

## EVALUATION OF THE ROADSIDE WALKWAY ENVIRONMENT OF DHAKA CITY

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**Abstract:** A comfortable environment makes a journey by foot pleasant and enjoyable. However, in Dhaka city, about 60% trips are making on foot but the pedestrians are facing many problems while using the walkways. It is because; the transport planners or researchers are always emphasizing the problems of the motorized vehicles. For instance, this paper tries to explore the qualitative level of comfort of the pedestrians in Dhaka City by offering Six broad categories of roadside walking environment in terms of i) safety, ii) security, iii) convenience and comfort, iv) continuity of the walkway, v) system coherence and vi) attractiveness by some specific facilities. Qualitative data have been collected from observation survey whereas the walker's responses have been recorded through questionnaire survey from the field. By far, this study contributes the factors that are very important to assess the roadside walking environment in a developing country's city with some attributes.

**Key Words:** Pedestrians, Walkway, Dhaka City.

## **1. INTRODUCTION**

Walking is by far the most important mode of transport, as it not only acts as a crucial link for intermodal transfers in major activity centers, but also helps to fulfill recreational and utilitarian trips (Sheila Sarkar, 2003). When designing circulation systems, it is important to recognize that walking is not only an integral part of the network, but that it can also fulfill many activities in an environmentally sensitive way. A comfortable environment makes a journey by foot pleasant and enjoyable. However, in Dhaka city, about 60% trips are making on foot but the pedestrians are facing many problems while using the walkways. A lot of research works are going on for assessing the pedestrian's level of services in the developed nations but in developing countries like Bangladesh, it is not a significant one for the transport planners. It is because; the transport planners or researchers are always emphasizing the problems of the motorized vehicles. Besides, budget allocation is not sufficient to continue research in the field of pedestrians. For instance, this paper tries to explore the qualitative level of comfort of the pedestrians in Dhaka City by offering a method. Six broad categories have been observed during the field survey to assess the roadside walking environment in terms of i) safety, ii) security, iii) convenience and comfort, iv) continuity of the walkway, v) system coherence and vi) attractiveness by some specific facilities. Five different blocks have been selected to assess the qualitative data. Those five blocks have different characteristics like: shopping area, residential area, Central Business District, Mixed use area and Transit area. We use primary data to compare the roadside walkway environment. Qualitative data have been collected from observation survey whereas the walker's responses have been recorded through questionnaire survey from the field.

## **2. OBJECTIVES**

The present study tries to focus the problems and the evaluation criteria of the roadside environment of Dhaka City emphasizing the pedestrians. Though sidewalks are very important for the pedestrians, the city authority and the responsible authorities have always neglected this important mode. For the sake of a better walkway, this research will also help the decision maker planners and engineers to pay attention in this field.

## **3. METHOD**

We use the primary data from the questionnaire survey and through observation survey to show the present level of services of the walkways in Dhaka City. Six different criteria have been fixed for evaluating the conditions with the qualitative data through photographs and

questionnaires. After reviewing some research works in some developed nations, this study considers the following six criteria and emphasizes as very important aspects to assess the roadside walking environment in the developing country's cities:

- a) safety: Basic concern of pedestrian safety is the reduction of the pedestrian and vehicle conflicts;
- b) Security: While designing the street, the presence of police and people should be considered for improving the security of the pedestrians like social security and the security in the night time;
- c) Convenience and comfort: It can be defined as the relief of problems while walking on the walkways. Smooth walking environment and easy access to necessary services can be added as well;
- d) Continuity: It defined as the continuation of the walkways besides the road space without altering the ideal situation:
- e) System coherence: Clear visibility of some transit facilities and social facilities can be added as system coherence in this research; and
- f) Attractiveness: It is the combination of color, scale and balance, shape, street character, view to convey the positive visual attributes etc. for the pedestrians.

The field survey has been conducted at the month of January'2004 with a total of 1000 sample size. In this paper, those six criteria will be discussed to know the walkway's environment in Dhaka City.

#### **4. STUDY AREA**

Dhaka, the capital of Bangladesh is located at the central part of the country with having a 10 million population (TMP, 1998). This city is now called one of the mega cities of the world. The urbanites of the city are depending on foot for 60% of their daily trips.

