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Who Switches to Metro and Why? Service Quality, Demographics, and Early Mode Shift of Dhaka's MRT Line-6

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Abstract

Rapid urban expansion has placed considerable pressure on transportation systems in many developing megacities and Dhaka is among the most affected. In response to rapidly growing travel demand and severe congestion, the city introduced MRT Line-6 as a modern mass transit system intended to improve urban mobility. Since the metro has recently begun operation, understanding its early usage patterns and user perceptions is important for guiding future transport planning.

This study examines the initial phase of metro adoption in Dhaka, focusing on passenger characteristics, mode shift behavior, and perceived service quality. Passenger information was collected through a large-scale survey conducted between July and October 2023. After data screening and quality checks, 1,397 valid responses were retained for analysis.

The findings indicate that metro users are predominantly young and middle-aged individuals from middle-income households mostly depending on salary; constituting approximately 45% of the respondents. Work-related travel represents the largest share of trips, comprising about 36.8% of total journeys. Mode shift patterns reveal that the metro is primarily attracting former bus users, who comprise nearly 60% of current passengers, while only about 12% previously relied on private vehicles. This suggests that the metro is currently substituting bus travel rather than significantly reducing private car usage.

Passengers expressed high satisfaction with several service attributes, including operational reliability, comfort, cleanliness, safety, and information provision, with most mean scores exceeding 4.0 on a five-point scale. Travel time savings received the highest rating (mean = 4.39), indicating that faster travel is a primary factor driving metro use. However, feeder service availability and travel cost received relatively low scores, pointing to shortcomings in first and last-mile connectivity and affordability that must be addressed to attract more private vehicle users.

Keywords: *Metro Rail Transit (MRT), Mode Shift Behavior, Perceived Service Quality, Demographic Characteristics, Developing Cities.*

I. INTRODUCTION

The growing pace of urbanization and economic development has imposed an ever increasing burden on transport infrastructure of most developing cities and Dhaka is no different. The city is characterized by the constant congestion, long and unpredictable travel durations with excessive dependence on the transport system which is based on roads. To overcome these issues, the Government of Bangladesh published the Revised Strategic Transport Plan (RSTP) in 2015 and established mass rapid transit as one of the key measures to enhance the movement in the city and alleviate congestion. The launching of MRT Line-6 was a great achievement in accordance with the mentioned plan as the first metro railway in the country.

MRT Line-6 was developed to make journeys faster, safer and more comfortable and promote a change towards travel that is no longer road-dependent. Metro systems find a way into policy discussions, however, as a way to shift people out of their own vehicles to public transport which

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would decrease the volume of traffic and the impact on the environment. But in reality, the results are frequently more convoluted. Some of these cities offer evidence that new metro systems can often attract the traffic formerly served by current public transport, but not by cars, so the effect that they produce on road traffic conditions is often short-term (De Oña et al., 2015; Lai and Chen, 2011).

Interpretation of this early shift is especially significant in the Dhaka, where income limitation, travel accessibility factors, and long time-established travelling habits determine the choice of the travelling options. Preliminary observations on MRT Line-6 show that a significant number of users were used to using buses, with only a small percentage of transfers of privately owned vehicles. This brings a critical issue concerning whether service quality has the ability of making any significant change in the behavior of travel and whether the various groups of users react differently to the change done to attract the users.

To examine this question, the paper does not view a service quality only as a performance outcome, but rather as an element that affects the travel behavior. The perceived service quality is often perceived as an assessment of service performance in comparison with the expectations by a user (Parasuraman et al., 1985; Cronin and Taylor, 1992). These perception-based measurements are especially beneficial in creating urban environment because the above qualities alone do not usually reflect the daily traveling experience that is defined by congestion, accessibility, and socioeconomic constraints (Eboli & Mazzulla, 2012).

It has been established that perceived characteristics, including reliability, comfort, safety, benefits in terms of the time spent traveling, affordability, are significant factors of forming the satisfaction, loyalty, and travel decisions (Lai and Chen, 2011; De Oña et al., 2015). Mode shift to MRT could be regarded as a result of service attributes and personal characteristics in terms of travel behavior perspective. Travelers have developed patterns of behavior and would resist switching their mode of travel. The shift typically takes place when the benefits of a new choice are evidently higher than the extra effort or the extra price of the switching (Bamberg et al., 2003).

As it was experienced in the case of MRT Line-6, the reduction of travel times and increased comfort can help tempt former bus consumers to switch to the metro. Concurrently, limited feeder connectivity, increased access costs, or affordability and related issues can deter users of privately owned vehicles to make the transition. Such external constraints may constrain the wider effects of the metro service, even when that itself is performing well. The age, gender, income, and occupation differences can also influence the manner in which the users will rate the service and which features they will prioritize, resulting in different reactions among groups of travelers (Machado et al., 2018; Mandhani et al., 2021).

Based on survey data obtained at the initial stage of operation of MRT Line-6 this paper will discuss the interplay between perceived service quality and user factor on early modal shift towards MRT. The results give an idea of the reasons why metro systems can enhance the quality of public transport experiences. It also shows that the modal shift to MRT from personal cars is taking place less comprehensively than what is expected in the rapidly developed cities such as Dhaka.

II. METHODOLOGY

- *Study Context and Data Collection*

This study examines some early mode shift associated with Dhaka's MRT Line-6. It focuses on the relationship between the quality of service, as perceived by the user, and the personal background, to decide to change the travel mode to achieve more perceived satisfaction in terms of different attributes.

Data were gathered using a structured passenger survey conducted at every operating station of MRT Line-6 between July and October 2023 as shown in figure 1. As the survey conducted was in the early days of operation, the data is ideal to capture early changes in travel behavior. Moreover, assisting in the understanding of the nature of shifting and cause of modal shifting towards MRT Services.

