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Transit Ridership of Dhaka Metro Rail: Understanding the Views of Prospective Users*

Md. Morshed Alom[1]

ABSTRACT

Dhaka offers an exceptional context for metro rail services with the world's highest population density. How the sociocultural condition of the city's population would affect the future ridership of the under-construction Dhaka metro rail is an interesting question. This paper aims to shed some light on this issue. It uses the quantitative data collected through a heuristically designed survey questionnaire by the participants of a training programme designed for the Dhaka Mass Transit Company Limited officials and implemented by the Bangladesh Public Administration Training Centre. It presents the survey findings from 625 prospective metro rail service users from six catchment areas of the Mass Rapid Transit (MRT) Line-6 using descriptive and inferential statistics. Contradicting the previous research findings of other contexts, the variables of walkable footpaths, transfer services, and commercial space in stations appeared as non-significant predictors of metro ridership in a regression analysis. A new suggested variable of female coaches in the metro rail also was found non-significant, contradicting local conventional beliefs. On the other hand, strap-hanging, reliability, timeliness were positively, and the fare of metro travel was negatively significant at $p<.05$, though all of them showed minimal impact on ridership. The findings imply that males and females will travel by the metro rail in the same coach, even standing. However, the fare of metro travel can become a crucial factor for travel decisions, which carries policy implications for the metro rail authority. These findings contribute to the scientific knowledge of urban transportation governance regarding rapid-transit facility development.

Keywords: Metro Rail, Ridership, First-Last Mile Problem.

INTRODUCTION

Metro rail transit is considered the most appropriate approach to tackling urban transportation and environmental problems (Gutiérrez et al. 2011, Kuby et al. 2004,

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1 Deputy Director, Bangladesh Public Administration Training Centre, Email: mmapatc@hotmail.com

Zhao et al. 2013). There has been rapid growth in urban transport-related challenges in developing countries, particularly in the last few decades (Pojani & Stead 2015), including environmental pollution, traffic congestion, accidents, and the inaccessibility of modes of transportation by the urban poor. These issues pose serious challenges to sustainable urban governance. The metro rail is a means of mass and unhindered transportation of people. However, its success lies in the actual ridership of this travel means. Transit literature indicates several crucial issues that might affect transit ridership. One critical point involves a travel gap from a traveller's origin of a journey to a departure metro station and from the arrival metro station to his final destination, which is known as the first-last mile problem (Ma et al. 2015). User-friendly sidewalk and transfer bus routes (Lin & Shin 2008) and bicycle and motor bike-sharing have emerged to ameliorate the first-last mile problem. Besides this issue, some other socio-economic variables specific to a rail transit context, such as commercialisation of station areas, fare, time, attitudinal and lifestyle preferences, affect ridership (Cervero 2002, Chiang et al. 2011, Wang et al. 2015).

Dhaka—the capital city of Bangladesh—is one of the world's megacities, with a high density of over 18 million people (Khan et al. 2018). Its transportation system includes motorised and non-motorised vehicles—bus, car, auto-rickshaw, and rickshaw. The city has only 7 per cent of space for transport facilities against an ideal allocation of 25 per cent (Chowdhury et al. 2016). With severe traffic congestion, the average traffic speed has come down to only 7 kilometres per hour which causes 3.2 million hours' loss of productivity a day in the city (Rahman et al. 2020). The number of public transport is fewer than private transports in the city. Cars—used by only 6 per cent of the road users—occupy 30 per cent of the road space (Mahmud & Rabbani 2012). With the country's rapid economic growth, private automobiles are expected to rise. Road accidents have been another tragic aspect of Dhaka's transportation system. Altogether, movement in the city has become unbearable for its dwellers. The complicated nature of Dhaka's traffic problem necessitated looking for modern options to improve the situation.