The figure bellow shows 5 different blocks that have been selected for the present study. Five blocks offer five different characteristics. For this, the pedestrian's level of service could be different. Mohakhali is a transit area for the daily commuters. Here people are coming from the hinterland by bus and then walk for changing another mode of transport. Farmgate is located at the central part of the Dhaka city area which offers commercial and transit areas for the urbanites and for the commuters as well. Malibagh is a mixed use area with many residential buildings and many shopping areas. New Market area is composed with some institutional land use and with some shopping centers. Well known Dhaka University campus is very close to this area and some other institutions are at a walking distance too. However, CBD area is fully composed with the service area and commercial district of the city.

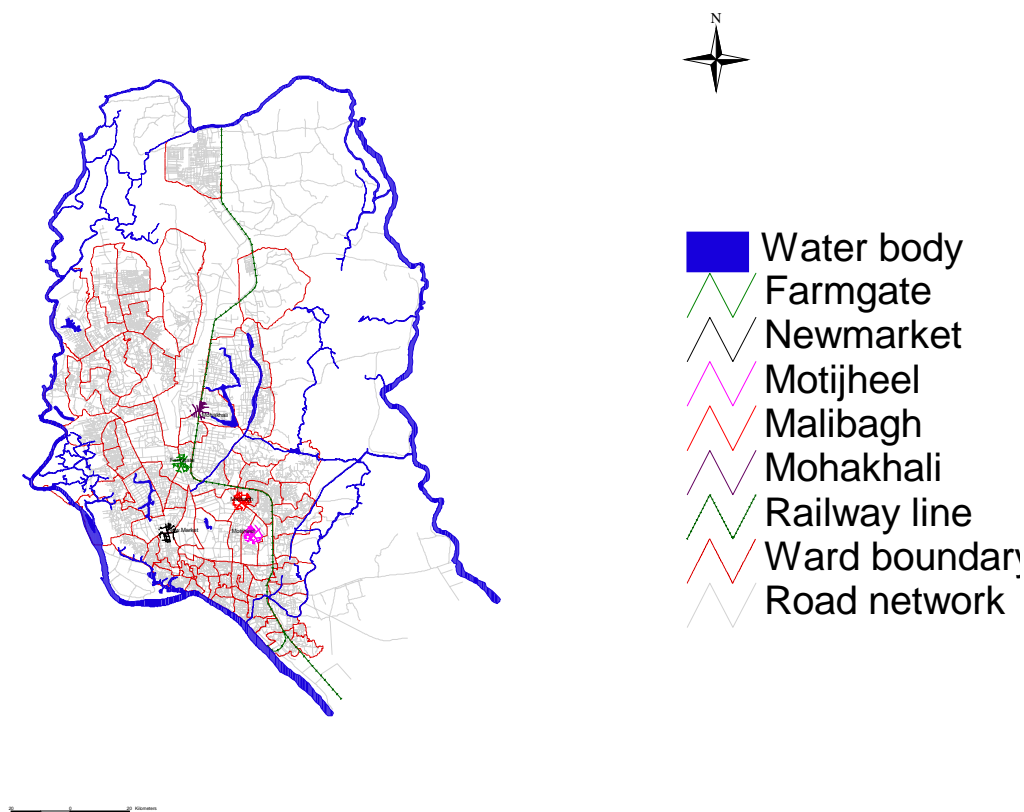


Figure 1, Road map of Dhaka City with the 5 study blocks

**5. PRESCRIBED CRITERIA FOR EVALUATING THE WALKWAYS IN DHAKA CITY**

Six major criteria have been considered for evaluating the roadside environment of Dhaka City. They encompass some sub-groups as well. We got some observation results and some subjective values from the pedestrians through questionnaire survey. Observation survey clearly revealed that the existing situation is not suitable for the walkers with some respective criteria to get a minimum level of service. However, the pedestrians were asked to give some values for some specific criteria. This also reflects the pedestrian’s impression on the walkway’s environment in Dhaka city.

The following table will show the summarized information of the observation survey during 2004.

Table 1. Summary of the observation survey with respect to the prescribed criteria.

