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S. M. Sohel Mahmud

Md. Shamsul Hoque

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Management of Rickshaw in Dhaka City for Ensuing Desirable Mobility and Sustainability: The Problems and Options

S. M. Sohel Mahmud,* Md. Shamsul Hoque**

* Assistant Professor, Accident Research Institute (ARI), Bangladesh University of Engineering & Technology (BUET), Dhaka-1000, Bangladesh smsohelmahmud@gmail.com

** Professor, Department of Civil Engineering, Bangladesh University of Engineering & Technology (BUET), Dhaka-1000, Bangladesh shoque@ce.buet.ac.bd

Abstract

Dhaka, the capital of Bangladesh has facing enormous transport as well as mobility problem due to the huge deficiencies in different fields including colossal operation of massive number of rickshaws non-motorized vehicle (three wheeler rickshaws) and excessive dependency on that of the city dwellers. Dhaka City Corporation (DCC) officially limits the number of license issued to rickshaw owners to some 87,000. However, unofficial estimate claimed that the number of rickshaw playing in Dhaka is about 500,000. In addition, around 800,000 rickshaw pullers employed in the Dhaka city area, plus another 50-70,000 people employed in ancillary occupations. The latest surveys represent that space occupied on Dhaka's road by rickshaws is 73%, and by cars, buses and tempo is 19.7%, 4.4%, and 0.4% respectively.

Now it is a burning issue that how to manage these huge numbers of rickshaw. A brief study has been conducted to evaluate the current profile and level of understanding of traffic rules and regulation to way out the options for better management of those NMVs on Dhaka's road. The study revealed that at present condition, the elimination or proper management of these massive number of rickshaws would be a very challenging task because of fully ignorance of traffic rules and regulations of the rickshaw pullers (92%), lack of basic minimum education and training (90%), huge number of families' economically dependency on rickshaws (0.8 millions), lack of alternative sufficient job facilities in the local market (around 0.9 millions are employed in providing rickshaw services) as well as inaccessible road in the local area (around 52%), poor public transport and mixed landuse pattern in all over the city. This paper will form from the part of that broader study. Prevailing transport system, traffic management and operational condition and some major inherent weaknesses of the city development will be discussed at the very outset of the paper.

1. Introduction

Dhaka is the main economic hub of Bangladesh but it loses immense amount of resources and productivity due to its poor and vulnerable transportation system. Haphazard urban expansion with a minimum attention to the living environment has been the most common scenario here and existing transportation system has become hazardous for the entire city system due to its inherent transport as

well as road network problems, operational and management deficiencies. Although, the city mainly depends on road-based transportation system, the amount of road network is far apart from the minimum requirements. Improving roadway capacity through better management of existing modes and sub modes is a crucial issue to minimize congestion and to increase mobility and accessibility. However, the city is facing enormous transport as well as mobility problem due to the huge deficiencies in different fields including colossal operation of massive number of rickshaws non-motorized vehicle (three wheeler rickshaws) and excessive dependency on that of the city dwellers. Dhaka City Corporation (DCC) officially limits the number of license issued to rickshaw owners to some 87,000. Whereas, unofficial estimate claimed that the number of rickshaw playing in Dhaka is about 500,000. In addition, around 800,000 rickshaw pullers employed in the Dhaka city area, plus another 50-70,000 people employed in ancillary occupations (DCC, 2006).

The latest surveys of person's movement in metropolitan Dhaka under the Dhaka Urban Transport Project showed walking as the predominant mode with a share of 62 percent of total person trips . This is followed by rickshaw (13.3%), bus (10.3%), auto rickshaw (5.8%), and car (4%). In consideration of person trips by vehicle, rickshaw takes the highest share, accounting for 35 percent followed by bus (21%), auto rickshaw (1.5%), and car (10.5%). Indeed, among the transportation modes, rickshaws dominate the traffic stream particularly in the inner areas of the city. Road space occupied by rickshaws is 73%, and by cars, buses and tempo is 19.7%, 4.4%, and 0.4% respectively (Mahmud, 2009).

The study revealed that at present condition, the elimination or proper management of these massive number of rickshaws would be a very challenging task because of fully ignorance of traffic rules and regulations of the rickshaw pullers (92%), lack of basic minimum education and training (90%), huge number of families' economically dependency on rickshaws (0.8 millions), lack of alternative sufficient job facilities in the local market (around 0.9 millions are employed in providing rickshaw services) as well as inaccessible road in the local area (around 52%), poor public transport and mixed landuse pattern in all over the city.

