

An Approach to Estimate Demand and Supply of Bus Service in Particular Road Section of Dhaka

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Abstract

With the increase of population demand for public transport is also increasing. On the other hand, supply is not sufficient to meet up the demand. Moreover there is no specific methodology to estimate demand and supply of bus service in a particular road. In this study, an approach has been taken to calculate the demand and supply of bus services. Rokeya shoronee has been selected as the study area because it connects a major residential area, Mirpur to Motijheel. At four bus stoppages of Rokeya Shoronee observation and counting methods have used to determine demand and current supply of buses. An average bus size has been considered as a unit. From the analysis, it has been found that there is a need of 6 buses in the selected section of the road to carry people. This process can be used to provide a guideline for determining balance between demand and supply of bus services.

Introduction

Transportation facilities are fundamental need in modern society. Transport sector of the mega city Dhaka includes both motorized and non-motorized modes of travel. Bus service plays an important role in the public transport sector of the city. According to the actual survey data 4590 bus and minibus, and 937 human haulers, totaling 5527, is the backbone of Dhaka's public transport system. Bus being an important mass transit available in Dhaka carries about 1.9 million passengers per day (Bhuiyan, 2007).

The bus routes mostly originate from sub urban areas and terminate mostly at city centre of Motijheel and some routes are extended up to the south eastern and eastern fringe of the city (Bhuiyan, 2007). Mirpur is one of the important sub urban residential areas of Dhaka and huge traffic generates from this area. Similarly, being the Central Business District (CBD) of Dhaka, Motijheel attract a large portion of working population. People travelling from Mirpur to Motijheel have two alternative options of corridors. They can travel either through Mirpur road or through Rokeya Shoroni. A study reveals that, about 96.67% bus passenger travel through Rokeya Shoronee and only 3.32% travel through Mirpur Road to reach CBD (Jahan et. al. 2011: 33). But, this is a city without well organized, properly scheduled and designed bus system (DoE, 2009). There are problems in the allocation of routes and the number of buses that can operate on a given route of Dhaka, which are neither based on proper estimates of demand of commuters, nor on the infrastructure needed for effective operation, but rather on the narrow business interests of bus owners and their political supporters (Wescott, 2009). According to Strategic Transport Plan (STP), in 2004, acute deficiencies exist in the provision of infrastructure facilities resulting in a widening gap between supply and demand for urban transport services. There is need for continuous review of the relationship between supply and demand for public transport services for the management of Dhaka's transport system. In this context an attempt has been made to estimate demand supply of bus service in a road of Dhaka. Demand and supply of bus service has been

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determined for a section of Rokeya Shoronee, which extends from Mirpur 10 to Agargaon. All the bus stoppage along the selected section has been studied to determine the demand and supply of bus for the corridor. The implication of the study from planning aspect is that, it can help policy makers and planners to investigate the demand and supply of bus service and thereby to take necessary steps.

Method

Selection of Road section and Bus services

To determine demand a section of Rokeya Shoronee has been selected as the study area, which extends from Mirpur-10 to Agargaon. This section has been selected because the next stoppage after Agargaon is Farmgate at which there are more options of buses available to people to reach Motijheel. Five bus services operate buses along this section namely Bikolpo Auto Service, Silk City Service, BRTC Bus Service, Best Transport and Pubali Poribohon. All the bus stoppage along the selected section has been considered to determine the demand and supply of bus in Rokyea Shoroni. Bus Stoppages locations are identified from the list of Dhaka Metropolitan Regional Transport Committee (DMRTC) List. These stoppages are Mirpur-10, Kazipara, Sheorapara, Agargaon. At these locations, Motijheel going selected bus services have been surveyed.

Determination of Demand and Supply of Bus

To determine demand at each of the selected bus stoppage, the total number of awaiting people counted for the selected five bus services during the office hour (8:00 am to 10:00 am) at a typical working day. To determine the supply, number of bus that pick passenger from the selected stoppages and overloaded bus run through the point have been counted. As the buses pick passenger at their origin that is at Mirpur-14 or Pollobi, therefore at Mirpur-10 no buses remain fully blank. For this, in the study it has been considered to convert the average number of passenger board on buses into fully blank bus of average capacity to determine the supply at a particular stoppage. Similarly, to determine demand the number of awaiting people has also been converted into fully blank bus of average capacity. By doing this the demand for bus and supply of bus can be determined.