Criteria	Sub-criteria	Study Blocks				
		Farmgate	New Market	CBD area	Malibagh	Mohakhali
Safety	Buffer (type)	Steel	Steel	Steel	Steel and Bamboo	Steel and Bamboo
	Sight Distance	Poor	Poor	Satisfactory	Poor	Moderate
	Accident (types)	Dart-out	Dart-out	Multiple threat	Waiting for a bus	Waiting for a bus
Security	Lighting (type)	Sodium Light	Sodium Light	Sodium Light	Sodium and Tube Light	Sodium and Tube Light
	Social Security (threats)	Hijacking and pick-pocketing	Bad comments	Snatching bags and hijacking	Hijacking and picking pockets	Drug sellers on walkways
Convenience and Comfort	Density (persons/min)	118 (peak)	115 (peak)	75 (p)	93 (p)	130 (p)
		82 (off peak)	79 (o-p)	58 (o-p)	70 (o-p)	85 (o-p)
	Avg	5	6	2	8	4
	Obstacles (no. per 20 feet distance)					
	No. of Drinking fountains	8	5	10	4	7
	No of Toilets	6	12	12	4	10
	Sitting Bench	0	0	0	0	0
	Illegal Occupancy	Hawkers	Hawkers and drug-sellers	Hawkers	Hawkers and drug-sellers	Hawkers
Continuity	Average Width of way (feet)	5	5	5.5	4	5
	Average break (feet)	18	14	20	8	15

Criteria	Sub-criteria	Study Blocks					
	Surface	Good	Moderate	Good	Poor	Poor	
System Coherence	Street type	Major	Major	Major	Major and Minor	Major and Minor	
	Connectivity with shopping	Well connected	Very well connected	Moderate	Not so well connected	Poorly connected	
System Coherence	Visibility	Good	Not so good	Good	Poor	Moderate	
	Scale	Very good	Good	Good	Poor	Moderate	
Attractiveness	Color	Moderate	Moderate	Good	Poor	Poor	
	Street Character	Good for walkers	Not so good for the walkers	Good for the walkers	Risky for the walkers	Risky for the walkers	

(Source: Field survey 2004)

5.1 SAFETY

Safety is one of the six major criteria to know the present condition of the walkways in Dhaka City. We divided safety issue into three categories as: existence of buffers in the roadways, enough sight distance for the walkers and the accident types commonly take place. In different five study blocks, buffers have been used made up with steel sheets, concretes or by using bamboo. Buffers allow a rigid wall in between the walkways and carriage ways of vehicles. In the developed countries, trees or small parallel land are used as a buffer item to save walkers from the motorized vehicles. But in the developing country’s city like Dhaka, there is not enough space to dedicate the land for creating buffers with small trees or saplings. Besides, people are trying to cross the roads if there are no rigid buffers in place. The following table will show the types of buffer used in different blocks of the study area.

From the table.1, it can be seen that different types of buffer items have used in Dhaka city to provide safer pedestrian facilities. So the assessment of buffer’s existence is very important to know the status of safety as well. If there are well maintained buffers beside the walkway then the walkers feel better safety than absence of buffers. In Dhaka City, the staffs used for buffer are also decreasing the beauty of the roads. Dhaka City Corporation (DCC) authority attempts many times to maintain a nice buffer opportunity in between the carriage way and the sidewalks. They use steel sheets, bamboo and concrete wall for creating the buffer instead of using the small trees. The DCC officials claim that they try for many times to use small trees as a buffer

item but fail to make any impact. They clarify that the air pollution level is very acute just beside the sidewalk and this creates problems for the trees to survive for a long time. There are also some disadvantages of using the steel sheets as a buffer item. People certainly steals the steel sheets at the night time and sale them in the local market to earn some money. For instance, DCC takes another strategy to put concrete wall and bamboo pipes for creating the buffer instead. Another important aspect for evaluating the safety is named as sight distance. If the sight distance is absent then the pedestrian could collide with another bi-cycle or with another pedestrian. Most of the cases in Dhaka City, we can see the sight distance opportunity is hindered with some illegal vendors. For instance, it also decreases the safety of the walkers. Among the five different study blocks, the sight distance opportunity is very poor in the Malibag Area and the option is a better in quality in the CBD area. Accident data is one of the major items to know the safety situation for the pedestrians in Dhaka city. 9 different types of accidents have been identified in 5 different study blocks. Both male and female walkers face small injuries on their way. We have collected the information whether the walkers face any small or major injury in the last four weeks while using the footpaths. The respondents give their responses as well. Almost 98% of the respondents (who at least faced small injury in the last four week) have faced small injuries. They claimed mostly for not having any buffer in between the walkways and carriage ways and also for the discontinuation of the walkway. The pedestrian crashes also help understand the walkway environment in Dhaka city from the following table.