The paper forms from the part of a border study on identifying the deficiencies of land-use and transport development in Dhaka city. This paper describes the possibilities of proper management of rickshaw in Dhaka city for ensuing desirable mobility and sustainability as well as improving city transport capacity and reducing unacceptable congestion. Correspondingly data has been collected from the field observation, road inventory and landuse survey. At the very outset, prevailing transport system, traffic management and operational condition and some major inherent weaknesses of the city development will be discussed.

2. Prevailing transport and traveling scenario in Dhaka metropolitan city

An assessment of the existing urban transport system of Dhaka revealed that it suffers from major constraints such as fragmentation of organizational responsibility; inefficient regulatory frameworks; insufficient financial resources; poor allocation of road space; presence of too many low capacity and slow vehicles on major roads; poor traffic control, management and enforcement; underdeveloped public transport system; absence of adequate pedestrian facilities; poor linkage between land use planning and transport development and finally, lack of emphasis on environmentally sound and sustainable transport development.

Various surveys (STP 2004, DITS 1994, JICA 1991, JBIC 2000 etc.) undertaken and their analysis revealed the following information about the city:

- The average household income in 2004 was Tk15,000 (\$253) per month while 3½% of households was in the "high" income group exceeding Tk55,000 (\$920) per month (STP 2004);
- The average number of persons per households in 2004 was 4.12 (STP 2004);
- Among households 7% either have or have access to a car, 4% owns motorcycle, 3% cycle

rickshaw, 5% bicycle and 2% auto-rickshaw (STP 2004).

- Almost 84% of household do not have any sort of transport vehicles and depend on public transport and only 16% have some sort of vehicles (STP 2004).
- Among the important purposes (i) home-work 31%, (ii) home-education 25%, (iii) home-shopping and others 36%, and (iv) non-home based trips 8% (STP 2004).
- On average, each household undertook 8½ trips per day by all modes (STP 2004);
- At present, the number of trips that are generated per day is 21.98 million and after 20 years, the trip generation per day that is estimated is 159.63 million in 2024 (STP 2004).
- The average trip length was found to be 5.37 kilometers (STP 2004).
- Buses comprise a small proportion of vehicle numbers (11½%) but carry about 77% of people (STP 2004);
- Rickshaws comprise 28% of all vehicles moving in the city and forms primary travel mode for 34% of all person trips (STP 2004);
- Proportion of trips made by walking is substantial, though according to STP around 22%, DITS estimated that 62 percent; and
- Road space occupied by rickshaws is 73%, and by cars, buses and tempo is 19.7%, 4.4%, and 0.4% respectively (DITS, 1994).
- Among the modes, car occupies the highest space for carrying a person which is 75.8%. Rickshaw occupies 21.9%, Baby taxi 17.9%, bus 8.7% and tempo 5% (STP 2004).
- Autos are a low proportion of vehicles comprising less than 10% of travel;

3. Some major weakness of road network

Scarcity of Road: The total road length in the DCC area is 1286 km comprising 61.35 km, 116.40 km, 219.54 km, 569.87 km, and 318.27 km of primary, secondary, connector, local and narrow roads respectively. The total area of these five types of road is only 12.09 sq. kilometer among them 8.84 sq. kilometer is pavement area which are respectively 9.01 percent and 6.59 percent of the total land area of the city. The length of roads in Zone-1 is 170.22 kilometer which is the highest compared to other zones and the length of roads in Zone-10 is 62.45 km which is just reverse. On the other hand, the highest primary road in the zone 5 (14.7 km) and followed by zone 7 and 9 (11.1 km) where as in zone 2 & 8 only 0.5 and 2.5 km of primary road respectively (RMMS, 2004).

Inadequate Wider and Accessible Road: There are only 107 kilometers road which width more than 24 meters. Indeed, there are only 45 km of road which pavement width more than 24 meter. About half of the roads are not sufficient width from where a motorized vehicle can move among the existing road. Indeed, 821.61 (64%) km road width is more or equal to 4.75 meter but according to pavement width, that's are only 618.14 (48%) km. That almost 52 percent of the roads are inaccessible for motorized traffic. About 464 (36%) km pavement width could not be increased without demolishing existing road side development but that's are almost impossible as this problem is started from very beginning of the planning of the city and both side roads is highly buildup by multi-storied building and huge densified with about 0.1 million people per sq. kilometer (Mahmud, 2009). On the other hand, a city could not sustain with this huge amount of so thin vein which is totally blocked or plugged or out of use.