Determination of Average Bus Capacity

As the capacity of selected bus services is different therefore to determine the demand and supply for bus an average capacity of bus has been considered for avoiding complexity in calculation. It has been done to calculate the demand and supply in a specific unit. The average bus capacity has been determined by taking the average seat capacity of the selected five bus services that go through Rokeya Shoroni via Mirpur 10 to Motijheel.

Table 1: Determining Average Capacity of Bus

Bus Service	Seat Capacity
Bikolpo Auto Service	35
Best Transport/BLCL	35
Silk City Service	30
BRTC Bus Service	50
Pubali Poribohon	50
Total	200
Average	$200/5 = 40$

Source: Field Survey, 2011

Results and Discussion

To determine supply of buses at each stoppage average pick of passenger per bus is required. From field observation it has been observed that average pick of passenger per bus is five to ten at Mirpur-10, Kajipara and Sheorapara which means at these three stoppages each bus can pick seven people on an average. But at Agargaon the number of awaiting people is comparatively lower than the other three stoppages. And also average pick of passenger per bus is low. Because maximum buses become loaded at the previous stoppages so they cannot pick more than three persons per bus. So, average pick has been fixed three persons per bus at Agargaon stoppage. The detail calculation has been explained as follow:

Table 2: Demand and Supply of Selected Bus Services at Mirpur-10

Demand		Supply	
People waiting per hour	513	Number of buses stopped at the point	61
Average bus capacity	40	Average pick per bus	7
Demand for bus = Total number of awaiting people/ average bus capacity	$513 / 40$ $= 12.825$ ≈ 13	Total pick	$61 * 7$ $= 427$
		Average bus capacity	40
		Current supply	$427 / 40$ $= 10.675$ ≈ 11
Difference between demand & supply = $13 - 11 = 2$			

Source: Field Survey, 2011

At first the demand and supply of bus have considered for the stoppages at Mirpur-10. The selected bus routes meet at this point coming from different location of origin. From field observation at Mirpur-10 bus stoppages, it has been revealed that about 513 people per hour wait for the selected bus service. Dividing the number of awaiting people with the average bus capacity it gave the number of demanded buses at that stoppage. From the calculation it has been revealed that total 13 full blank buses of 40 seat capacity are demanded at Mirpur-10.

On the other hand when considering the supply of bus, from the survey it has been revealed that per hour 61 buses stopped at Mirpur-10. As these buses got partially filled up from their origin, therefore they have been converted into full blank buses of 40 seat capacity. For the conversion the average number of passenger who can board on those buses has been determined by observation method. From the observation it has been revealed that these buses pick 7 passengers on an average. By multiplying the average pick of passenger with number of buses stopped at the stoppage the total pick of passenger has obtained. It indicated that, this amount of passengers avail the supplied bus service. To express this amount of passenger in terms of supplied bus, this amount has been divided by the 40. It would give the number of fully blank buses with 40 seat capacity available at the stoppage. From the calculation at Table 2, it has been evident that at Mirpur-10 the existing bus service can serve as equal to the 11 fully blank buses. That means partially filled up 61 buses is equal to 11 fully blank buses of 40 seat capacity. But there is demand for 13 fully blank buses of 40 seat capacity.

Therefore, after the thorough calculation it can be said that considering the demand there have been deficiency of 2 buses per hour. These 2 fully blank buses can serve the remaining passenger.

