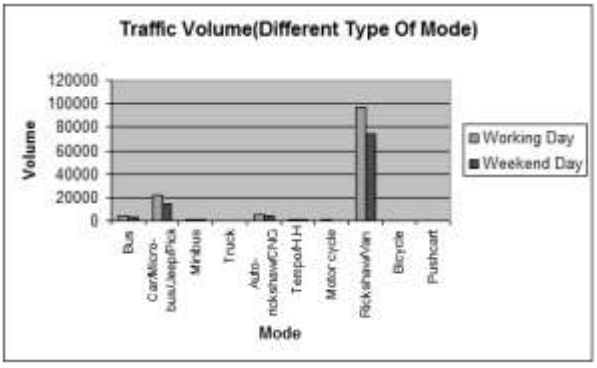
Source: Traffic Field Survey, 2005

Table 4: Traffic Volume in a typical working day

Conflict Points	8 am-9am (peak)	10am-11am (off peak)	7pm-8pm (peak)	Average (peak)	Average (off peak)
Rifles Square	2507.2	2838	4030.4	3268.8	3125.2
Kakoli Intersection	2837.6	4459.6	9144	5990.8	5480.4
Anam Rangs Plaza	3220.2	4338.4	9220.8	6220.5	5593.13
Shankar Plaza	3905.6	3811.2	8008.8	5957.2	5241.87
Star Kabab	3168.8	4843.2	9129.2	6149	5713.73
Meena Bazar	1290.8	2302	4760	3025.4	2784.27
Total	**2895.2**	**4505.2**	**7506.4**	**5200.8**	**4968.93**

Source: Traffic Field Survey, 2005

Figure 2: Traffic Volume (Different type of mode)



Outcome from Volume Running and Journey Speed Study

The moving observer method was used for conducting running and journey speed survey. For obtaining speed three observers, a group of 3 persons traveled in black cabs against and with the flow in different times. One observer in the cab carried a recording board with a stop watch. The recording board carried a journey log prepared in advance. It has also been recorded the continuous time at different point's on-route by him, and the individual stopped time delays. The second and third observer recorded the number of overtaking and overtaken vehicles. Total distance of the route is 2.075 kilometer.

Different traffic flow of different road sections, journey speed are shown at the following

Figure 3: Traffic Flow in different road sections (South to North)

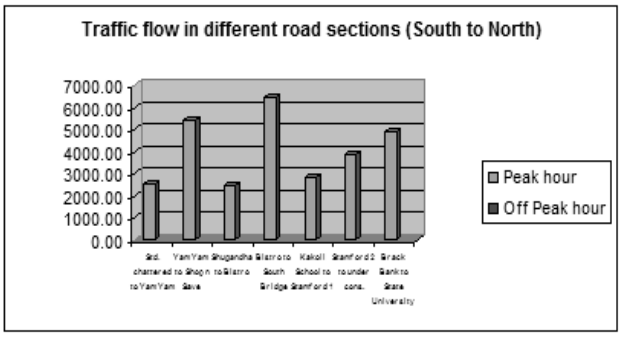


Figure 4: Traffic Flow in different road sections (North to South)