The survey was carried out onsite by trained surveyors. They used KOBO Toolbox platform to gather responses. This system permitted both online and offline data entry, which helped in avoiding the loss of data and reduced data entry mistakes from the primary stages.

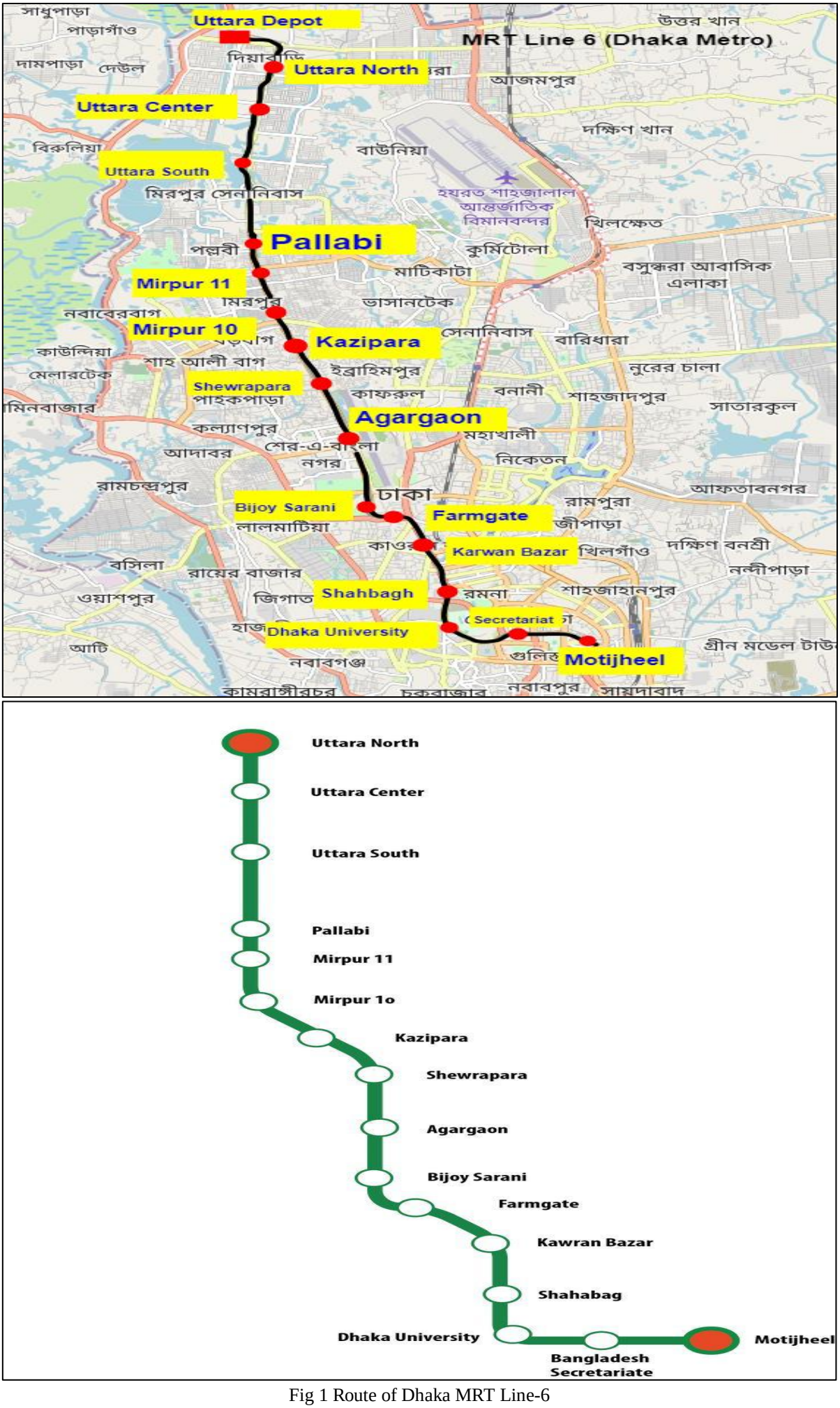

Fig 1 Route of Dhaka MRT Line-6

Figure 2 is the heatmap of the responses taken from the passengers from different stations of MRT Line-6. The total number of responses was 1,500, and following data screening for incomplete and inconsistent data, 1,397 valid observations were available for analysis. The final sample size meets suggested criteria for recommended thresholds for analytical analysis and perception-based transport studies (Kline, 2011; MacCallum et al., 1999).

