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Evaluation of Bus Services in Selected Routes of Dhaka City

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Abstract

Bus service plays a significant role in urban transportation system. Evaluation of public transport mode like bus is critical in facilitating operational improvement and strategic decision making. The purpose of this paper is to evaluate the bus service performance in selected routes of Dhaka city based on users' perceptions. Structured questionnaire comprising different bus service oriented variables were employed in data collection process. Users' perceptions indicate that the overall performance of bus service in selected routes are not satisfactory. Parametric analysis of bus service identified the key areas where effective initiatives should be introduced to a greater extent to improve the quality of the bus services in Dhaka city.

Key words: transportation system, bus service, bus routes, Dhaka city

Introduction

The transportation system in Dhaka City, the capital of Bangladesh, catering to more than 12 million people, faces numerous and significant challenges (Andaleeb *et al*. 2007). As a result of increasing population, the travel demand is also increasing very rapidly in the city causing enormous pressure on the existing transport system of Dhaka city, which does not have a reliable transport system (Hasnine, 2011). The complex and heterogeneous traffic pool, largely dominated by non-motorized vehicles (especially rickshaws), poorly maintained motorized vehicles, and the lack of enforcement of traffic rules - creates serious and unbearable congestion as well as heavy pollution in the city's streets. These factors also contribute enormously to the travel-related suffering of city dwellers (Andaleeb *et al*. 2007). Transportation sector is a mass scale playground for its users where bus is the biggest player in the road based public transportation system in Dhaka city. The increase in number of registered bus, minibus and motor car was 135.5%, 8.55% and 31.9% respectively between the years of 2003 to 2007. The percentage increase in the number of bus is the maximum among all the modes. However, all of these buses are not operating in the metropolitan area. So the demand for buses is still higher (Hasnine, 2011). Additionally, bus is considered as the prime mode of transportation for the middle and lower income group in Dhaka city. However bus transport authorities are not providing efficient bus services for city dwellers due to different reasons (Hossain, Ayon, Haque, Roni, 2012).

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Transit service quality is an aspect markedly influencing travel user choices. Customers who have a good experience with transit will probably use transit services again, while customers who experience problems with transit may not use transit services the next time. For this reason, improving service quality is important for customizing habitual travelers and for attracting new users. Moreover, the need for supplying services characterized by high levels of quality guarantees competition among transit agencies, and consequently, the user takes advantage of better services. To achieve these goals, transit agencies must measure their performance (Eboli and Mazzulla, 2009). Customer satisfaction with transportation services can be placed in the framework of stakeholder (passenger) interests (Andaleeb *et al*. 2007). Customer satisfaction with bus transportation can be used to find reasonable solutions to problems. This study, therefore attempts to evaluate bus service performances in different routes of Dhaka city based on passengers' perceptions.

Methodology

Five major bus routes, namely *Abdullahpur-Azimpur* route, *Gabtoli-Victoria Park* route, *Savar-Gulistan* route, *Gabtoli-Abdullahpur* route, and *Abdullahpur-Motijheel* route were chosen for this study. While selecting the bus providers of a specific route, both the *counter service* (*sitting service*) and *local service (non-sitting)* were considered to have the complete scenario of existing bus services of the city. A discussion with the bus operators (i.e. employee at the counters, bus conductors, and bus drivers) was done to know the frequency of services as well as other issues related to the bus service.

The questionnaire was prepared considering the factors most suitable to explain passenger satisfaction. Different variables have been selected to measure bus service performances (Table 1). These variables have been measured on a five point 'Likert Scale' with "Extremely Satisfied" reflecting the highest favorable response, Satisfied, Neutral, Dissatisfied and "Extremely Dissatisfied" indicating the least favorable response to each statement. Demographic questions was also included in the questionnaire.