In the face of the growing urban sprawl, the government of Bangladesh formulated a Strategic Transport Plan (STP) in 2005 under the Dhaka Urban Transport Project to address Dhaka's traffic problems. The STP recommended developing a mass rapid transport system in Dhaka as a necessary action (Mahmud & Rabbani 2012). Following the STP, the Japan International Cooperation Agency (JICA) conducted a study to understand the urban development scenario for Dhaka and recommended the construction of a Mass Rapid Transit (MRT) Line-6 on a priority basis to avoid traffic congestions, faster movement of people, and reduce air pollution (JICA 2018). Under this plan, a metro rail project is being implemented in Dhaka. Alam (2010) reviewed a few studies on the introduction of rapid mass transit and found arguments for introducing such systems in developed countries but against developing such systems in developing countries. He noted research findings that introducing the metro system in developing countries did not substantially reduce traffic congestion. The Dhaka metro rail construction was against these warnings.

What factors would affect the transit ridership of the Dhaka metro? This question is

interesting because metro rail is new to Dhaka city dwellers. Well-designed studies on this subject are not available. The context of the study is socio-economically different from previous studies. It offers a developing country perspective where population density is exceptionally high. One estimate showed that Dhaka's urban population density in 2017 was 44,500 people per square kilometre, making it the most densely populated city in the world (Murphy 2017). This paper investigates heuristically the question raised above using cross-sectional survey data collected from 625 prospective users of the Dhaka metro rail. It explores the current travel facts of the respondents, measures their attitude towards a set of selected variables about metro ridership, and projects the effect of the variables on future ridership.

TRANSIT RIDERSHIP LITERATURE

The transit ridership literature investigates different facets of it. Most literature focuses on metro rail ridership, though some focus on bus ridership in cities. This literature explores the influence of land-use patterns, including the commercialization of station areas, the walkability of footpaths in catchment areas, and weather conditions on ridership. Some studies involve the impact of transit services on property price and land-sector revenue generation. Studies vary in methodologies as well. This section gives an overview of this literature and sets the scope of this paper.

One of the issues that affect metro ridership is the first-last mile problem. This problem is a gap between the origin of a passenger's travel and a metro transit station. It also indicates the gap between a metro station and the passenger's final destination. When this gap remains underserved by public transportation and is not suitable for walking, a passenger either has to walk the gap or use other modes of transportation to avail of metro transit (Ma et al. 2015). Suppose walking is not suitable for him or other transportation methods are not available to cover the gaps. In that case, he feels discouraged to avail of metro transit. A Bicycle-sharing system has been developed in many cities to address this first-last mile problem. In the bicycle-sharing system, bicycles remain available at many docking stations in the catchment areas of a metro station where users can instantly rent or return bicycles. Such a system offers rental bicycles on a membership basis having weekly, monthly, or annual subscriptions or spontaneously. This system has spread in many parts of the world, including Asia, Europe, and the Americas (Ma et al. 2015). Bicycle-sharing does not have a linear impact on metro ridership in all places of all cities. Demographics such as age, sex, living place, and commute distance appear to impact ridership (Martin & Shaheen 2014). Martin & Shaheen (2014) also found that people living in the urban periphery tended to use bicycle-sharing more than those living in the urban core in Washington DC and Minneapolis. Their study found that the bicycle-sharing provision reduced automobile use in personal driving or taxi hiring.

Another aspect of the ridership issue has been how transit-friendly environments, known as transit-oriented developments (TOD), affect transit ridership. The core belief is that a central business district (CBD) and densely populated residential areas help increase transit ridership. The CBD zone offers job opportunities where people from

residential areas travel. Pushkarev & Zupan (1977), cited in Thompson et al. (2012), found a statistically significant relationship between 'minimum employment concentrations and residential densities' and the rise in transit ridership (p. 3332). Based on these findings, policymakers had taken refuge in policymaking favouring the structural design of cities targeting the creation of CBDs and high-density residential developments. However, Thompson et al. (2012), in their study of Broward County in Florida, found that the built environment characteristics had no relationship with bus transit ridership. Variables related to land use such as population, employment, international borders, airports were found by Kuby et al. (2004) significant in predicting light-rail ridership in the United States.