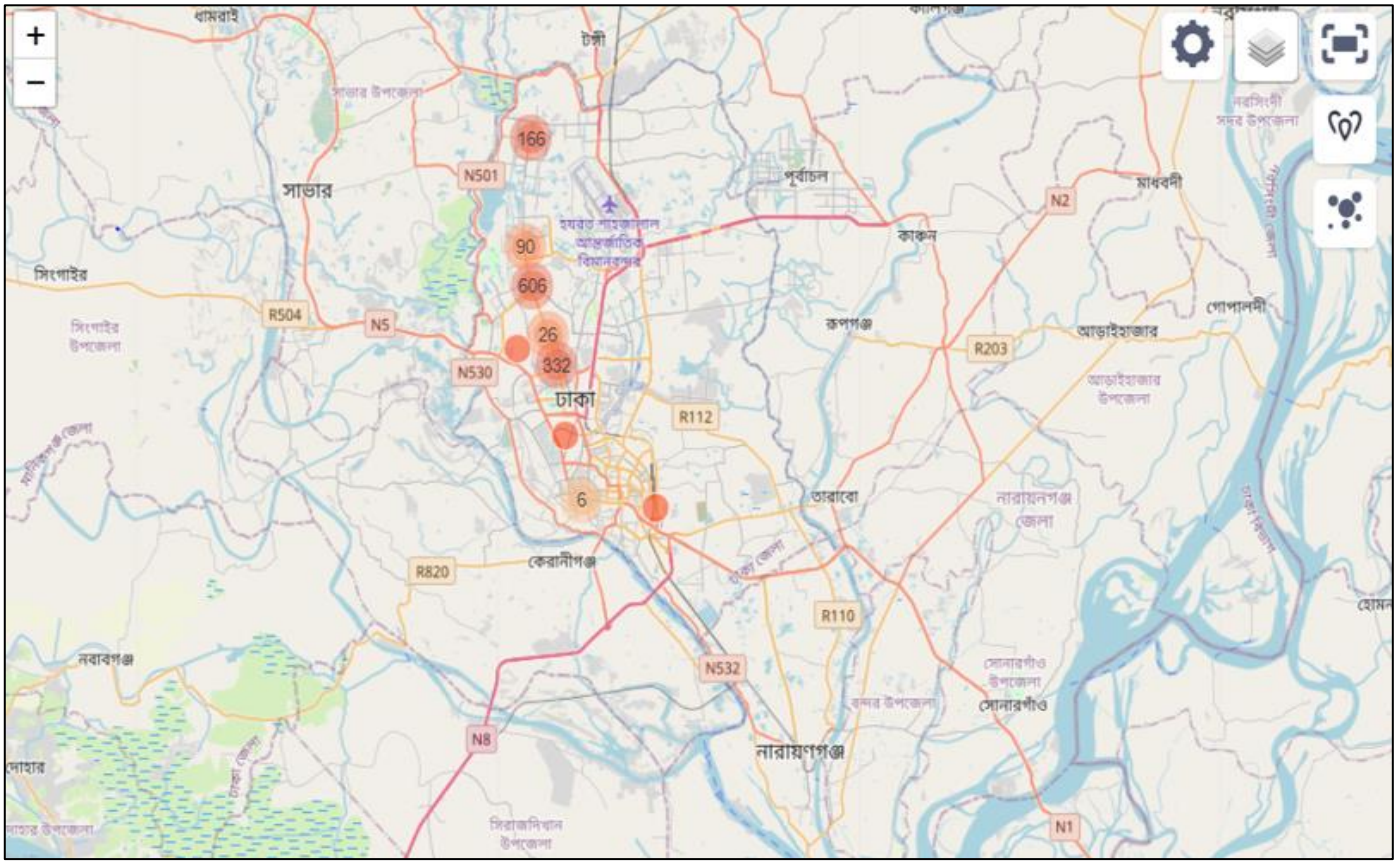

Fig 2 Data Collection Heatmap

➢ *Questionnaire Design and Variables*

The questionnaire was prepared after reading a huge number of studies on the quality of public transport services. It was further improved through focus group discussions and a pilot survey as shown in figure 3. The final questionnaire contained two major parts to deal with.

The first one was gathering basic background information. This is gender, age, income, occupation, and trip purpose. The second part focused on the rating of passengers on different features of the metro service. It contained 29 service attributes that were chosen based on the conceptual framework presented in figure 3. These attributes included such areas as train operation, comfort, safety, access to stations, cost, information and so on.

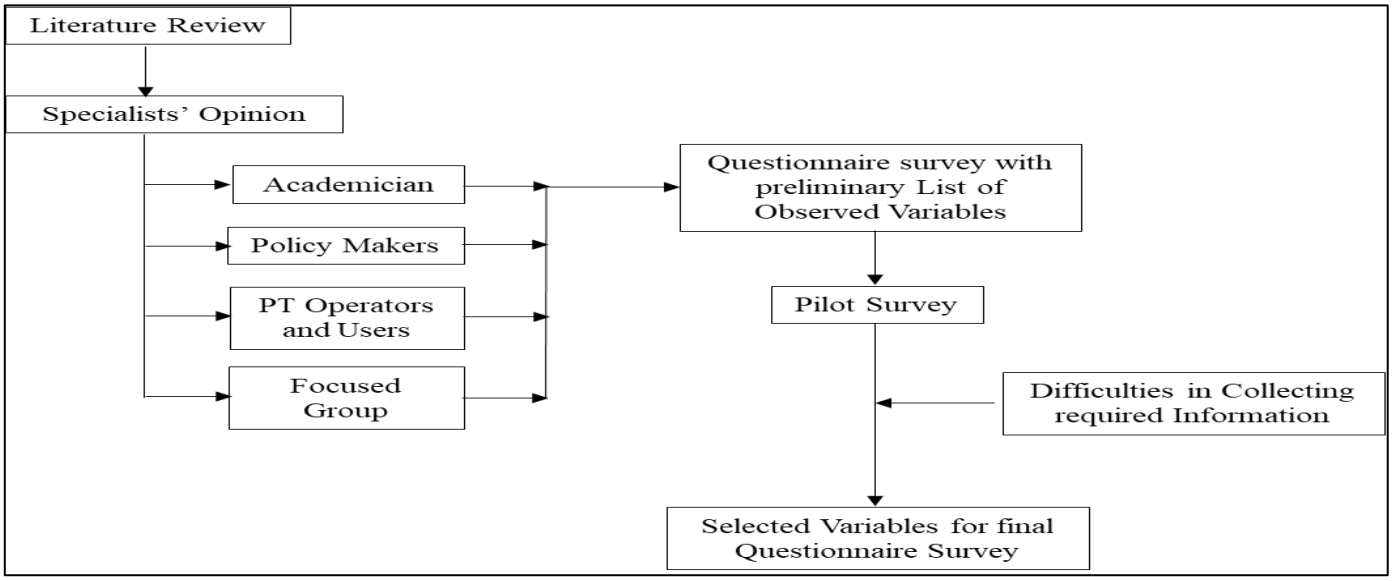

Fig 3 Conceptual Framework of Observed Variable Selection

Passengers rated each attribute using a five-point Likert scale, ranging from very poor to excellent. This approach follows common practice in service quality research and has been widely used in earlier studies related to perceived service quality assessment frameworks (Parasuraman et al., 1985; Eboli & Mazzulla, 2012).