Table1: Variables to Measures bus services performance

Bus Service Variables	Parameters
Comfort	Ease of boarding, seat availability, condition of seat, enough foot space, ceiling height, facilities for disables, facilities for women, availability of air-condition, ease of carrying luggage, cleanliness of seats and floors
Information about Bus Services	Frequency of bus service, information on service changes (e.g. delays)
Quality of the ride	Frequency of blowing the horn, driving speed, dangerously overtaking tendency, frequency of hard brake, breakdown tendency of buses on the road.
Co-passenger behavior	Passengers are disciplined, well behaved and maintain cleanliness.

Bus Service Variables	Parameters
Attitudes of bus operators	Staffs behave properly with the passengers, attitude toward women passengers
Ticketing	Ease of purchasing ticket and getting information on ticket's fares
Safety	Afraid of being robbed/mugged at the bus stand, afraid of being pick-pocketed in the bus, Women passenger safety
Bus Stoppage facilities	Enough lighting, shelter at the bus stands against rain, sun, storm, adequate seating arrangement, sign, symbol, vending facilities, cleanliness of bus stop, toilet, information board
Physical Condition of the Bus	Condition of bus structure

Source: Modified after Andaleeb *et al*. 2007

A total of 250 bus passengers (50 from each route) were selected using purposive sampling and interviewed with a predetermined structured questionnaire at different bus stoppages. The questionnaire were pretested on several randomly selected respondents. Minor adjustments were made to ensure conciseness, objectivity, and clarity. The questionnaire covers the points to explore passengers experience and satisfaction level of current bus journey, and their overall expectations about bus services. While selecting the respondents for a particular bus route, it was further considered that the passengers of all the different bus services (operators), which had been chosen for this study of that particular route, have been considered equally and the sample had been drawn from different stoppages of that route.

A team of two observers were set up for each route. For each route, two observers started the journey from the starting point of the route and continued their journey to the last stoppage. During the bus journey, passengers who board on from each stoppage were interviewed according to pre-determined questionnaire about bus service features. The survey was conducted on weekday on 1 November' 2016, 2 November' 2016 and 3 November' 2016 from 7:00 am to arrival at the last stoppage of selected route. This three survey days were selected randomly by considering weather condition, political situation and other relevant issues.

Data Calculation

To evaluate the bus services features, nine service features or indicators have been observed, such as Comfort, Information about bus services, Quality of the ride, Co-passengers Behavior, Attitudes of bus operators, Ticketing, Safety perception, Bus Stop facilities and Physical condition of bus. Each features are observed on five point Likert scale as Extremely Dissatisfied=1, Dissatisfied=2, Neutral=3, Satisfied=4, Extremely Satisfied=5 according to the user perceptions. Variable of each service features have been evaluated by using the appointed weightage.

Average / mean value of each service features or indicator has been calculated to find out the overall condition of the service. Therefore following formulas has been used (Mostofa, 2007) for analysis of bus services.

Total point = $\sum(Frequency\ (Respondents\ No) * Weitage\ of\ acceptance\ level)$

Each variable Mean = Total point/Total frequency (Respondents No)

Feature Mean or Indicator Mean = Total Variable mean/ total no. of variables

Literature Review

Andaleeb (2007) explores ways of improving bus transportation services in Dhaka. He found that comfort levels, staff behavior, number of buses changed to reach destination, supervision, and waiting facilities have significant effects on passenger satisfaction. Hasnine (2011) revealed operational weakness as a significant cause of the deficiency in the operation of bus services. Dedicated bus lane, higher trip frequency at peak period, ticketing system, trip information display, institutional set up, personnel skill development were suggested to improve the bus service. Hossain et al. (2012) found travel time, waiting time and comfort level along the route had found quite unsatisfactory. Eboli and Mazzulla (2009) proposed an index based on customer perspective for evaluating transit service quality. The index allows service quality to be monitored, the causes generating customer satisfaction/dissatisfaction to be identified, and the strategies for improving the service quality to be defined. Littman (2015) portrayed how to create a comprehensive framework for evaluating the full impacts (benefits and costs) of a particular transit service or improvement. He also identified various categories of impacts and how to measure them and discussed best practices for transit evaluation and identifies common errors that distort results. Vaidya (2014) found that evaluating the performance of public transportation systems facilitates operational improvement and strategic decisions. Khan and Anderson (2014) argued that the use of performance measures to evaluate operation is essential to maintain growth.