Table 2, Pedestrians' Accident types in Dhaka City					
Crash Type	Name of Blocks				
	Farmgate	New Market	CBD area	Malibag	Mohakhali
Dart-out	40%	30%	18%	15%	12%
Walking Along roadway	12%	10%	14%	10%	10%
Multiple Threat	12%	18%	20%	19%	11%
Vehicle Turn	6%	7%	10%	6%	6%
Vendor Truck	1%	5%	1%	1%	1%
Backing up	5%	8%	11%	10%	9%
Intersection Dash	4%	3%	5%	6%	5%
Crossing in front of Bus	2%	3%	6%	7%	10%
Waiting for a bus	15%	14%	14%	23%	35%
Others	1%	2%	1%	1%	1%
Total	100	100	100	100	100

(Source: Field Survey 2004)

In Dart-out type crash, a pedestrian enters the street and either runs into or hit by a moving vehicle (most of the cases walkers collide with Non-motorized vehicles like three wheeler rickshaws). Walking along the road way is another type of accident that can be seen almost everywhere in Dhaka city. Often people faced accident while waiting for the buses on the walkways or just beside the walkway. Some buses or other human haulers collide with the pedestrians for not having the control of the speed in the places where they are supposed to stop. Walkers in the transit area, especially in the Mohakhali Block, are facing a crash so often while waiting for the bus. The bus counters are situated on the sidewalks and a long queue can be seen during the peak hours especially in the morning peak from 8.00 A.M. to 9 A.M and in the evening peak from 17.00 P.M. to 19.00 P.M. It has been observed that the crashes often occur with some non-motorized vehicles while the walkers cross the streets to buy some food items from some vendors on the walkways. But this accident is not so common rather in the mixed land use areas like in New Market block. Crossing behind a vehicle that is backing up, strikes a pedestrian who is crossing behind it. Most of the cases pedestrians who are not using the sidewalks due to some sort of problems are getting collided with some low speed vehicles or with the Non-Motorized Rickshaws. In the CBD area, especially at the evening, many people parked their cars illegally on the sidewalks or on the streets. This offers a poor sidewalk situation and decreases the safety of the sidewalks.

## 5.2 SECURITY

The second criteria for knowing the pedestrians' level of service is the security here. We considered lighting facilities at the night time on the walkways, social security especially for the women walkers and policing opportunities on the walkway to know the security concern of the pedestrians in Dhaka city. Table 1 also shows the summary of security issue in Dhaka City. Among the five study blocks, the lighting provision on the walkway is the worst in the Malibag area. The situation is a bit better in the Farmgate area in compare to other blocks. We observed the lighting facilities in the night time while walking on the walkways. Light posts are placed at an interval of about 110 feet. All the posts have the opportunities to provide lighting facilities to the pedestrians as well as the drivers to locate the places in the surrounding vicinity. Unfortunately, the lights are broken (average 1 is broken in 3 light posts) in most of the cases for bad weather condition and often some are not working properly due to lack of proper maintenance at a regular interval. In the five studied blocks, there are very well lighting opportunities in the main roads (primary roads) in both the sides. But the access roads or the connecting secondary roads do not have well lighting facilities. Presence of the illegal drug sellers and the hijackers were observed in the places where the lighting facilities were not well in the secondary roads. For instance, the roadside environment in the night time makes people



worried to walk though they want to make a short trip of 1 km or less. However, this situation encourages people not to use the road side walkway during the night time. Our observations survey also revealed that the streets with good lighting facilities attracted more pedestrians and the volume of pedestrians is higher at the same time in compare to the street with poor or no lighting facilities in the five studied blocks.

Besides, in each area there are some police boxes close to the intersections. The police stations are situated within a distance of 2 km from the five studied blocks. Some traffic polices are also performing duties on the roads to control the motorized and non-motorized vehicles as well. The automatic signaling system for the vehicles is not working most of the blocks due to technical faults and for proper maintenance. For instance, traffic polices are controlling the vehicles and the pedestrians to stop and cross the road intersections. Number of hijacking and bag-snatching events of the walkers on the walkway is very common in the city area. Research shows the number of hijacking and pick pocketing cases are lower in number at the adjacent sidewalks to the police boxes (Sowgat and Khan 2002). But the numbers are increasing with the distance of the police boxes and the absence of police at the same time. Many women walkers complain for not having well policing facilities in the CBD area in the night time when the walkways are becoming empty. Moreover, there are five major social security problems have been observed in Dhaka City. The walkers also claimed those five problems are happening even in the day time on their way to the workplace or to the shopping area. These types can not be found in the developed country’s cities rather it is a unique problem in the Dhaka City. The following figure will show the different types of social problems that the walkers always face.