➢ *Analytical Approach*

The methodological framework finds this mode shift towards MRT as a behavioral outcome influenced by perceived service quality. This perception varied moderately by demographic characteristics. Descriptive and exploratory analyses were conducted to examine demographic composition, prior mode choices and distributional properties of service quality attributes ratings using 5-point Likert scale which will be used for assessing the overall satisfaction level of the passengers.

➢ *Ethical Considerations*

Participation in the survey was voluntary, and respondents were informed of the academic purpose and usage of the study. No personally identifiable information was collected. Moreover, anonymity and ethical compliance are ensured throughout the research process.

III. RESULTS

➢ *Demographic Characteristics of MRT Line-6 Users*

The analysis is based on 1,397 valid survey responses collected from passengers at all operating stations of MRT Line-6 during its early stage of service delivery. The sample has a broad heterogeneity of urban travelers and makes it possible to compare the service quality perceptions from different user groups.

In terms of gender, 58.9% of the respondents were male while 40.7% were female. Male users nonetheless make up the larger segment of riders in the metro. However, the proportion of female passengers is relatively high when compared to other public transport options in Dhaka like bus services which is approximately 21% (ActionAid Bangladesh, 2016).

This leads to the suggestion that the metro has been able to attract more female users. The gender mix also helps to understand some later findings relating to safety and comfort perceptions of passengers of the recently launched MRT service in Dhaka.

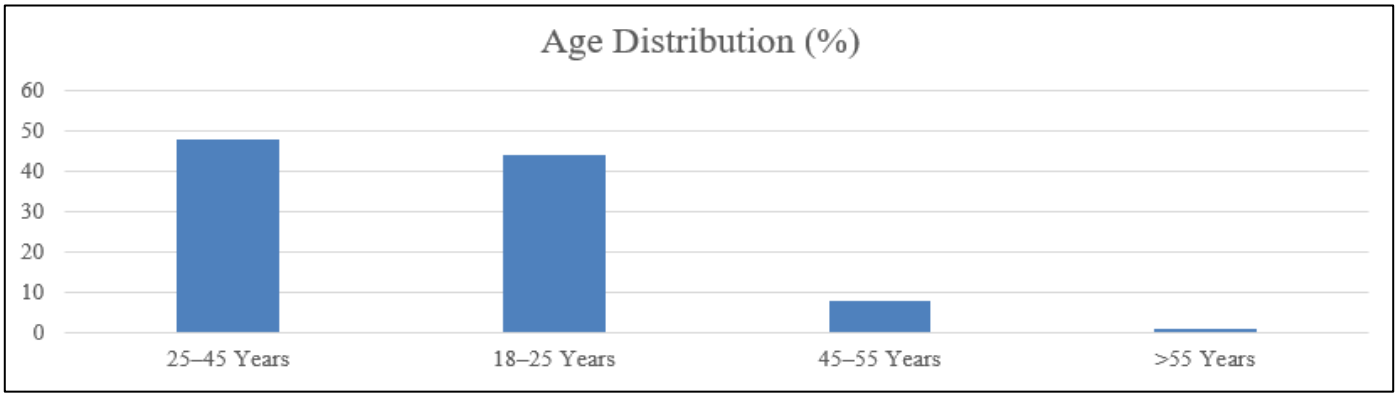

Fig 4 Age Distribution of the Respondents

From figure 4, age distribution of the respondents shows that MRT Line-6 is mostly used by young and middle-aged people. The majority of users are between the ages of 10 to 55 with only about 0.5% of those surveyed above 65-years-of-age. This pattern would imply that the metro system is today better geared towards the mobility requirements and physical accessibility preferences of economically active and younger populations with limited access from elderly users.

Table 1 Income Distribution of the Respondents

Income level in BDT	Percentage (%) of the respondents
< 20,000	21.22 %
20,000-50,000	31.57 %
50,000-80,000	29.43 %
80,000-100,000	14.92 %
>100,000	4.02 %

Income level analysis from table 1 shows that MRT Line-6 is used the most by the middle class. About 31.6 percent of respondents had monthly family incomes in the range of BDT 20,000 to 50,000 followed by 29.4 percent in the BDT 50 000 to 80 000 range. Lower-income (less than BDT 20,000) users are 21.2% of the sample and higher-income (above BDT 100,000) users are only 4.0% of the sample. This distribution shows that MRT Line-6 is currently a favorable choice for middle-income commuters but its penetration of the high-income groups is still low.