Study Area Profile

All the major bus service providers operating in the selected route were considered for this study (Table 2 and Figure 1). While selecting the bus providers of a specific route, both the *counter service* (*sitting service*) and *local service (non-sitting)* were considered to have the complete scenario of existing bus services of the city. A discussion with the bus operators (i.e. employee at the counters, bus conductors, and bus drivers) was done to know their frequency of services as well as other issues related to service.

Table 2: Characteristics of selected Routes

Parameter	Route-1	Route-2	Route-3	Route-4	Route-5
Origin and Destination	Abdullahpur to Azimpur	Gabtoli to Victoria Park	Savar to Gulistan	Gabtoli to Abdullahpur	Abdullahpur to Motijheel
Route length (km)	24.5	14	18.5	20.4	21.6
Round trip	5	6	5	5	4
Total distance covered/bus/day (km)	240	168	189	204	172.8
Time to complete single trip (hours)	2-3	2-2.5	1-1.5	2.5	2-3
Number of Stoppages	10	12	15	12	13
Average distance between stoppages (km)	2.4	1.17	1.23	1.7	1.66
Operating Period	6 a.m. to 7 p.m. and continues up to 12 p.m. at night	5 a.m. to 6 p.m. and continues up to 11 p.m. at night	6 a.m. to 7 p.m. and continues up to 11 p.m. at night	6 a.m. to 7 p.m. and continues up to 11 p.m. at night	6 a.m. to 7 p.m. and continues up to 11 p.m. at night

Source: Interview of Bus-Minibus Owners' Association of Selected Routes, 2016

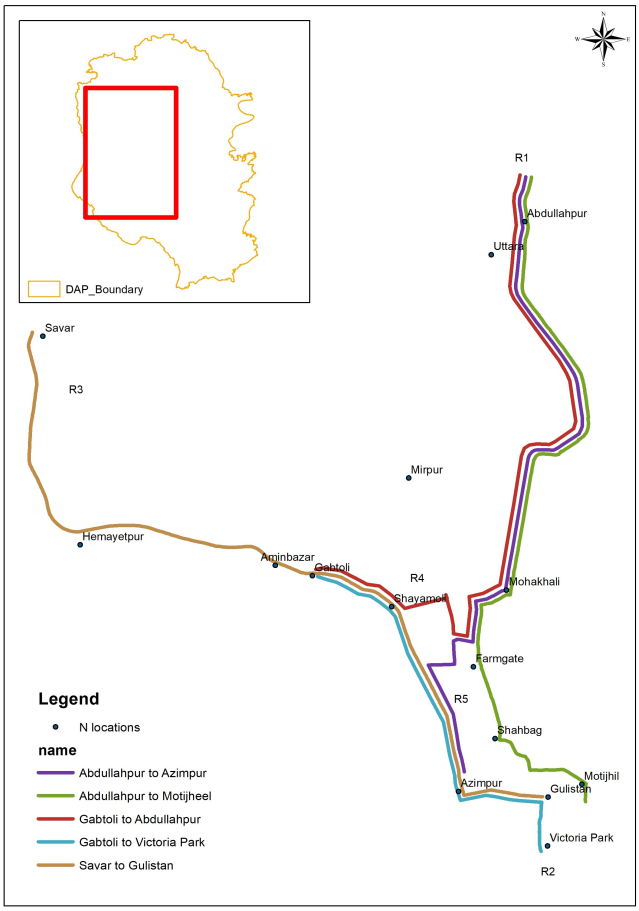

Figure 1: Selected Bus Routes in Study Area

Among the selected routes, Abdullahpur to Azimpur is the longest routes followed by Abdullahpur to Motijheel, while Gabtoli to Victoria Park is the shortest route in length (14 km). The maximum number of bus stoppages were found in Savar to Gulistan route followed by Abdullahpur to Motijheel. Stoppages in Abdullahpur to Azimpur is the minimum. The average distance between stoppages are minimum in Gabtoli to Victoria Park route followed by savar to Gulistan. Required time to complete a single trip, operation periods are almost similar in all these bus routes.