Other facets of transit literature include studying the effect of transit facilities on property value, building activities along transit lines, the effect of weather conditions on ridership, awareness about transit facilities, and the layout of the metro route. Rail and bus transit facilities enhance property values based on the location of the properties in relation to transit facilities (Zhong & Le 2016, Mulley & Tsai 2016). Weather conditions negatively affect the different modes of ridership (Li et al. 2018, Meng et al. 2016). People living within walking distance of transit facilities tend to have more information about ridership than the people living within driving distances (Outwater et al. 2011). Ridership concerns did not always dictate metro lines' route alignment and station placement. Yang et al. (2016) found that political decisions in China directed metro layout in under-developed places to expand land-sector revenue, exploiting the land-development potentials instead of farebox revenue. The transit literature shows variety in methodologies—from a direct demand forecasting model using multiple linear regression as an alternative to the traditional four-step computer-based travel demand model to estimate traffic volumes or transit ridership (Anderson et al. 2006) to a before-after research design to assess the impact of transit facilities on building activities (Cao & Porter-Nelson 2016).

The MRT Line-6 of Dhaka metro starts in Uttara and runs through Mirpur to Motijheel. Uttara and Mirpur represent high-density residential areas, and Motijheel represents a central business district. This study avoided the issue of TOD and CBD, property value, and weather conditions as the metro rail was still under construction. It instead explored how the first-last mile problem and some sociocultural issues would affect Dhaka metro ridership. Sociocultural factors affect an individual's choices concerning its social context. Following his research findings, Cervero (2002) recommended for inclusion of some socio-economic variables such as travel time and cost, demographic, attitudinal and lifestyle preference-related variables in travel demand models to account for their possible influences. Fare is found to have a negative impact on bus ridership (Chiang et al. 2011). Commercialization of station areas by building shopping malls and recreational facilities increases ridership (Wang et al. 2015). Khan (2019) recommended a special arrangement for women in metro transit. Therefore, this paper investigates the respondents' attitude towards some selected sociocultural issues, including strap-hanging, commercial activities, female coach, and the expected benefits from metro ridership besides the first-last mile factors and their effect on ridership.

DATA AND METHODS

This paper uses data collected by the participants of a training programme of the Bangladesh Public Administration Training Centre (BPATC). Thirty-seven officials from the Dhaka Mass Transit Company Limited (DMTCL) participated in a two-month-long foundation training course at the BPATC from 11 November 2019 to 8 January 2020. The training programme included fieldwork comprising empirical data collection and report writing. The participants, divided into six groups of six or seven members, went to six purposively selected catchment areas in Mirpur along the MRT Line-6 of Dhaka city. Mirpur is a densely populated area in Dhaka city where mostly the middle-income group and poor people live. Each catchment area was densely populated and had commercial facilities and educational institutions. Sidewalks in the catchment areas were uncongenial because of their dilapidated condition, hawkers' business, unauthorised parking, and safety concerns for pedestrians. Rickshaws dominated the roads and lanes, contributing to traffic congestions. The selected catchment areas were Paikpara, Palashnagar, Mirpur-1, Mirpur-2, Mirpur-14, and Mazar Road. Each member of the groups interviewed 20 respondents using a structured questionnaire for collecting data from the prospective users of the Dhaka metro rail on 11 and 12 December 2019. They selected the interviewees following a non-probability sampling technique of reliance on available subjects. This resulted in interviewing people from roads, residential areas, shopping complexes, office buildings, educational institutions, and bus stoppages who agreed to give an interview.

The survey questionnaire was developed through group discussions with the trainee participants. The group discussion results and the author's experience of metro rail travel in other countries helped set the items in the questionnaire matching usual scenarios of metro rail in other countries and the current travel constraints of the respondents. It was assumed that most of the respondents had not experienced metro rail travel. The questionnaire had five parts. Items in the first part collected current travel facts of the respondents, which included distance from the origin (residence) to the nearest departure metro station, distance from the nearest arrival metro station to the destination, current modes of transportation used by the respondents from the origin to the destination, and the time taken by a journey from origin to destination. This section captured factual information and had no fixed-answer categories. The second part had ten items relating to the first-last mile problem. Four of these items were on conditions of the footpath—width, cleanliness, hawker business, and safety. Another four items were on feeder travel services—bicycle sharing, motorbike sharing, city bus service, and rickshaw. The remaining two items were on parking facilities and road conditions.