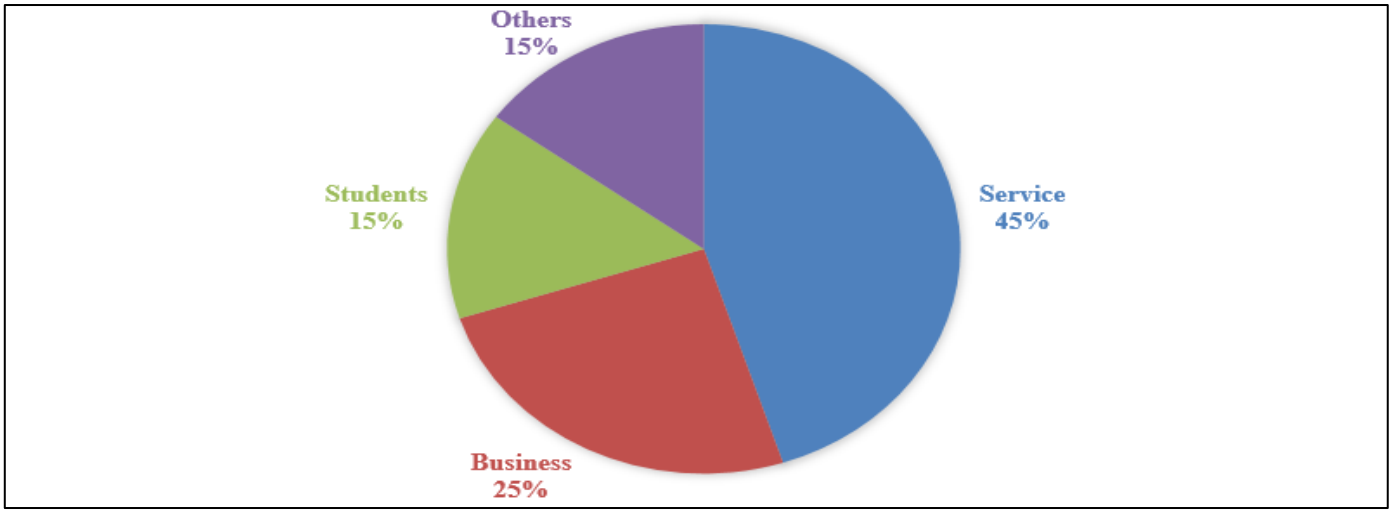

Fig 5 Age Distribution of the Respondents

Occupational data also support the invasion of the middle-income passenger. As it can be seen from figure 5 that about 45% are salaried service holders which also includes people from the professions like engineers, teachers, office workers, etc. Students account for around 15% and business owners and other occupational categories make up the rest of the percentage.

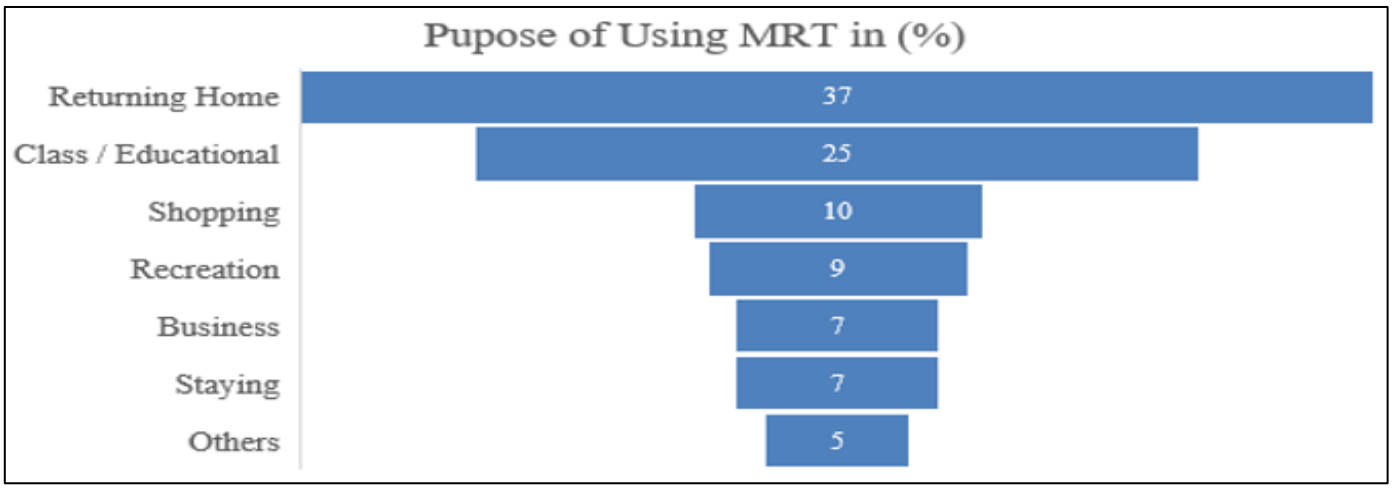

Fig 6 Age Distribution of the Respondents

Trip purpose data from figure 6 shows that commuting between home and workplace is the main reason for using MRT (36.8%), followed by education-related trips (10.2%), leisure and social travel (8.7%), and business-related travel (7.0%). These patterns highlight the impodrtance of MRT Line-6 as a regular mode of commuting for daily travel, as opposed to travel that is incidental or discretionary.

When asked to express respondents' reasons for choosing MRT as means of transportation, comfort came out as the trending factor (94.27%), followed by availability (67%) and reliability (10%) as shown in figure 7.