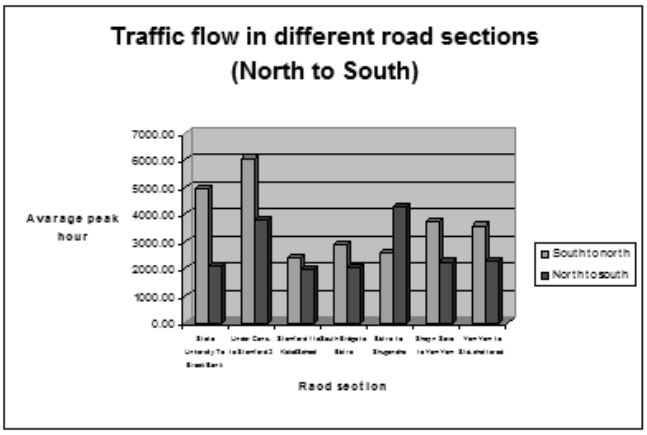


Figure 5: Journey speed in North-South direction

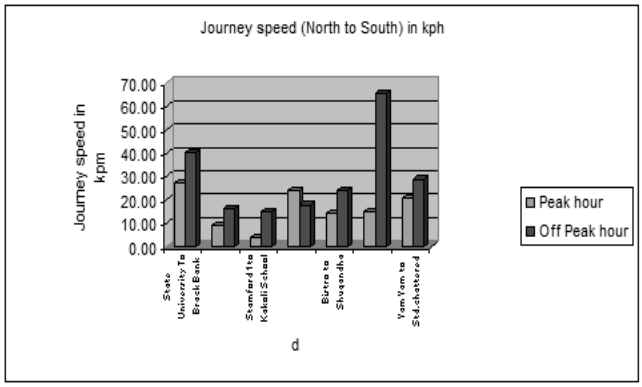
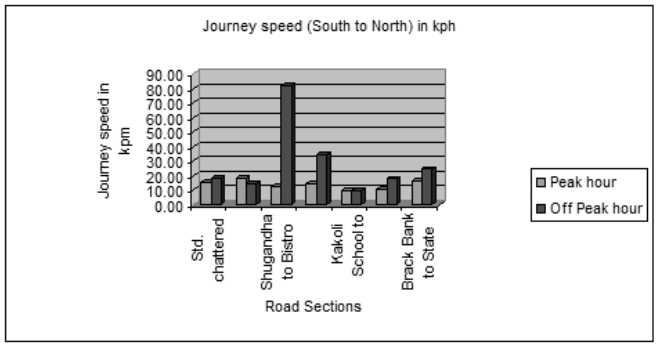


Figure 6: Journey speed in South-North direction



Outcome from Parking Analysis

After completion all kinds of survey and collection of data, it can be said that parking is on of the major problem for the easy movement of both vehicles and peoples. From the data it is clear that only few spaces have their own parking facilities. Only 12.71 percent plots have their basement parking. Here we can mention that most of the built up multi storied shopping complexes and hospital and clinic centre have no basement parking which is really creates a great congestion normally in peak-hour. More or less about 40.68 percent plots have surface parking but not sufficient for the needs. A large number of plots have no legal parking space, so, vehicles have to park on the street which is totally illegal and it also creates traffic jam in this area.

Table 7: Distribution of type of parking

Type of Parking	Percent (%)
Illegal(On Street Parking)	46.61
Basement Parking	12.71
Surface (Off Street parking)	40.68

Source: Field Survey, 2005

Outcome from Users' opinion survey

The survey was conducted among the users classifying them into two types. One was local road user and the other was external. The salesman of the different commercial establishment was counted as a local resident. Data come out through the questionnaire survey are analyzed and findings are shown at the following.

Table 5: Percentage of types of user

Type Of User	Percent (%)
Local	42.36
External	56.94
Total	**100**

Source: Traffic Field survey, 2005

Table 6: Percentage of problems ranked by the users

Category	Percent (%)
On street parking	24.7
Management problem at intersection	24.7
Inappropriate & insufficient pedestrian	25.4
Undersigned bus stop	24.7
Others	0.5
Total	**100**

Source: User Opinion Survey, 2005

Table 7: Percentage of attraction of people's coming

Purpose Of Coming	Percent (%)
Academic	20.83
Official	21.53
Shopping	22.22
Hospital/Medical Centre	10.42
Recreational	9.03
Others	13.19
Total	**100**

Source: User Opinion Survey, 2005

Table 8: Distribution of different type of mode that user travel most

Mode of Traffic	Percent (%)
Rickshaw	36.11
CNG	4.17
Taxi-Cab	1.39
Bus	17.36
Private Car	13.89
Auto Rickshaw	1.39
Mixed	18.06
Others	6.94
Total	**100**

Source: User Opinion Survey, 2005

Conclusion

Satmosjid road plays a vital role to the transportation system of Dhaka city. But its transportation performance has been degraded and still being degraded with the increase of roadside commercialization and lack of transportation management. Therefore, it is necessary to take policy measures immediately for limiting its both sides commercialization to bring efficient performance of the road so that it may contribute to resolve the transportation problems in Dhaka City.

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