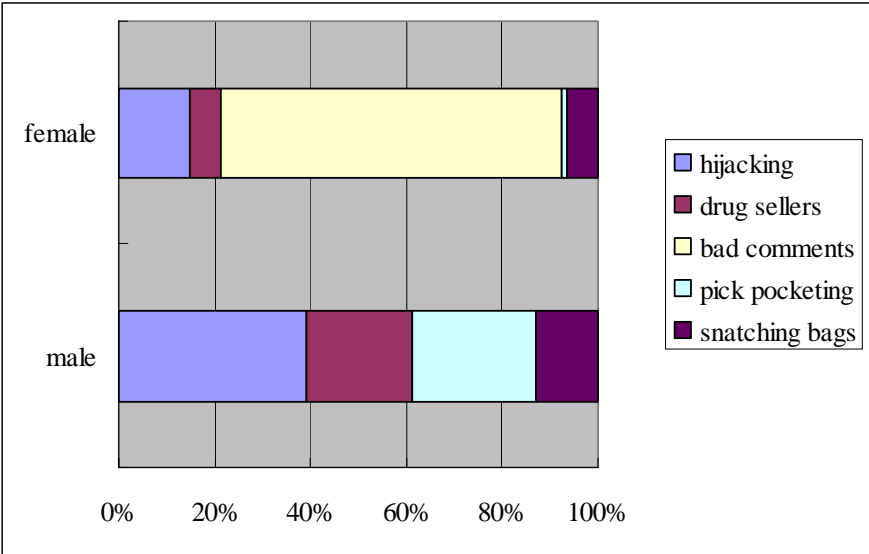


Figure 2, Types of social securities and walker’s responses.

From the figure2, it can be seen that about 40% male walkers complained about hijacking and about 80% women walkers complained about throwing bad comments. But both male and female walkers concern goes to hijacking as this is one of the headaches in Dhaka city

nowadays and the walkers are the most vulnerable to this type of crime. It has been observed during the field survey that the young boys are making small groups at the intersections of the roads for having some refreshments in the illegal shops on the footpaths. Those boys throw comments to the young girls or the women who are walking alongside the road for going to the shopping centers or bringing their child from the schools. However, the pick pocketing cases happening in the crowded areas most of the time. Some people try to snatch the bags at the same occasion.

### 5.3 CONVENIENCE AND COMFORT

Smooth walking with easy access is a desirable criterion while designing the walkways. Barrier free walkway and walker's friendly walkway can allow pedestrians a high level of comfort (Pushkarev & Zupan, 1969). During the hot summer, the walkers need some shade-tress and in the rainy season, walkers need some shades as well. Often the walkers feel tired on the walkway and need to sit on some benches or some other small places. These opportunities are completely absent in the five studied blocks in Dhaka city. For knowing the level of services in terms of convenience and comfort, we use some criteria here as

- movement/density of the pedestrians
- presence of obstacles on the walkways
- presence of drinking fountains
- presence of public rest rooms/toilets
- Existence of Signage for the pedestrians to cross the roads and
- Presence of benches and chairs for seating

The summary of the observation for existing situation in Dhaka city can be seen in table 1. There are lot of obstacles can be seen on the walkways like placement of dustbins, presence of illegal vendors who are selling their goods, illegal bus stops and structures so on and so forth. Presence of drinking fountain and seating arrangements are completely absent in Dhaka city. However, some public toilets or rest rooms can be found in the New Market area and in the CBD area. These toilets or public rest rooms are maintained by the City Corporation Authority and people need to pay 2 Tk/- (Bangladesh Currency) to enter the facility in the New Market and CBD area.

The foremost important aspect that has been considered here to evaluate the road side environments in terms of Convenience and Comfort in Dhaka City is the flow density of the walkers. We observed the pedestrians density on the major roads in five different blocks. The flow rate has been counted as persons are walking in a specific segment of the road per minute along the roadway and space allocation per pedestrian has been observed in a specific area to get the actual data of the study blocks. Following figures will focus the pedestrian flow rate and

the space required per person in Dhaka City.