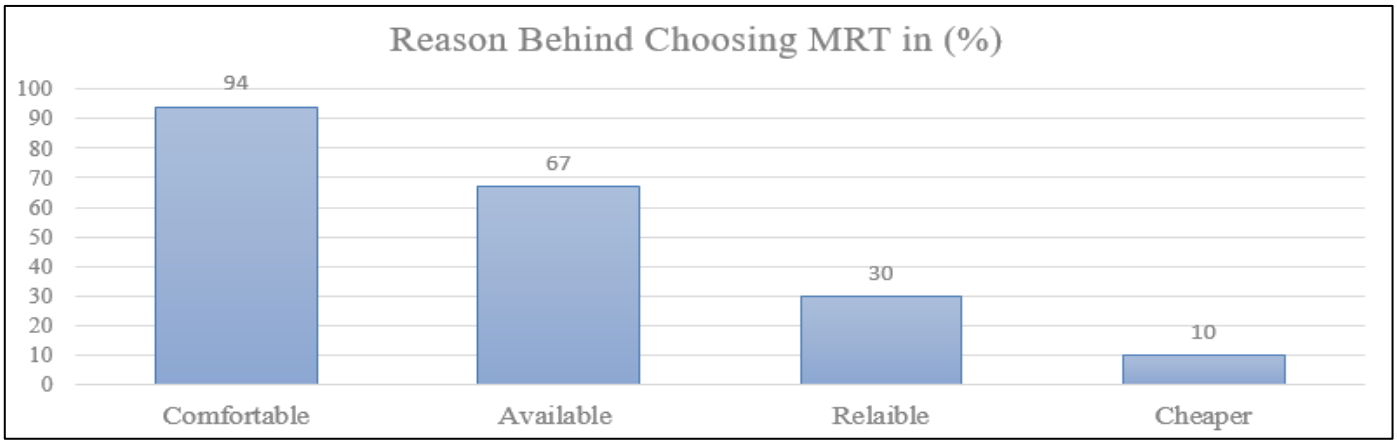

Fig 7 Reasons of Choosing MRT According to Respondents

Overall, the results conclude that the primary reason for the preference of MRTs is because it provides a higher level of comfort than other existing urban transport modes in the city. Moreover, availability and reliability of service factor in the choice of the service over other mode of transportation especially public transports such as busses.

➢ *Prior Mode of Transport Before Using MRT*

Figure 8 shows the distribution of the mode of transport used by the respondents before adoption of MRT Line-6 for the same trip on regular travel cases. The results show a highly uneven pattern of mode substitution, and provide early insight into the behavioral adaptation associated with the newly introduced metro service in Dhaka city.

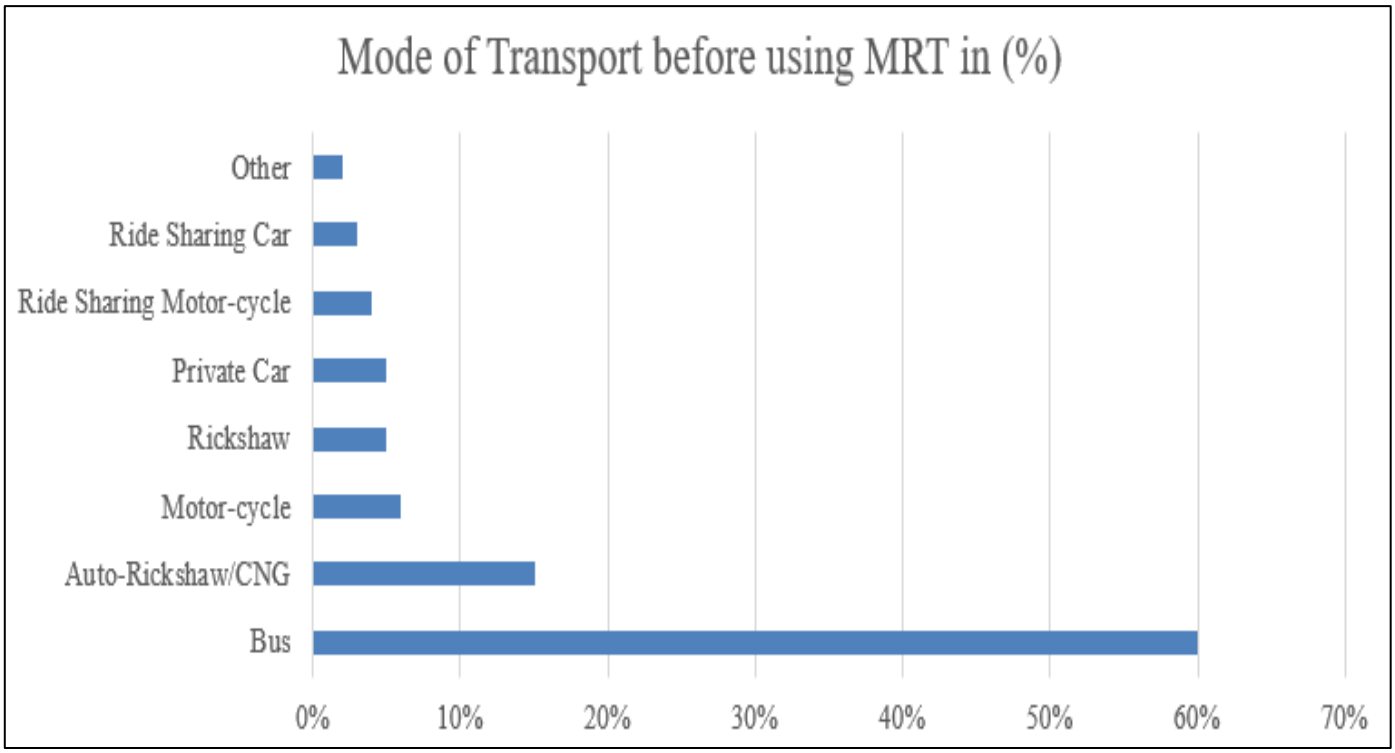

Fig 8 Mode of Transportation Before Using MRT by Respondents

The figure 8 shows a clear indication about the previous modes of the passengers before using MRT for the same travel purposes. Most current users of MRT used to travel using buses. Nearly 60% of the people polled said that they used buses for the same trip before switching to the metro.

This means MRT Line-6 has attracted mostly riders from existing public transports specially busses. For many of these users, metro seems like a better option to existing city bus services of Dhaka. It provides for better travel with reliability, it saves time and it is a more comfortable journey than the bus services.