Lack of Per Capita Road: The availability of major roads in terms of either km per thousand populations or km per square kilometer of area is too low as compared to the other cities of different developed and developing countries. In Dhaka City Corporation area, there are per capita road is only 0.213 meters is whereas many other cities including developing cities, it varies between 4.5 to 0.5 meters (Ingram & Liu, 1999). This scarcity of the road length or area will be sustaining until the city remain. That's this is one of the fundamental inherent weakness of the city of Dhaka for their yield land use and transport panning.

Insufficient Road after the Implementation of STP: The existing road in the entire city road

network is not quite enough and is the one-fourth of the minimum requirement of a modern city. Even, after the implementation of STP, total road network would be around 1413.67 km and road and pavement area would be 15 (11%) and 11 (8%) sq.km respectively (Mahmud, 2009). Obviously, it is the very lower than the minimum standard of a modern city.

No Classical or Functional Road Orientation: Besides this huge scarcity of the road network, the unplanned and haphazard orientation of road networks viz. no road network pattern, faulty road orientation at micro/local level, un-organization and non-integration of road network, no bypass, ring or functional arterial road, no east-west continuous road, huge missing links (9 major links missing in the major roads), staggered & T-junction (six staggered junctions within the 5.19 kilometer of Mipur road and 19 major T-junctions in three major roads), right angle bend (5 in major roads), no classical and functional hierarchy, lack of functional gate way, discontinuity of the main road also leads to built-in problems on the operational and management aspects of the transportation system and functionally sabotages the entire street network performance (Mahmud, 2009).

Patternless Road Network: The layout of major roads e.g. primary, secondary and tertiary are neither straight nor diagonal, neither grid nor orthogonal. Indeed, the primary, secondary even tertiary roads are scattered and haphazard without well-linked and functional connectivity with each other. Primary roads are separated from each other and ended by creating either a T-junction or staggered junction with tertiary road which are crating permanent bottleneck on the enter city road network. Indeed, the city road network was developed without any well-defined pre-plan. Even, until today, the city is expanding without any long-term vision, following any detailed road network master plan.

4. Functional and operational deficiencies

Lack of Functional Classification: There has not any classical as well as functional hierarchy in the road network of Dhaka city. For developing a functional road classification for the network of roads of Dhaka city by DITS, 20 desirable features are also depicted considering mobility and functionality. Indeed, hierarchical road classification could not satisfy almost 90 percent desirable features and unfortunately it is almost impossible to provide a full fledged functional primary road in the future on the existing city areas by the city authority for the city dwellers. There is very little possible way to overcome this deficiency and this inherent weakness of the city road network will be containing until the city will exist in this location without major demolishing or shifting particularly in Dhaka City Corporation Areas.

Non Integrated Transport System and Lack of Interchange Facilities: The share of intercity passenger by different modes bus, train and launch are 76, 9 and 15 percent respectively. Interchange or interface facility between the three modes are very poor. Though Kamalapur railway station is only 0.5 kilometer away from the CBD almost 90 percent of the people go to the station by rickshaw from the CBD for the lack of well connectivity. There has not also any connecting service with the Gabtoli and Mohakhali and Sadarghat terminals. On the other hand, the nearest bus stoppage is almost 1 km away from the Sadarghat launch terminal. The main railway station Kamlapur is 4 km away from the terminal but does not have any good access or interface. There has not also any connecting bus route with Mohakhali and Saidabad bus terminal (Mahmud, 2009).

There are approximately 18.7 million intra city trips per day among them the share of intra city commuter train and launch are 5000 and 2000 passenger per day respectively. Lack of interchange facility as well as connecting facility with final destination to railway station is the major cause of less demand of the commuter train service. Shawrighat to Khlomor is the only one intra city waterway passenger flow route carrying around 1500 to 2000 passengers par day. For freight transport there are some other extended routes along the circular waterway. Only 11 percent of the total passenger of the Shewari Ghat use the circular route and other 89 percent only cross the river. Almost 90 percent of the passengers use these stations only for crossing the river not for circulating from one station to another station. However, the number of passengers which have been shown in the feasibility study in both

phases I and II is confusing. On the other hand, 14 low roads and railway bridges are cutting off the circular water way facility. In addition, there are almost 30 passenger crossing stations in the both side circular waterway and every day thousands of passenger cross the river using that stations. Almost 60 percent of the stations have not any functional road connectivity. For the lack of connecting road or interchange facility people are bound to go their final destination either by rickshaw or by foot and their share in some selected stations is 50 to 60 percent and 30 to 40 percent respectively. In present condition, most of the spaces are occupied by haphazardly developed multi-storied residential and commercial building and it is almost impossible to develop connecting road or provide well facilitated interchange facility with the city center (Mahmud, 2009).