The third part had seven items that addressed issues that the metro rail management could manipulate through policy intervention. These included crowd inside a coach, provision of strap-hanging, buying tickets standing in queues, designated female coach, shopping and food court facilities in metro stations, and metro rail fare. The eight items in the fourth part asked the respondents about their expected benefits from metro ridership. The items included time, comfort, safety, travel environment, cost-saving,

timely travel, on-demand availability of transit, and decency of travel. The fifth part of the questionnaire had items that asked for demographic information about sex, age, education, and occupation. Two open-ended items asked the respondents to mention the amount of money they were willing to pay for two fixed distances. The final item in the questionnaire asked the respondents to indicate their possibility of metro ridership. All the items in the questionnaire, except for the demographic information, produced numeric data. The 26 attitudinal items asked for responses on a 10-point scale, with 1 as the lowest and 10 as the highest degree of opinion.

The total number of filled out survey questionnaires stood at 740, from which information of 688 was entered into the SPSS software considering data consistency. This SPSS data were further reviewed and cleaned, resulting in retaining 625 cases for statistical analysis. Data received from 23 of the 26 attitudinal items were processed for principal component analysis (PCA). Three attitudinal items—fare, female coach and ridership probability—were used as single-item variables. The Kaiser-Meyer-Olkin measure of sampling adequacy was .77, and Bartlett's test of sphericity was significant ($p<.000$). An examination of the eigenvalues and scree plot suggested a six-factor solution to the data set, which accounted for 61.34 per cent of the total variance. These six variables and the other two single-item variables—fare and female coach—were regressed on ridership probability, the dependent variable. Descriptive statistics of the questionnaire items, results of the PCA and regression analyses are presented in the following section.

RESULTS

Demographic data of the respondents appear in Table 1. Male respondents constituted 82 per cent of the total 625 respondents. The majority of them were university graduates having graduate and postgraduate degrees—40 per cent and 20 per cent respectively. A vast majority of the respondents, over 80 per cent, belonged to the youth age group—20 to 49 years of age. Nearly half of the respondents were in service occupation (47 per cent), followed by the students (28 per cent) and business persons (19 per cent) categories.

Table 1: Respondents' Demographic Information

(Parentheses show percentage)

(1) Sex	**Frequency**	**(3) Education**	**Frequency**
Male	511 (82)	Below Secondary School	43 (7)
Female	114 (18)	Secondary School	57 (9)
		Higher Secondary	147 (24)
		Graduate	248 (40)
		Postgraduate	127 (20)
(2) Age	**Frequency**	**(4) Occupation**	**Frequency**

Up to 19	53 (9)	Service/doctor/ engineer/driver	290 (47)
20-29	287 (46)	Business/hawker/ lawyer	120 (19)
30-39	169 (27)	Students	171 (28)
40-49	65 (10)	Retired officials	5 (1)
50-59	30 (5)	Housewives	24 (4)
60-69	9 (2)	Unemployed	3 (1)
70-79	2 (1)	Others	4 (1)

Table 2 shows some facts about the current travel behaviour of the respondents. The respondents lived within an average of 2.6 kilometres of distance from their nearest metro stations. Their destinations from the nearest metro station were within 1.8 kilometres on average. The diversity of distance was lower in the case of residence to the nearest metro station than in the case of the nearest metro station to destination. For travelling from origin to destination, the respondents used the city bus to travel the longest average distance, 6.2 kilometres. The respondents travelled a moderate distance of 8.65 kilometres on average from their origin to destination with a standard deviation of 6 kilometres. The travellers spent, on average, over one and a half hours travelling from origin to destination.