Demographic Profile of the Respondents

Major demographic features of the respondents are presented in Table 3. Male are the most dominated among the respondents in all the routes. However, a considerable portion of the respondents were female in the Gabtoli to Abdullahpur and Abdullahpur to Azimpur routes. The maximum respondents belong to the age group of 25-29 years followed by 40-49 years. A small portion of respondents in age groups 10-19 years and 50-59 years were also interviewed.

Table 3: Respondents' Profile

Demographic features	**Routes**				
Gender	Route 1	Route 2	Route 3	Route 4	Route 5
Male (%)	64	76	80	60	68
Female (%)	36	24	20	40	32
Age Group (year)	Route 1	Route 2	Route 3	Route 4	Route 5
10-19	18	18	0	0	0
20-24	14	14	14	22	14
25-29	26	26	32	36	38
30-39	12	12	20	24	16
40-49	22	22	22	10	24
50-59	8	8	12	8	8
Income (BDT per Month)	Route 1	Route 2	Route 3	Route 4	Route 5
10,000-20,000	10	10	16	14	14
20,001-30,000	22	24	44	20	20
30,001-40,000	46	44	26	42	42
40,001-50,000	14	14	10	14	16
50,000+	8	8	4	10	8
Occupation	Route 1	Route 2	Route 3	Route 4	Route 5
Businessman	10	10	16	14	14
Student	30	24	44	30	20
Service holder	46	52	26	42	42
Others	14	14	14	14	24

Source: Field Survey, 2016

The maximum respondents were in income range between 30,001-40,000 BDT per month followed by 20,001-30,000 BDT per month. Some respondents with an income of 10,000-20,000 BDT and more than 50,000 BDT per month were also surveyed in this study. Service holders constitute a larger portion among the respondents followed by students in all routes. Few businessmen and people from other occupations were also interviewed for this study.

Assessment of Bus Service Performance

The performance of bus services in different routes were analyzed according to service variables. Parametric mean values of service variables in selected routes are presented in Table 4. The mean value for the variable 'Comfort' regarding Gabtoli to Abdullahpur and Abdullapur to Motijheel route indicates 'Neutral' level. For Abdullahpur to Azimpur and Savar to Gulistan route, passengers were found to be 'dissatisfied' relating 'comfort' variable. The comfort level found extremely poor in the Gabtoli to Victoria Park route. Facilities for the physically challenged people were found extremely poor in all the routes.

Table 4: Variable wise Performance Mean Value

Bus Service Variables	Parameter	Route 1	Route 2	Route 3	Route 4	Route 5
Comfort	Ease of boarding	2.16	1.36	2	3.56	2.3
	Seat Availability	2.46	1.44	2.24	2.22	2.48
	Condition of seat	2.16	1.72	2.18	3.5	2.16
	Enough foot space	2.06	1.28	2.08	3.56	2.14
	Ceiling height	3.94	3.98	3.64	3.82	3.92
	Facilities for disables	1.26	1.16	1.32	1.74	1.76
	Facilities for women	3.6	1.6	2.44	3.56	3.56
	Availability of air-condition	1.24	1	1.22	1.28	2.24
	Easy to carry luggage	2.24	1.42	2	2.3	2.16
	Cleanliness of seats and floors	3.66	1.22	2.3	3.58	3.64
Information about Bus Services	Frequency of bus service	1.72	3.36	2.18	2.4	2.24
	Delay information	1.24	1.1	1.74	1.58	1.62
Quality of the ride	Drivers blow the horn too much	1.66	1.82	1.66	1.3	1.5
	Drivers drive too fast	1.22	1.08	1.76	1.22	1.32
	Buses overtake other vehicles dangerously	1.16	1.14	1.82	1.82	1.82
	Bus drivers frequently brake hard	1.12	1.26	1.9	1.8	1.2
	Buses often dysfunctional on the road	1.06	1.2	1.2	1.12	1.9
Co-passenger behavior	Passengers are disciplined	4.08	4	3.84	3.72	3.96
	Passengers maintain cleanliness	4.12	4.04	4.12	3.96	4.02
	Passengers are well behaved	3.56	3.66	3.52	3.48	3.52