There are five intercity bus terminal in Dhaka city i.e. Gabtoli (23%), Mohakahli (6%), Gulistan (7%), Fulbari (15%) and Saidabad (25%) bus terminal. But, unfortunately there has not any designated intra city bus terminal. In Gabtoli bus terminal, there are only two connecting intra city bus route is available and serve almost 65 percent of the passengers. Around 23 percent passengers' pre travel origin is mirpur and Mokhali and 35 percent passengers' post travel destination is that place, but there has not any connecting bus service route. In Saidabad bus terminal, there are around 12 intra city connecting bus routes but almost 75 percent of the passenger make pre and post trip by other than bus (rickshaw 45%, walk 17% and auto-rickshaw 10%) particularly for the operational deficiency of the bus service. Around 15 percent of passenger pre and post travel origin and destination is Sadarghat and Basabo (Sadarghat 9%, Basabo 6%), but there has not any connecting bus service facility from this terminal. In consideration of these, it is obvious that for certain areas of Dhaka city, physically as well as functional integration of different modes of public transport would be a very challenging job and feasibility of which needs a very comprehensive study (Mahmud, 2009).

Immense Geometric and Operational Delay: Almost 2 to 3 km extra distance have to travel in the every route in Dhaka city due to the faulty road alignment in compare to the transverse-grid system of road network which poses immense geometric delay. In addition, it is also revealed that every bus route 20 to 30 minutes geometric and 50 to 70 minutes operational delay occur in the city. The geometric delay results from the default road network plan, turning of vehicles for the default road alignment and staggered link i.e. results from the planning problem. However, it will have to continue and minimization is almost impossible (Field survey, 2009).

Minimum Possibility to Implement of Modern Short Term Traffic Management Tool: There are only about 4 km one way road which is only 0.31 percent of total road network of DCC. There is very few option to introduce the one way operation in other road for the lack of alternative or twin road in the city. The city has not any tidal flow operational road and it is almost impossible to introduce such tool for the mixed land use of the entire city. For the lack of well orientation of road network as well as alternative road, there have very few options to restrict right turn of an intersection by accommodating the vehicle in alternative road in Dhaka city. About 86 percent of major X-junction are 4 phases and about 90 percent of T-junction are 3 phases. Among the newly signalized 59 intersections, 47 (80%) intersections phases are equal to its approaches. For the lack of alternative road, or link road or for the lack of east-west connectivity there is very few opportunity of reducing signal phases of the major busy intersections (Field survey, 2009). It is also difficult to provide coordinated signal in the intersection of the city. For the lack of interconnection between the side roads or for the absence of service road it is also difficult to close the side street. At present condition, it is nearly impossible to construct bus bay on road side, as most of the side of the road are fully buildup without sufficient setback. There is also minimum scope to provide exclusive bus lane in present road network. This is a built in problem for the mega city of Dhaka and the city is detriment such a cost effective modern traffic management tool everlasting.

Difficult to Implement Long Term Measure: On the other hand, for the causes of haphazard densification and unplanned development, road side and junction corner point development, conflict between other utility service as well as conflict between different existing and proposed road project, it becomes vary difficult to provide effective and well designed grade separated (elevated or

underground) facilities in the major road and intersection of Dhaka metropolitan city. Technological measures such as intelligent/automated highway/vehicles, advanced traffic information system, adaptive traffic signal control, active marking and headlight, auto-surveillance/incident detection/enforcement measures is also difficult to implement in the present indiscipline traffic condition of the city.

Less Productive Intersections: Around 90 percent major intersections phases are equal to its approaches (Field survey, 2009). In addition, lack of junction clear way, illegal parking, loading unloading, absence of appropriate channelization devices, roadside land use pattern etc also reducing the productivity of the intersection. Besides, inappropriate road sides land use activities, corner point development not only further decreasing the capacity of the intersection but also deteriorating the future improvement options.

Road Side Friction: In many places, almost two-third spaces of most of the major roads in Dhaka city are not properly used for the road and roadside hazards which is creating adverse impact almost entire road network performance. This is now one of the major inherent operational problems of the city transportation system as different legislations, movements, steps for eliminating of these friction became fully unsuccessful so many times, even executive order by army government under the emergency.