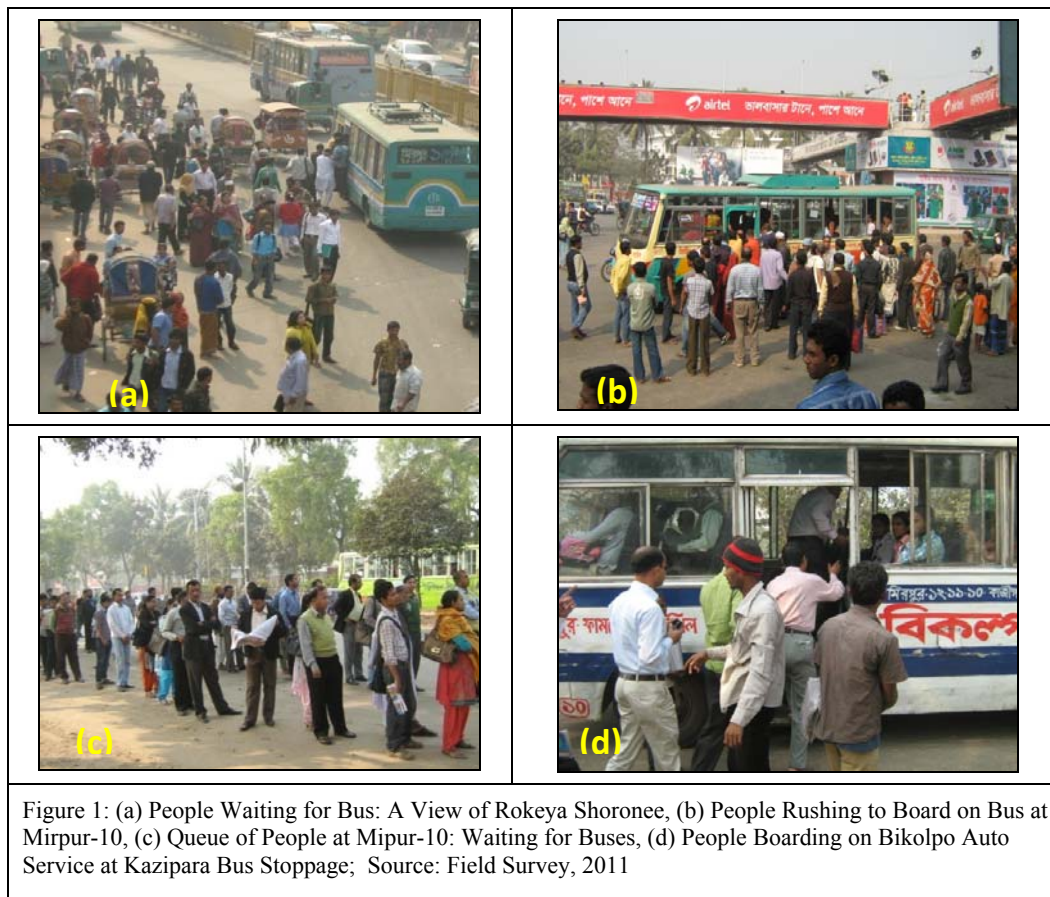
Similar calculation procedure followed in the rest of the stoppages. By summarizing the demand at each stoppage the total demand of bus at the selected portion of preferred corridor can be obtained. Similarly the supply of bus at selected portion of preferred corridor can be revealed from the bus supply data of each stoppage. All the demand and supply considered in terms of fully blank bus of 40 seat capacity.

Table 3: Demand and Supply of Selected Bus Services at Portion of Rokeya Shoronee

Name of bus stoppage	Total number of awaiting people per hour	Total demand for bus per hour	Current supply of bus per hour	Deficiency
Mirpur 10	513	13	11	2
Kajipara	360	9	8	1
Sheorapara	200	5	3	2
Agargaon	70	2	1	1
Total	1143	29	23	6

Source: Field Survey, 2011

From the Table 3, it can be stated that along the selected portion of Rokeya Shoronee, there has been demand for selected bus service to the 1143 people per hour. From the total number of demanded bus at each stoppage it has been revealed that per hour there is need of 29 fully blank buses of 40 seat capacity. These 29 buses can serve the 1143 awaiting people along the corridor. But from the field survey it has been revealed that per hour existing bus supply can serve equal to 23 full blank buses of 40 seat capacity. Therefore it can be said; along the corridor per hour there has been deficiency of 6 buses that can carry 240 people.



The study reveals that at portion of a corridor there has been deficiency in the supply of selected bus service with respect to demand. The feature is common at everywhere of the Dhaka. The survey result shows that per hour there has been demand of selected five bus service to 1143

people along the corridor. But the existing bus service is not sufficient to meet the demand. The supply of bus service should not be such that it remain far to meet the demand of people. On the other hand demand should also be controlled so that it would not go beyond the capacity of any service.

Conclusion

The public transport of Dhaka is a subject of inefficient balance between demand and supply. There is deficiency of supplied bus with respect to demand. This phenomenon is common throughout the city. Bus route network of Dhaka city need to be rationalized based on demand and supply. There is no scientific way to provide bus with respect to demand and to determine the supply of bus. The procedure mentioned in the study can be a way for determining demand and supply of bus. This process can be used to provide a guideline for determining balance between demand and supply of bus. The outcome of the assessment may play an important role in developing transport policy.

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