Table 2: Current Travel Facts

Items	**Mean**	**Median**	**Mode**	**SD**
(1) Distance from residence to the nearest station (km)	2.6	2.0	1.0	2.2
(2) Distance from the nearest station to the destination (km)	1.8	1.0	1.0	2.3
(3) The current mode of travel from origin to destination (km):				
(i) Walking	0.30	.00	.00	.68
(ii) Rickshaw	0.80	.00	.00	1.34
(iii) Bicycle	**0.12**	**.00**	**.00**	**.96**
(iv) Motorcycle	0.67	.00	.00	2.65
(v) Car	0.40	.00	.00	2.10
(vi) City Bus	6.20	5.00	.00	5.86
(vii) Others	0.12	.00	.00	1.02
(4) Total distance from the origin to destination	8.65	8.00	3.00	6.06
(5) Time taken from origin to destination (minutes)	92.66	90.00	90.00	52.15

Note: km = kilometre

Table 3 shows descriptive statistics on all the attitudinal 26 items and the two items on willingness to pay for two fixed distances. Among the ten fast-last mile issues, the respondents highly rated the four qualities of a footpath—width, cleanliness, hawker-free condition, and safety. They considered the cleanliness of footpaths for pedestrians' sidewalks more critical with greater consistency, which scored slightly higher than the other three items on footpaths. Along with the walkability of a footpath, the quality of feeder roads scored high with a mean of 9.27. Respondents' mean scores on bicycle and motorbike sharing and availability of rickshaws hovered in the middle of the scale. City bus service and parking availability near metro stations scored moderately above the average point. Metro rail is a mass transit means where a crowded coach, strap-hanging, and queuing to buy tickets are common phenomena in developed and developing countries alike. The respondents appeared not to be serious about these conditions instead would embrace them. The mean scores for these issues hovered around the average point of the scale. Shopping facilities and food courts in metro stations and the fare of metro travel appeared to have a moderate influence on metro ridership decisions. The expectation of reserved coaches in the metro rail for female travellers scored very high.

The respondents placed high expectations on their metro travel. They expected time-saving to benefit them the most, which scored more than nine on the 10-point scale. In their perception, comfort, safety, friendly environment, cost-effectiveness, time-bound travel, on-demand availability, and decency would benefit the metro users. The two items in the willingness to pay category of the same table show the amount of money the respondents were willing to pay for two fixed distances. Mirpur-10 to Farmgate and Mirpur-10 to Motijheel were around 7 and 11 kilometres, respectively. The respondents were willing to pay on average Taka around 17 and 31 for the two distances, respectively, with a large spread in the opinions. The last item in the table shows the probability of their ridership of the metro rail, which was high.

Table 3: Descriptive Statistics on Study Items

Items	**Mean**	**Median**	**Mode**	**SD**
First-last mile (FL) issues to affect ridership				
Wide footpath (FL1)	8.56	10.00	10.00	2.36
Cleanliness of footpath (FL2)	9.14	10.00	10.00	1.79
Hawker-free footpath (FL3)	8.89	10.00	10.00	2.11
Safe footpath (FL4)	8.99	10.00	10.00	1.99
Bicycle-sharing (FL5)	5.71	**6.00**	**10.00**	**3.51**
Motorbike hiring (FL6)	5.62	5.00	1.00	3.46
City bus service (FL7)	7.46	9.00	10.00	3.05
Rickshaw (FL8)	5.63	6.00	10.00	3.35
Feeder road condition (FL9)	9.27	10.00	10.00	1.63
Parking availability (PL10)	7.02	9.00	10.00	3.49