The second largest group is from auto-rickshaw or CNG users. About 15% of respondents said they had used these modes in the past. This means that the metro has also attracted some paratransit users. This is more likely for longer trips where lower cost and predictable travel time is more important. Smaller groups of users who previously relied on motorcycles, rickshaws or ride-sharing motorcycles also migrate to MRT. Each of these groups constitutes less than 10%.in total. These shifts reveal that some solo travelers are opting to take the metro to avoid traffic delays, heat and rain that make MRT a more suitable option.

In contrast, there was very little shift from private cars or ride-sharing cars. Together they make up only about 12% of MRT users. This low share points to a key limitation that though MRT Line-6 has improved the public transport experience but it has not yet convinced many car users to change their habits. Issues like lack of access to stations during peak hours (when crowding is at a peak), lack of feeder services, high transfer costs and personal travel preferences continue to seem to hold private vehicle users back from fully moving to metro rail services.

➢ *Perceived Service Quality Based on Likert Scale Ratings*

Passenger perceptions of service quality were obtained by a five-point Likert scale for twenty-nine (29) service attributes. Overall, there is a noticeable concentration of responses towards positive evaluations with most of the attributes have mean scores that are above 3.5 as presented in below mentioned table 2.

Table 2 Descriptive Analysis of the Responses

Sl.	Attributes	Numerical Scale	Minimum	Maximum	Mean	Std. Deviation
1	Train Punctuality	1-5	3	5	4.29	0.652
2	Service Frequency	1-5	3	5	4.13	0.523
3	Stop Time at Stations	1-5	3	5	4.09	0.587
4	Seat Availability	1-5	3	5	4.05	0.673
5	Travel Time Savings	1-5	3	5	4.39	0.704
6	Switching Cost Comparison	1-5	1	5	2.61	1.378
7	Weather Protection	1-5	3	5	4.07	0.604
8	Thermal Comfort (Air & Ventilation)	1-5	2	5	3.49	0.781
9	Waiting Area Condition	1-5	2	4	3.01	0.763
10	Toilet Facility	1-5	3	5	4.17	0.665
11	Noise Level Inside System	1-5	3	5	3.75	0.725
12	Passenger Information Display	1-5	3	5	4.23	0.582
13	Crowd Handling Capacity	1-5	2	5	3.49	0.692
14	Staff Courtesy	1-5	3	5	4.11	0.587
15	Women Safety	1-5	3	5	4.18	0.598
16	Overall Security	1-5	3	5	4.21	0.601
17	Concourse Cleanliness	1-5	3	5	4.36	0.591
18	System Maintenance Quality	1-5	3	5	4.25	0.613
19	Overall Ride Comfort	1-5	3	5	3.87	0.673
20	Performance of ATS	1-5	3	5	3.99	0.691
21	Performance of MTS	1-5	2	5	3.49	0.834
22	Adequacy of Feeder Service	1-5	1	4	2.74	0.966
23	Feeder Service Availability	1-5	1	4	2.54	0.918
24	Cost of Feeder Services	1-5	3	5	3.65	0.685
25	Station Area Lighting	1-5	3	5	4.10	0.516
26	Access Control	1-5	2	5	3.76	0.667
27	MRT Ticket Fare	1-5	2	5	3.49	0.837
28	Customer Loyalty	1-5	3	5	4.19	0.496
29	Service Inclusiveness	1-5	3	5	4.07	0.532

Passengers rated operational performance very favorably. Punctuality of MRT, a high mean was obtained (4.29). Travel time savings was rated the highest of all attributes with an average rating of 4.39. Service frequency (mean 4.13) and stoppage time at the stations (mean 4.09) were also rated quite well. These results indicate that users are quite satisfied with the reliability and speed of the metro service.

Ratings for comfort and safety were also good. Concourse cleanliness received a mean score of 4.36 and system maintenance quality received a mean of 4.25. Overall safety was rated at 4.21. Safety for female passengers was also rated highly at 4.18. This suggests that many users feel safer and more comfortable on the metro compared to other modes of public transport or paratransit in Dhaka.

Information and staff related features were also viewed positively. Passenger information displaying in concourse and platform areas scored a mean of 4.23 and staff courtesy scored 4.11. These results show that having clear information disseminated and demonstrating positive behavior from staff contribute to a better overall travel experience.

In contrast, cost and access-related attributes received much lower ratings in terms of perceived rankings. Cost of switching to MRT only got 2.61. Feeder service availability thus first mile last mile connectivity had mean 2.74 which is not up to the mark, and cost of related feeder services scored 2.54 making it less accessible to lower income people. These segment of attributes suggest mixed experiences, likely influenced by income level, past travel mode and the ease of being able to access the stations access the concourses.

Overall, passengers have a positive image of MRT Line-6. About 74.5% of them rated the service as "Good" and 16.8% rated it as "Excellent." Very few users rated it as "Average" or "Poor." This confirms that MRT Line-6 provides a good service, although access and affordability remain huge issues for some groups as mentioned earlier.

IV. DISCUSSION

This study focuses on the initial mode shift due to the MRT Line-6 in the city of Dhaka by looking at who is using the system, which modes they used in the past and how they assess the service in the system. The results indicate that the current use of the metro is concentrated among young and middle age groups, predominantly from middle-income households. Most passengers are working adults and the highest proportion of journeys are made to commute. In contrast, relatively few elderly or high-income travellers can be found among the current users, suggesting that accessibility conditions and already

established travel preferences may still be limiting broader adoption at this point.

The pattern of mode shift is not even here either. A large proportion of metro users relied on bus services in the past, with nearly 60% of current passengers reporting they switched from bus services, with only about 12% of users reporting switching from private cars. This suggests that the metro is mostly replacing existing public transport instead of attracting users from private cars. Similar results have been found in other cities, where although new rail systems succeeded in attracting riders from competing public transport services, they did not notably displace car travel (De Oña et al., 2015; Lai & Chen, 2011).