Lack of Parking Facility: Almost 12 percent of tall building (7+ floor) has not any parking facility at all. Old Dhaka like Kotwali and Lalbag thanas' almost 67 percent and 54 percent tall building have not any parking lots or facilities (Mahmud, 2009). For the causes of incorrect placement, lack of entry and exist facility as well as wrong planning and design, the proposed parking cum commercial complex (city center) will create negative impact on the road network of this area as well as entire the city area.

No Designated Parking Facilities for Trucks in the City: There are only two designated space to use as truck terminals in Dhaka metropolitan city, which can accommodate 750 trucks altogether but the number of trucks plying in and out of the city could be as a many as 10,000 every day. As a result more or less thirteen unauthorized truck terminal developed in the city area. Indeed, there have not any well design, modern, equipped truck terminal or parking facility with minimum conveniences for operators, users and owners. At present for the lack of ownership on the land, it becomes almost impossible to develop a well organized truck terminal in the city area or entrance of the city.

Huge Lack of Pedestrian Facility: Walking as primary mode of travel is dominant in all age groups and income classes and pedestrian is by far the highest number of road user (62% according to DITS and 37% according to STP of all trips). But, unfortunately there is huge lack of pedestrian facilities, only 388 kilometers of paved footpath and 53 over pass and 3 under pass (DCC, 2006). Unfortunately, these limited available facilities could not used properly for the causes of ill maintenance and management.

Poor Mass Transit System: Bus are main player of the mass transit system in Dhaka city and the total road length of the bus operating route is only 120 km which service are is only one third of the metropolitan area. For the causes of limited road space (around 6%), lack of bus accessible road (around 1%), unplanned road network pattern, unorganized and non-integrated road network, absence of east-west continuous road (one third of total bus operating road comprising 22 links), lack of continuity of main road, huge side friction (more than 100 abating connectivity per km), uncontrolled access (more than 10 per km), less productive intersection (96% equal phases of approach), lack of loading and unloading facility (no except banani to utara), inadequate bus stops, lack of bus lay on road, poor allocation of road space, deficient and improper place of bus terminal (no intra and inter city interchange facility) and for the lack exclusive right of way, the mass transit system is not quite good and seems very difficult to improve the condition in present situation.

Implementation of BRT: A Huge Challenging Task: In spite of having huge benefit and large potentials, there are so many conflicting and constraining issues like insufficient road width (17 m in some segment), insufficient space for BRT station, uncontrolled and excessive access road (around 10 per km), overlapping bus route (120 km road but 149 route, 57 routes in one segment, varied between 100 % to 5% at start and end segment)), fragmented ownership (around 5000 bus, 1200 owner) huge pedestrian movement (10,000 to 20,000 is some busy point), huge number of bus operators (57.6% buses are owned by individuals), unorganized and non-integrated road network (lack of interface and interchange facility), mixed operation in major roads of the proposed route (motorized & non-motorized; local and through), turning difficulties of BRT bus (corner point development), lack of traffic signal (96 % equal phase of it approach), lack of passenger information etc (Field survey, 2009). on the existing transport system of the city, which directly conflict the implementation of the proposed Bus Rapid Transit BRT successfully. These issues not only creates question on its feasibility but also possibility at all.

5. Traffic operation in major roads

Road network of Dhaka city is characterized by mix traffic system. All types of vehicles, both motorized and non-motorized vehicles are in operation on each and every road, except some NMT restricted routes. Where, all types of vehicles are played on the road, majority of road spaces occupied by rickshaw as described in Article 4.6. Because of the presence of non-motorized vehicles, travel speed is significantly reduced for motorized vehicles and a huge congestion occurred. To realize the facts comparative picture with and without NMT of Azimpur to Technical route (Mirpur Road) are shown below (Figure 1).

Figure 1: New Market road with Rickshaw and without Rickshaw



Even where non-motorized vehicles are restricted, the majority of road space is occupied by three wheeler vehicles for the lack of alternative whereas alternative is the fundamental pre-requisite to remove or ban any facility. Without any alternative, it could not be sustainable. Rickshaw was the dominant mode in the Mirpur road but it is banned without any alternative results opening space is occupied by motorized three wheeler.

On the other hand, a capital city contains two types of traffic: local and through and they will be segregated in separate routes. But in Dhaka city, both the traffic moves in same way sharing the inter city road. There are no alternative routes for through traffic. In the strategies transport study, a plan has been provided on the name of NMT free arterial network- phased implementation plan and in the revised plan there has targets times for specific route. But, unfortunately more than two years have passed from the last target time (time was 31-07-06 and specific route North-south, English road and

Chittagong AV.) but all are in paper until now except Mirpur road.