Metro-management (MM) issues to affect ridership				
Crowded coach (MM1)	5.18	5.00	1.00	3.43
Strap-hanging (MM2)	5.39	5.00	1.00	3.36
Queuing to buy tickets (MM3)	5.83	5.00	10.00	3.29
Shopping facility at metro stations (MM4)	6.86	8.00	10.00	3.29
Food court at metro stations (MM5)	7.73	9.00	10.00	2.83
Fare of metro rail transit (MM6)	6.53	6.00	5.00	5.99
Female coach in metro rail (MM7)	8.35	10.00	10.00	2.72
Expected benefits (EB) from metro rail				
Time saving (EB1)	9.41	10.00	10.00	1.31
Comfortability (EB2)	8.98	10.00	10.00	1.74
Safety (EB3)	8.95	10.00	10.00	1.75
Better travel environment (EB4)	8.42	9.00	10.00	2.05
Cost-effectiveness (EB5)	8.07	9.00	10.00	2.18
Time-bound travel (EB6)	8.76	10.00	10.00	1.89
On-demand availability (EB7)	7.86	8.00	10.00	2.31
Travel decency (EB8)	8.22	9.00	10.00	2.21
Willingness to pay for transit				
From Mirpur-10 to Farmgate (in Taka)	16.75	15.00	10.00	9.85
From Mirpur-10 to Motijheel (in Taka)	31.10	30.00	20.00	14.67
Ridership probability	8.80	10.00	10.00	1.79

Table 4 shows the results of the principal component analysis of the 23 attitudinal items. Sixteen items meaningfully grouped into six variables. The variables were named as timeliness, walkable footpath, strap-hanging, transfer service, commercial space, and reliability. The items that had factor loadings less than .7 or loaded on more than one component were excluded from forming the principal components. The walkable footpath and transfer service were formed from the first-last mile items. These two variables represented footpath condition and feeder transportation services from origin to departure metro stations and from arrival metro stations to destinations. Two variables emerged from the metro management items—strap-hanging and commercial space. Strap-hanging is the respondents' attitude towards travelling by metro rail standing inside a coach accepting the unavailability of seats. Commercial space refers to an attitude towards business activities such as food courts and shopping facilities near metro stations. Two variables—timeliness and reliability—were formed from the expected benefits. Timeliness indicates unhindered travel as and when required, and reliability refers to safety and relieving travel.

Table 4: Factor Loadings on Principal Components

Items	Timeliness	Walkable Footpath	Strap-Hanging	Transfer Service	Commercial Space	Reliability
EB6	.760					
EB7	.797					
EB8	.748					
FL1		.755				
FL2		.842				
FL3		.825				
FL4		.702				
MM1			.848			
MM2			.879			
FL5				.897		
FL6				.906		
MM4					-.861	
MM5					-.868	
EB1						-.813
EB2						-.871
EB3						-.792

Extraction Method: Principal Component Analysis, Rotation Method: Oblimin with Kaiser Normalization. Rotation covered in 10 iterations.

The reliability test results of the composite variables are shown in Table 5. Cronbach alphas of all the variables are in the .7s or .8s. The composite variables have face validity and content validity. The variables appear valid and reliable considering the Cronbach alphas.

Table 5: Reliability of the Principal Components

Variable	Number of Items	Cronbach Alpha
Timeliness	3	.756
Walkable Footpath	4	.796
Strap-Hanging	2	.808
Transfer Service	2	.825
Commercial Space	2	.754
Reliability	3	.829

The results of the multiple regression analysis are presented in Table 6. The six composite variables and the single-item variables of fare and female coach were regressed on the single-item dependent variable ridership. The first-last mile problem variables—walkable footpath and transfer services—and the variables of commercial space and female coach were found not significant in predicting ridership. The non-significance of walkable footpath and transfer services was surprising. Strap-hanging, reliability, timeliness, and fare were significant at p<.05, though with minimal impact on ridership.

Table 6: Regression Results of Factors Predicting Ridership

Factor	B	Std. Error	Beta	t	Sig.	Adjusted R2
Strap-Hanging	.064	.022	.111	2.875	.004	
Reliability	.180	.057	.139	3.179	.002	
Timeliness	.227	.044	.223	5.141	.000	
Commercial Space	.043	.026	.066	1.662	.097	
Fare	-.027	.011	-.089	-2.335	.020	.116 (p<.00)
Female Coach	-.013	.026	-.020	-.499	.618	
Walkable Footpath	-.013	.044	-.012	-.296	.767	
Transfer Services	.016	.022	.029	.734	.463	

Note: The dependent variable was Ridership, R2 was .128 (p<.00)