Passenger evaluations of service quality help to explain this trend. Users usually express their high satisfaction on things such as punctual train operations, lessening of travel time, comfort, safety and cleanliness. These advantages seem to make the metro an enticing substitute to the bus for former bus users. However, the perceptions are less positive when it comes to feeder service availability, feeder service cost and the cost of switching to the metro overall. Lower ratings for these factors indicate persistent problems with access and affordability.

Unless these barriers are dealt with, then the metro is likely to continue serving only those who already use public transport. Strengthening first and last mile connections and lowering the total cost of metro-based travel will be important if the system is going to affect travel behavior more broadly and promote more shifts away from private vehicles in Dhaka (Bamberg et al., 2003; De Oña et al., 2015).

V. POLICY IMPLICATIONS

The findings provide some clear lessons for cities that are planning new MRT systems, especially in developing countries. First of all, the massive transition from public buses to metro demonstrates that MRT has the capacity to significantly enhance the quality of public transport. It makes travelling more reliable and comfortable. However, this is not sufficient improvement to attract the private car users. Experience from many cities demonstrates the same pattern. Better trains do not automatically mean that there are fewer cars on the road (Lai & Chen, 2011; De Oña et al., 2015). Moreover, poor ratings for availability of feeder services, access cost and cost of switching point to a major gap that has to be addressed. First and last mile connections are important. Without cheap and convenient access to stations, people are less willing to use the metro. Cities should focus on low-cost feeder services, safe walking routes, and simple ticketing systems. These steps help to reduce the overall effort and cost of using MRT. Without this support, metro systems may not replace bus trips but, instead, just change the travel behavior more broadly to reduce the overall congestion in Dhaka city.

Furthermore, the heavy use of MRT by young and middle-income groups suggests the need for more inclusive planning. Elderly users may have issues with accessing stations, walking distance or comfort. Fare levels can also influence who gets on the metro and why. Making stations more accessible and keeping fares affordable can help to reach more users.

Overall, MRT policy should not focus only on building rail lines where possible rather it should also support access, affordability and user needs. Only then can the metro systems result in actual behavior change and long-term congestion reduction in cities such as Dhaka (Bamberg et al., 2003).

VI. CONCLUSION

This study considered the early changes in travel behavior on the introduction of MRT Line-6 in Dhaka by examining passenger characteristics, previous travel modes and perceived service quality. The results reveal that currently, metro use is dominated by the young and middle-aged, from predominantly middle-income groups. Most users are working adults and commuting trips make up the largest proportion of travel by metro. In contrast, elderly and high-income travelers seem to occur less often among early users, which may indicate that accessibility conditions and established travel patterns still exert an influence.

The results also show a lumpy mode shift. A large proportion of metro users previously depended on the use of buses while a small proportion shifted from private cars. This means that MRT Line-6 is currently replacing existing trips made by public transport, not substantially reducing trips made by private vehicles that are essential to reduce congestion in Dhaka.

Passenger evaluations emphasize high satisfaction on reliability, time saving, comfort, safety, and cleanliness which probably caused many bus users to use the metro. However, feeder service availability, station access, and cost of switching received relatively low ratings. These barriers may limit the metro's ability to attract private vehicle users thus challenge the shift towards MRT.

Overall, MRT Line-6 has definitely helped improve the quality of the urban public transport in Dhaka. Yet broader travel behavior change will depend on improving first- and last-mile connectivity and ensuring affordable access to the system.

REFERENCES

[1]. ActionAid Bangladesh. (2016). *Make transportation women-friendly*. The Daily Star. https://www.thedailystar.net/supplements/digital-frontiers/make-transportation-women-friendly-1535836

[2]. Bamberg, S., Ajzen, I., & Schmidt, P. (2003). Choice of travel mode in the theory of planned behavior: The roles of past behavior, habit, and reasoned action. *Basic and Applied Social Psychology, 25*(3), 175–187. https://doi.org/10.1207/S15324834BASP2503_01

[3]. Cronin, J. J., & Taylor, S. A. (1992). Measuring service quality: A reexamination and extension. *Journal of Marketing, 56*(3), 55–68. https://doi.org/10.1177/002224299205600304

[4]. De Oña, R., Machado, J. L., & De Oña, J. (2015). Perceived service quality, customer satisfaction, and behavioral intentions: A structural equation model for the metro of Seville. *Transportation Research Record, 2538*(1), 76–85. https://doi.org/10.3141/2538-09

[5]. Eboli, L., & Mazzulla, G. (2012). Structural equation modelling for analysing passengers' perceptions about railway services. *Procedia – Social and Behavioral Sciences, 54*, 96–106. https://doi.org/10.1016/j.sbspro.2012.09.734

[6]. Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). Guilford Press.

[7]. Lai, W. T., & Chen, C. F. (2011). Behavioral intentions of public transit passengers: The roles of service quality, perceived value, satisfaction and involvement. *Transport Policy, 18*(2), 318–325. https://doi.org/10.1016/j.tranpol.2010.09.003

[8]. MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1999). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 4*(2), 130–149. https://doi.org/10.1037/1082-989X.4.2.130

[9]. Machado, J. L., De Oña, R., & De Oña, J. (2018). Finding service quality improvement opportunities across different typologies of public transit customers. *Transportmetrica A: Transport Science, 14*(9), 761–783. https://doi.org/10.1080/23249935.2018.1437314

[10]. Mandhani, J., Nayak, J. K., & Parida, M. (2021). Establishing service quality interrelations for metro rail transit: Does gender really matter? *Transportation Research Part D: Transport and Environment, 97*, 102886. https://doi.org/10.1016/j.trd.2021.102886

[11]. Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *Journal of Marketing, 49*(4), 41–50. https://doi.org/10.1177/002224298504900403