Bus Service Variables	Parameter	Route 1	Route 2	Route 3	Route 4	Route 5
Attitudes of bus operators	Attitudes of bus conductor and drivers	1.96	1.88	2.04	1.4	2.04
	Attitude toward women passengers	3.18	3.54	3.54	3.58	3.54
Ticketing	Ease of purchasing ticket	4.14	0	4.18	4.1	4.12
	Ease of getting information on ticket's fares	4.38	0	4.34	4.34	4.4
Safety	Feeling safe on bus	2.3	1.28	2.16	2.32	2.26
	Feeling safe at night	1.56	1.42	1.64	1.6	1.58
	Women passenger safety	2.26	1.74	2.42	2.28	2.28
Bus Stoppage facilities	Shelter coverage	1.94	1.96	2.06	1.9	1.92
	Sign, symbol	2.3	2.54	2.08	2.18	2.28
	Lighting facilities	1.7	1.3	1.74	1.68	1.68
	Vending facilities	1.7	1.5	1.48	1.72	2.1
	Sitting facility	1.26	1.22	2.22	1.42	1.88
	Cleanliness of bus stop	2.28	1.38	2.06	2.02	2.2
	Toilet	1.12	1.06	1.16	1.16	1.88
	Information Board	1.16	1.02	1.06	1.18	1.92
Physical Condition	Overall condition of bus structure	**3.24**	**1.58**	**3.54**	**3.56**	**2.46**

Passengers were dissatisfied on the information about bus service in all the routes. The quality of ride was found dissatisfactory in the Savar to Gulistan and Abdullapur to Motijheel routes, while such quality in other three routes were exceedingly poor. This is evident that the quality of ride was substantially deteriorated by the blowing horn more frequently and unnecessarily, fast driving, dangerous over taking, frequent hard breaking and vehicle becoming dysfunctional on the road. In all routes, co-passenger behavior were in satisfactory condition. The attitude of bus operators was stated as almost dissatisfactory in Savar to Gulistan, Abdullapur to Motijheel and Gabtoli to Victoria Park routes. Passengers in other two routes have more complains in this regard. There is no ticketing system in Gabtoli to Victoria Park route. The ticketing system in other four routes were satisfactory. The Abdullahpur to Azimpur route was found safer than the other route. However, safety for women passengers were not satisfactory in any of these five routes and maximum passengers were not satisfied during travelling at night time irrespective of gender. Overall 'Safety' condition in the Gabtoli to Victoria Park route was the worst. The bus stop facilities in all these routes is not satisfactory at all. The conditions of toilet, information board, sitting facilities, lighting facilities, vending facilities, shelter coverage and cleanliness were extremely poor. The physical conditions of the buses in Gabtoli to Abdullahpur and Savar to Gulistan route were found to be near satisfactory condition while neutral conditions has been found in Abdullahpur to Azimpur and Abdullapur to Motijheel route. Buses operated in the Gabtoli to Victoria Park route were in the worst physical condition.