The Old Dhaka roads are normally suitable for cycle rickshaws, pushcarts, cycle vans, auto-rickshaws, small pick-up vans, small and light trucks, and mini or micro buses. Only a few roads can take large trucks and buses. Almost no road in old Dhaka has any footpath. There is no modal restriction by street; the only restriction is enforced by road width. Streets offer an extremely mixed modal pattern of transport. Except in the narrowest lanes, where no motorized vehicle can enter, pedestrians have least honored right of way in spite of their high concentration on the streets. At present, rickshaws poses dominate mode of the roads which one of the major weakness of the entire transport operational system particularly for the through arterial road. This problem is now become a major concern issue and becomes an irreversible problem for the causes of uninhibited landuse and transport planning and uncontrolled development.

5.1 Dependency on Non-Motorized Transport

The majority of transport in Dhaka city is non-motorized. It accounts for over half of all vehicle trips within Dhaka city. Dhaka Urban Transport Project showed walking as the predominant mode with a share of 62 percent of total person trips. This is followed by rickshaw (13.3%), bus (10.3%), auto rickshaw (5.8%), and car (4%). In consideration of person trips by vehicle, rickshaw takes the highest share, accounting for 35 percent followed by bus (21%), auto rickshaw (1.5%), and car (10.5%) (JBIC, 2000).

The majority of NMT is provided by cycle-rickshaws. There are no exact statistics of the number of rickshaw in the Dhaka city. It is estimated that about 350,000 and 500,000 rickshaws are operating in Dhaka City Corporation area and Dhaka Metropolitan area respectively. Although officially, the government would like to phase the rickshaws out, and a ceiling had been set on rickshaw licenses (currently 79,000, plus 8,000 rickshaw van licenses). In practice, the ceiling had no impact on rickshaw numbers. But it has caused much hardship for rickshaw operators, and also deprived the City Corporation of a great deal of potential revenue. The cycle-rickshaw is widely used because it provides a service which buses and tempos (10-12 Seater auto-rickshaws) cannot easily provide. It serves areas where bus services are insufficient or absent, and caters particularly to the needs of women and children, and people carrying small loads.

A huge number of people are employed in the rickshaw sector. From the field survey it is found that most of the rickshaws (about 60%) are operated by two drivers, who change shifts at around 2 pm. If the average employment is 1.6 drivers per rickshaw, then overall there could be 800,000 rickshaw drivers employed in the Dhaka city area, plus another 50-70,000 people employed in ancillary occupations (owners, repairers, shopkeepers selling spare parts, and so on). Hence roughly 20% of the city's population are employed in providing rickshaw services, and a further one and a half million people in Dhaka and in the rural areas depend on these people's earnings.

The cycle-rickshaw is cheaper than the auto-rickshaw, but considerably more expensive than buses and Taxi cab. According to the estimation, the relative economic costs per passenger-kilometre in 2008 were: rickshaw Tk. 10; auto-rickshaw Tk. 5; Taxi cab 12 Tk.; minibus Tk. 1.25; large bus Tk. 0.80. However, cars and jeeps, at Tk. 5.5 to Tk. 6.8 per passenger-kilometre, are far more expensive than any of these modes (BRTA, 2008).

A 16-hour traffic count by the Dhaka Urban Transport Project in 1996 indicated that buses and tempos carried 65% of all passengers, but took up only 18% of the road space. Rickshaws occupied 40% of the road space to carry 15% of the passengers compared to 18% of the space occupied by auto-rickshaw to carry the same percentage of passengers. According to the estimation of DITS 1994, road space occupied by rickshaws is 73%, and by cars, buses and tempo is 19.7%, 4.4%, and 0.4% respectively. In this study it is observed that in the old Dhaka like Lalbagh, Chakbazar, almost 80 percent of the road space occupied by rickshaw where as in the major arterial roads where rickshaw is

prohibited, around 80 percent of the road spaces are occupied by private car and three wheelers. This analysis indicates clearly that rickshaws contribution a great deal to traffic disorder in rickshaw permitting route, but do not pay even a fraction of the road user's charges.

6. Rickshaw: The major concern in Dhaka city

Rickshaws are three wheeled cycles called cycle rickshaws. It is manually operated giving door to door services to the passengers. The rickshaws normal carrying capacity is two passengers. Because of their size, rickshaws can easily operate on lanes and by-lanes of the city. Although it is slow moving vehicle, rickshaw journey is cheaper and comfortable.