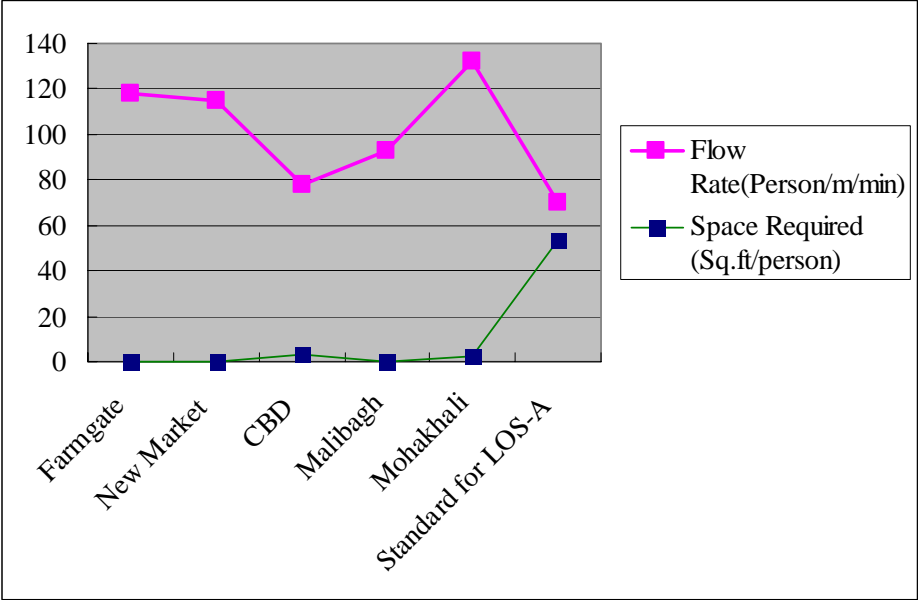


Figure 3. Pedestrian Flow in compare with the standard level ‘A’

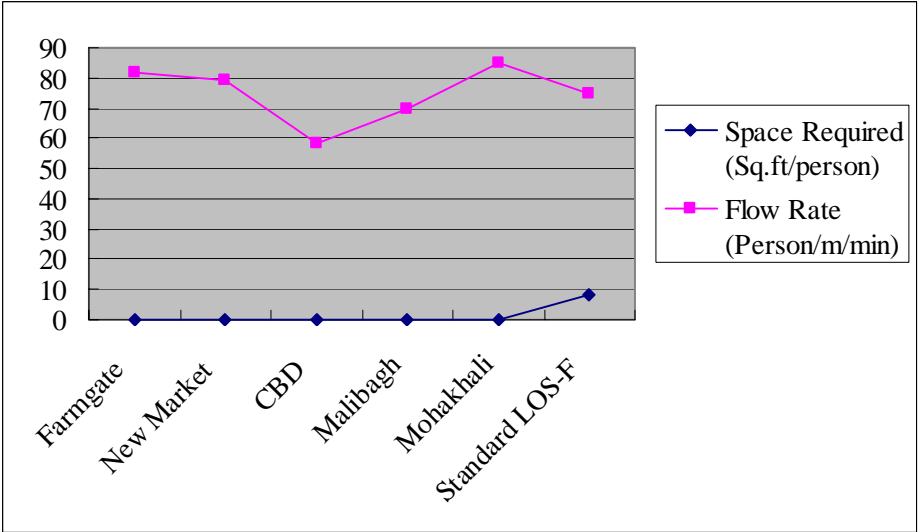


Figure 4. Pedestrian Flow in compare with the standard level ‘F’

Figure 3 depicted the existing pedestrian flow rate and density in Dhaka City in compare to the standard level given in some books and literatures. However, figure 4 depicts the existing condition with the standard F level of service in a scale of A to F. These two situations compare the standard level of services with the condition of Dhaka City. However, Figure 3 is an output in the peak hour situation and figure 4 is an output of the off peak hour survey. For this instance, we can easily see that the F level can be found in the off peak hours when comparatively lower numbers of pedestrians are using walkway.

5.4 CONTINUITY

Continuity refers to the continuation of the walkways beside the road space without altering the ideal situation (Sheila, Sharkar 1993). Discontinuity of the walkways offers very uncomfortable situation to the walkers especially the old persons or the handicapped persons. In average the walkways height in Dhaka City is 1’ to 2’ from the ground level. It separates the walkways from the carriage ways of the roads by allowing the height. People also responded that discontinuity offers them a lot of uncomfortable environment while walking through the way. For the handicapped people or for the older persons, discontinuity is a very big problem. As the walkways got 1-2’ height, older persons or the handicapped persons (though there are hardly the handicapped persons could be seen) need to climb on and get off from the walkways at an average 15 to 20 feet interval. For this instance, older persons are freely moving as jaywalker on the carriage way rather using the walkways. However, following reasons have been identified for breaking the continuation of the walkways:

- a) Providing road access to the local houses.
- b) Presence of Illegal Shops or Vendors.
- c) Illegal Parking on the walkways.
- d) Illegal Temporary structures.