Table 5: Integrated Mean Values

Bus Service Variables	**Route 1**	**Route 2**	**Route 3**	**Route 4**	**Route 5**
Comfort	2.48	1.6	2.14	2.91	2.63
Information about Bus Services	1.48	2.23	1.96	1.99	1.93
Quality of the ride	1.24	1.3	1.67	1.45	1.55
Co-passenger behavior	3.92	3.9	3.83	3.72	3.83
Attitudes of bus operators	2.57	2.71	2.79	2.49	2.79
Ticketing	4.26	0	4.26	4.22	4.26
Safety	4.26	1.48	2.07	2.07	2.04
Bus Stoppage facilities	1.68	1.5	1.73	1.66	1.98
Physical Condition of the Bus	3.24	1.58	3.54	3.56	2.46
Integrated Mean Value	2.79	1.81	2.66	2.67	2.61
Ranking	**1**	**5**	**3**	**2**	**4**

The integrated mean values of the bus service variables is presented in Table 5. The integrated mean values indicate that the overall bus service performance is close to neutral value in Abdullahpur to Azimpur followed by Gabtoli to Abdullahpur. Bus service performance is not satisfactory at all in the Gabtoli to Victoria Park route. In Savar to Gulistan and Gabtoli to Abdullahpur routes, the service performances were found to be similar. Both Table 4 and 5 indicate that substantial improvement is required in the quality of ride, bus stoppage facilities, safety, comfort and attitudes of bus operators to enhance bus services in these routes.

Recommendations

Based on above findings, some measures are recommended here to enhance the performance of bus services in the study area.

- This is inevitable for the bus drivers to follow the guidelines prescribed in the Bangladesh Road Transport Authority (BRTA) regarding blowing horn and overtaking. The sign and symbols (Figure 2) should be placed in appropriate locations and the drivers should follow those accordingly.

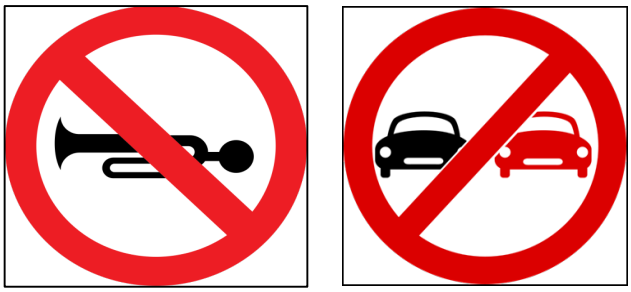

Figure 2: "No Horn" and "No Overtaking Sign"

- Training and motivational programs should be introduced for the bus operators, drivers and conductors.
- Enormous efforts are required to upgrade the bus stoppage facilities in all the routes. Adequate shade and shelter, lighting facility, vending facility, information board (displaying route details, bus schedule, fare rate, stoppages), toilet and signage should be provided (Figure 3).

Figure 3: Bus Stop Facilities: Shelter and Information Board

- Except some reserved seats, no other facilities are currently available for the physically challenged people. Provision of ramp for boarding on bus with wheelchair and separate sitting arrangement should be provided for them to ease their use of public transport (Figure 4).

Figure 4: Facilities for Physically Challenged People

- Safety measures should be strengthen for the women during bus ride. Installation of CCTV camera inside the bus, safety app in the mobile phone can be introduced.
- Traffic rules and regulations should be implemented strictly and penalties should be imposed on the violators.

Conclusion

This study tries to evaluate the performance of bus services in five major routes in Dhaka city. Users' perceptions indicate that bus services in these routes are not quite satisfactory. Bus service in Abdullahpur to Azimpur route is slightly in a better condition compared to other routes. On the other hand, bus services in Gabtoli to Victoria Park route has been found to be in the worst condition. The study identifies that quality of ride, attitudes of bus drivers and conductors, safety at night, safety for women, bus stoppage facilities, level of comfort, and facilities for physically challenged people are the major concerns for bus services in these routes. These facts should be duly considered by the policy makers and regular performance evaluation in each routes are required to enhance the bus service quality in Dhaka city.

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