One of the main causes of Dhaka's traffic jam is the unrestricted playing of rickshaws particularly on the main transport corridor. Reliable estimates of the non-motorized vehicle fleet are difficult to obtain. DCC (Dhaka City Corporation) limits the number of license issued to rickshaw owners to some 79,000. However, unofficial estimate claimed that the number of rickshaw playing in Dhaka is about 500,000 (STP, 2004).

6.1 Profile of Rickshaw Puller

A questionnaire survey was made in this study on the rickshaw puller of Dhaka city. The questionnaire has been designed into two parts. One was to evaluate the current status of rickshaw puller and other was to assess the knowledge and level of understanding on traffic rules and regulations and road signs and markings of rickshaw puller. In the person-to-person questionnaire survey, almost 14 questions with six sub-questions have been asked to the rickshaw puller. Through the location of the survey has been selected randomly in the city, higher number of sample have been collected from the old Dhaka as the intensity as well as dependency on rickshaw of the user of this area is much higher than any other areas of the city.

In reply to a question on "location of home district" by the respondents, it is evaluated that rickshaw puller are not coming from some particular district or a particular region. Rickshaw puller are coming from almost all over the country. Among the respondents, 40 percent are come from the east Bengal like Kishorgon, Sunamgonj, Mowlavibazar district followed by south (22%) and north Bengal (22%) like Potuakhali, Barishal, Sirajgonj, Dinajpur, Kurigram etc.

Almost all of the rickshaw puller lives in the fringe areas where socio-economic condition is very low compare to the other areas of the city. Among the respondent it is found that almost half of the puller live in Kamrangir char area followed by Lalbagh, Keranigon, Kafrul, Inrahimpu, Mirpur fringe area, Hazaribagh, Pagla, Islambagh etc.

From the questionnaire survey, it is also found that almost 90 percent of the rickshaw puller pull their rickshaw on hire basis. Among the respondent, 63 percent mentioned that they provide rent 80 TK for per full day and for half day, 40 to 50 Tk. From the discussion about hiring of the rickshaw, it is found that the rent of the rickshaw varied on the originality of the number of rickshaw. If the number of rickshaw is original then its rent is around 100 and if they use duplicate number then the rent is 70 to 80. In the survey, it is found that only 14 percent pullers provide 100 TK rent per day. Almost 85 percent of the rickshaw puller, who pull personal rickshaw, bought second hand rickshaw because of in particular low cost. Among them, 43 percent bought their rickshaw by 5000TK only and 29 percent by 6000 TK and 14 percent by 4000 TK only. The price of a new rickshaw varied between ten to fifteen thousands taka. At the period of survey a large number of puller (8 %) mentioned that they pull rickshaw half of the day because of shortage of rickshaw.

In the survey, they were asked how many years they are pulling rickshaw. With this three connecting questions have been asked, have they participated any training program in this period, what did they do before this work and why did they involve in this job. Among the respondent it is found that almost

32 percent have involved in this profession within the last 1 to 5 years, followed by 28 percent 6 to 10 years, 27 percent 11 to 15 years, 10 percent 16 to 20 years and others 6 percent upto 20 years. Among the respondents, only 8 percent have participated in a formal training program and others 92 percent have not any formal training. They respondent who are participated in the training program have mentioned that they participated in the training program at the Earshad period. According to their opinion, after Earshad government, no formal training program has been organized for the rickshaw puller (Field Survey, 2009).

Almost 26 percent of the respondent was farmer before starting this work. Among the others, 20 percent was tempo driver, 18 was doing daily basis job in different sectors, 10 was daily worker, 10 percent was garments and other factories worker, 10 percent was businessman. Almost 26 percent replied that they come to this profession only for poverty. About 22 percent replied for more income, 18 percent replied that they did not find any other job and 12 percent mentioned that it is easy to do. A significant number of respondent come to this profession because of loosing every thing by river erosion (8%) and by accident (4%). About 8 percent puller mentioned that they are seasonal puller and involved this work for un-season of their main job. In this survey, they were asked about their daily income. Almost 32 percent replied that their daily income per day 251 to 300 TK, followed by 28 percent 201 to 250 TK, 28 percent 301 to 350 TK and 12 percent 100 to 200 TK (Field Survey, 2009).

In the questionnaire survey, it was tried to evaluate the percent of original number of the operating rickshaw. To find out this, in the discussion with the respondent they were tactfully asked about the number of rickshaw. Almost 62 percent agreed that the number of their rickshaw is duplicate. But if we consider the rent or hired value of the rickshaw, the percent of duplicate number rickshaw is more high and that would be nearly 80 percent. Even, in the cantonment area where enforcement of legislation as well as traffic rules and regulation is very strict, almost 20 percent rickshaw puller among the respondent agreed that the number of their rickshaw is duplicate.