Quantifying the criteria named as continuity is very difficult in the present study. For this instance, we consider the qualitative data from the photographs in the five respective areas to analyze. But possibility of quantifying this aspect by estimating the average gaps of the walkway’s alignment can be taken under consideration for further research. The following pictures will show the problems with the continuity in the sidewalks of Dhaka city.



Figure 5. Discontinuity of Sidewalks for allowing access to local housing



Figure 6. Discontinuity of walkway for giving access to other roads

Figure 5 shows that the walkway got disrupted for allowing a narrow access to a housing area.

The height of the sidewalk is 1 foot and 6 inches. It is very difficult even for a young man to get down and walk on the way while walking. Smooth landing could be provided without any major efforts. However, figure 6 has been taken from the Farmgate area where this small access connecting with another road. Older person like the picture can not feel comfortable with this discontinuity of the sidewalks as well.

5.5 SYSTEM COHERENCE

Clear visibility of some transit facilities like shops and public rest room and some social facilities like park and play grounds from the walkway is very essential. People feel encourage to walk when there are nice walkway connection in between attractive places like parks, shopping centers and transit bus stops (Fruin, J. 1971). To look at the street types, connectivity with the shopping areas and clear visibility of different services like small parks, seating places, public toilets and drinking fountains can attract more pedestrians to walk. For this, if we want to assess the walkway environment, we must look at the system coherence (Shelia, Sharkar 2003). System coherence can further be quantified by measuring the distances from the walkways to some shopping centers or to some activity centers in Dhaka City. The walkways alignment and the connectivity with the activity centers can be a very important tool to assess the system coherence as well. Most of the areas in Dhaka City, the sidewalks are very narrow (3 to 5 feet width) and hinder the clear visibility beside the facilities with some rigid concrete wall (Traffic Management Plan Zone 4, 1998). Following figures will give an idea about good and bad design criteria in respect of system coherence in Dhaka city.



Figure 7. Rigid wall at the left side of walkway is a bad design criterion



Figure 8. Flexible wall at the left side of walkway is a good design criterion

Pictures placed in above show two different types of wall that have been placed beside the walkway. Figure 7 shows a very rigid wall that hinders the visibility of the walkers. For this instance, walkers can not understand the presence of other service activities beside the walkway. However, in the figure 8, visibility of an important office can be seen by the walkers while they



are walking along the road the side. In the New Market area, sidewalks are not well connected with the shopping centers whereas in the CBD area, very narrow sidewalks connect with some big office buildings. In the Mohakhali transit area; there is poor connectivity of the footpaths for the transit passengers to change their route of transport modes. In this block, pedestrian overpass is needed urgently to connect the transit passengers (Sowgat & Khan, 2002).

## 5.5 ATTRACTIVENESS

Attractiveness is the combination of color, scale, balance, shape, and street character etc. The walkways should be well organized in those aspects to attract more people. Almost 95% pedestrians in Dhaka City are not walking only on the walkways. They use the carriage way instead because the walkways are not allowed enough width in the peak hours. Often, the surface of the walkways are got damaged and offered muddy environment especially in the rainy season (Sowgat and Khan, 2002). Besides, Dhaka City Corporation Authority, who is supposed to give the design guidelines of the walkways, is always giving constant criteria for each road. They followed 5' width and 1'6" height walkways besides the main streets in both sides. In the crowded walkways where the density is higher, the same guideline would not suit to meet the demand. For this, people feel convenient to use the road space and many accidents take place indeed. Scale is one of the important aspects here to attract more people on the walkway. In developed countries, walkways often segregated with different colors. However, in Dhaka City, observation survey reveals that height segregates the walkways in most of the cases.



Figure 9 (a, b). Problems with scales in designing sidewalks in Dhaka City.

poorly to make the harmony with the streets. In the left picture, the height of the walkway is 2 feet that makes very difficult situation for the vulnerable walkers like the baby. In the right hand picture it can be seen that a big major road has only a 3 feet width sidewalk full with mud. For instance, walkers do not want to use the footpaths for walking rather using the carriage way which allow more pedestrian accidents as well.

5.6 SUBJECTIVE EVALUATION

We made some questionnaire survey to know the views of the pedestrians. The impressions of the walked in different criteria can be summarized in the following graph.