DISCUSSION

Dhaka is a megacity with the world's highest density of population. The city's scarcity of roads and lack of adequate public transport cause severe traffic problems. Under this situation, the metro rail might appear a saviour to the residents' travel sufferings and an uplift in Dhaka's urban governance. As the study findings show, the residents possessed high hopes of relief from the travel hazards by the metro rail. The respondents of this study lived near the metro stations. A vast majority of them belonged to the working-age population. This fact indicates that they possessed the probability of using the metro rail. They mainly represented the service holders, business people, and student groups, increasing this probability. For travelling an average short distance from the origin to destination, which was only 8.7 kilometres, they spent an average of 93 minutes. These statistics became a testimony to the difficulties they faced in their movements within the city. The time the respondents spent travelling a short distance in the city would be a significant motivating factor for using the metro rail.

As the respondents lived within a short distance of their nearest metro stations and their destinations were also within a short distance, they could be expected to use the footpaths for walking to and from the metro stations. Therefore, they expressed concern for quality footpaths, as was revealed in the descriptive statistics. The respondents were

concerned about the walkability of their footpaths. On the roads of Dhaka, footpaths are not very wide. Moreover, hawkers keep them occupied. Wide, clean, hawker-free, and safe footpaths would increase their walkability. This condition, in turn, would increase the ridership of the metro rail. However, the variable of walkable footpath appeared in the regression analysis non-significant predictor of ridership. The respondents did not expect bicycle and motorbike sharing and rickshaws as much as they expected quality footpaths. Instead, they expected the city bus service with good quality of roads. An explanation for not having many expectations for bicycle and motorbike sharing and the availability of rickshaws could be that the city dwellers were not familiar with the first two feeder services. Although the city was flooded with rickshaws, many accuse this non-motorised vehicle of being a significant cause of Dhaka's traffic congestion. Therefore, the walkability of footpaths and city bus service appeared to be the preferred options for addressing the first-last mile problem.

Three conditions of metro management—crowded coach, strap-hanging, and queuing to buy tickets—may not become influential factors in metro ridership. Shopping facilities and food courts in metro stations might draw people to the use of metro rail. Looking at the descriptive statistics, the availability of designated female coaches was a significant determinant for choosing the metro transit for female travellers, which did not prove significant in regression analysis. This option's median and mode scores indicated that both male and female respondents had recommended having a designated female coach on the metro rail. More importantly, if the amount of fare the metro authority would fix exceeds the amount the respondents were willing to pay will have an impact on metro ridership. The respondents considered this to be one of the critical determinants.

The respondents' expectations from metro rail were high. They expected the metro rail to benefit them from two dimensions. One dimension is time. The loss of time they incurred on roads was unbound. Therefore, the metro rail would help them by saving their time. It would give them insurance of availing the service at their will and taking them to their destinations timely. The other dimension is reliability in terms of safe and comfortable travel. The metro rail would give them a sigh of relief from the hazards of the existing travel experiences.

CONCLUSION

This study presented a perspective of metro ridership in the context of a city of a developing country where population density is exceptionally high. Although the metro rail was under construction, the perception-based study findings would work as a baseline study to compare results of future studies when the metro rail would be in operation. The study's descriptive statistics corroborated past studies regarding the first-last mile problem but were not supported by the regression analysis. The discrepancies between the regression findings and the existing theoretical framework may have been caused by the fact that the metro rail was still under construction when the study was carried out. Moreover, the respondents were prospective users of the under-construction rail network. Another explanation for the discrepancies can be that the respondents

would avail themselves of the metro rail and travel strap-hanging despite not having walkable footpath, transfer services and female coaches because it would relieve them of the afflictions they get from the existing travel means. The amount of fare might appear as a crucial determining factor for the ridership decisions of the research participants. The study findings shed some light on some sociocultural aspects of their influence on metro ridership which might benefit policymakers and future studies. In the absence of any rigorous study, the findings of the current one shed some light on the ridership issue of the Dhaka metro rail. This study concentrated on a small part of the MRT Line-6, which is its limitation. Future studies can focus on the same sociocultural variables in other catchment areas and compare their results with the same of this study.

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