To assess the knowledge and level of understanding of traffic rules and regulations and road signs and markings of rickshaw puller, three questions with six sub-questions have been asked to the rickshaw puller in the second part of the questionnaire survey. In reply to the direct question on the level of understanding of the traffic rules and regulations and road signs and marking, almost 50 percent respondent mentioned that they know most of the rules and regulations, understand majority of the sings and markings, 18 percent replied that they fully understand the signs and markings and only 32 percent said that they do not understand signs and markings. To access their actual understanding on sings and marking they were asked six sub question showing demo picture coupled with real scenario about five signs (no parking, no stopping, pedestrian crossing, school ahead and stopping) and one marking (double solid). Surprisingly, there has not found any one who could provide correct answer of all the showing sings and markings, even there was not found any one who could provide 50 percent correct answer among the respondent. From this survey it is fond that none of the respondent understand that the real meaning of stop sign and double solid. About 22 percent of respondent understand the meaning of pedestrian crossing sign, 14 percent school ahead sing, 6 percent no parking sing and only 2 percent no stopping sing (Field Survey, 2009). From these results it is evaluated that almost 99 percent of the rickshaw puller do not understand most of the major road signs and markings. Even, they don't know that their conception or understanding on the road signs and markings is wrong and has not the realization that they need comprehensive training on this.

From this survey it is also evaluated that almost 50 percent of the rickshaw pullers have not any formal educational background i.e. illiterate. Around 34 percent of the respondent's educational level within class one to class three. Among the respondent, 6 percent were found who passed the primary level.

7. Conclusions

From the above discussion, it is evaluated that rickshaw puller come in Dhaka city from almost all over the country due to in particular poverty. A significant number of rickshaw puller (38 percent among the respondent) come in the capital city by loosing their job or work in their local areas. Almost all of the rickshaw puller lives in fringe areas where social status and living conditions as well as living facilities are very low because of their poor income (32 percent replied that their daily income per day 251 to 300 TK, followed by 28 percent 201 to 250 TK, 28 percent 301 to 350 TK and 12 percent 100 to 200 TK) as well as ill planned development and maintenance. From this survey it is evaluated that they choose this profession because of extreme poverty (26%), easy and income is comparatively better (22), lack of alternative job (18%), there has not required any qualification, there has not any restriction (12%).

Even they do not require any educational background, training, certificate and original numbered rickshaw. Almost 62 percent agreed that the number of their rickshaw is duplicate and actually is would be more than 80 percent. Even, in the cantonment area where enforcement of legislation as well as traffic rules and regulation is very strict, almost 20 percent rickshaw puller among the respondent agreed that the number of their rickshaw is duplicate. Almost 92 percent have not any formal training. Results uncountable number of rickshaw is operating in the Dhaka's road by the poor, uneducated and frustrated rickshaw puller who has not any training, knowledge on traffic rules and regulations and understanding on traffic signs and markings.

Now it is a great shout that rickshaw should be eliminated or restricted from Dhaka's road. Obviously, to improve the operational and functional condition of the road network, it could be required. But it is reality that which has been demonstrated also from the questionnaire survey and road network quality and quantity analysis, the elimination or controlling or proper management of this rickshaw in the city road is almost impossible at this stage because of the following reasons:

- Huge poverty: Almost 800,000 family depends on a rickshaw. If they become jobless, it will create extra problem on the society.
- Huge rickshaw puller: The number of rickshaw puller is almost 1.6 times more than that of rickshaw.
- Lack of sufficient job facility in the local market.
- Uneducated people: More than 90 percent of the rickshaw puller have not any understanding of the traffic signs and marking. Providing training is also impossible of these huge numbers of uneducated groups.
- Huge demand, as about 90 percent of its trips are within 4 km in Dhaka city and it is more comfortable particularly for the children and women and it provide door to door service.
- Public transport is not quite good for the causes of various deficiencies.
- Finally, the road network pattern and the condition of the roads in terms of road width and alignment of the city and many local areas landuse and road network pattern are not fully supportive for the other mode of transport like motorized transport. Indeed, the road pattern makes it very difficult to introduce large public transport in many parts of the city. Almost 40 percent of the road in Dhaka city is accessible only for rickshaw.

So, the city will have to sustain with this huge number of unregulated, uncontrolled, unguided rickshaw. This also poses a serious inherent weakness of the city.

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