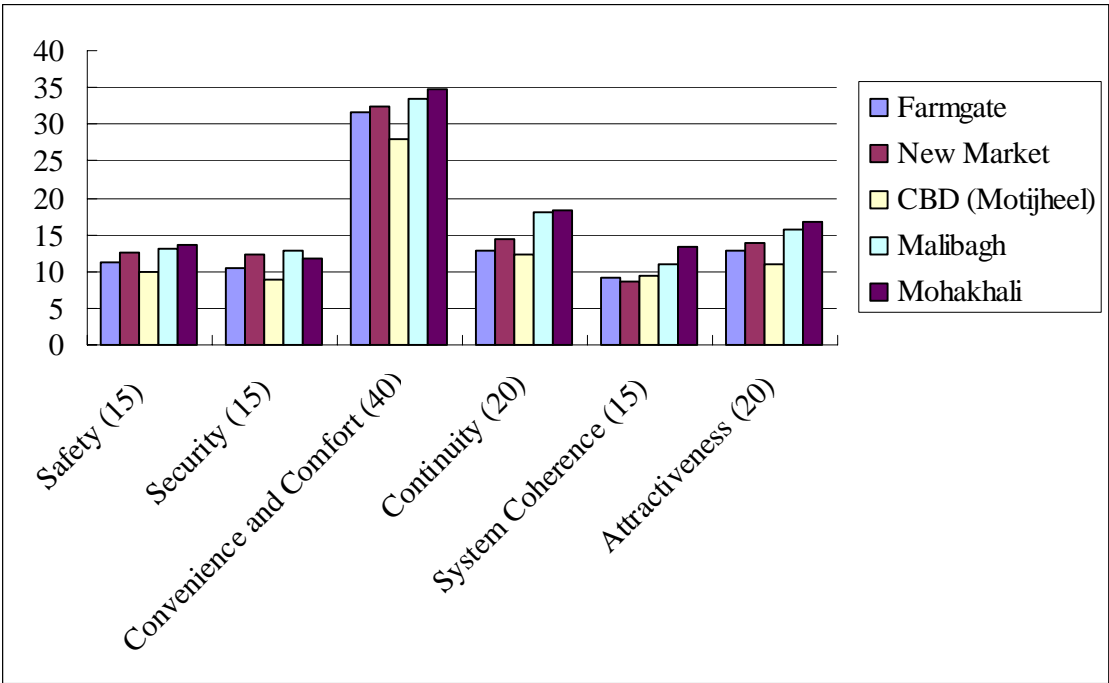


Figure 10. Summarized responses of the pedestrians with the 6 prescribed criteria. In the above figure, the 6 prescribed criteria have been placed and it also depicts the standing of some 5 studied areas. We distributed 500 questionnaires to the pedestrians in 5 areas to give their impressions in 6 specific criteria and sub-criteria. We followed itemized data collection method (Urban Transportation Planning, 2nd Edition, Meyer, Miller) at a scale 1 to 5. In the figure 10, safety, security and system coherence was measured based on 3 sub criteria, whereas continuity and attractiveness were measured with 4 sub-criteria. Convenience and comfort was measured based on 8 criteria. However, the lowest the value in each area means the highest walkway environment and the highest the number mean the bad walkway environment in Dhaka city. For example, safety can be very good if the value goes to 3 and the worst case would be 15. From the figure 10, it can be seen that among 5 different areas, safety is very poor in Mohakhali area in compare to CBD (Motijheel) area.

6. CONCLUSION

Nowadays, lot of advancement can be seen with many models and techniques for designing pedestrian way or sidewalk around the world. But in Dhaka City, the transport authorities or the researchers are still thinking with managing only the motorized vehicles. For this, the most

vulnerable road users in the transportation planning, the pedestrians are neglected for their safety as well as convenience. This research work is an attempt to aware the transportation planners and researchers about the existing problems of Dhaka City so that they can understand the problems and the need for the walkers. For the present study, we struggle a lot to collect any pedestrian database from any secondary sources rather fully depending on field and observation survey which could give us some opportunities to analyze the problems in detail. This part of the work tries to explore the six broad criteria that can be followed to assess the pedestrian's level of services in a rapidly growing mega city. In the same time, pedestrians' impressions have been included here to know the importance of some criteria. Further research works can find more details with quantifying the problems in the line with different criteria so that the major problems can be truly identified and can be minimized.

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