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The Public Perception about Dhaka Metro Rail: A Mixed-Methods Study of Bangladesh's First MRT Project

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Abstract:

As Dhaka faces severe traffic congestion, the Dhaka Metro Rail project promises transformative benefits for daily commuting. Understanding public perception is vital to build trust, address concerns, and ensure effective management. To gauge public perception about Bangladesh's first metro rail, we conducted a mixed-method study involving focus group discussion and survey with regular commuters. Our findings show a largely positive perception of the Metro Rail, with many highlighting its potential to reduce commute time, ease traffic congestion, provide a safe and comfortable travel option, and mitigate environmental pollution. Participants praised the well-planned design, strategic station locations, and infrastructure. However, concerns were raised about ticket affordability, the complexity of the ticketing system, potential mismanagement, and the system's ability to meet the city's growing population needs by 2030. Environmental impacts during construction, particularly pollution, were also discussed, with calls for stricter regulations. These insights underline the importance of addressing affordability, simplifying ticketing, planning for future capacity, and minimizing environmental impacts to ensure the project's long-term success. However, the current study has a few limitations, such as reliance on convenience sampling technique and unable to avoid social desirability response bias. By considering public feedback, policymakers can bring changes to enhance urban mobility to gain public trust and promote sustainable development.

1. Introduction

Dhaka, the vibrant capital of Bangladesh, sees a steady influx of people seeking better livelihoods every day. Each year, over 400,000 migrants flock to the city, drawn by the prospect of jobs and opportunities (Bird *et al.*, 2018). However, this rapid population growth has had a profound impact on the city's infrastructure, with traffic congestion emerging as a painful daily challenge. Dhaka's traffic moves at a sluggish pace, averaging just 6.4 km/h, often forcing commuters to resort to walking as a faster alternative (Hasan *et al.*, 2020; Khan *et al.*, 2018).

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The cost of this gridlock is staggering, with each commuter estimated to lose around $4.21 per day or a staggering $1,010.76 per year, a significant sum if we consider Bangladesh's per capita income. The total yearly cost of congestion in Dhaka, including environmental and fuel consumption impacts, is a staggering $3.868 billion (Haider & Papri, 2021).

The root causes of Dhaka's traffic problem are manifold. The absence of an efficient public transport system has led to heavy reliance on walking, rickshaws, and informal paratransit further increasing the congestion (Ahmed *et al.*, 2018). Other available mass transportation modes are also full of issues. The public bus transportation system struggles with issues such as unfit buses, mismanagement, poor maintenance, and inadequate safety measures leading to discomfort and disliking (Ali *et al.*, 2023; Mowri & Bailey, 2023). Adding to the chaos are the sheer number of rickshaws and unregulated "human haulers" fighting for road space, further aggravating traffic congestion (Hasan & Dávila, 2018; Mahmud *et al.*, 2021; Pritu, 2018). In addition to these problems, Dhaka's inland waterways suffer from a lack of proper infrastructure and coordination, hindering the development of a sustainable waterway service (Hassan & Xuefeng, 2022). Similarly, the traditional railway also had major problems and was much disliked by the population. Passengers were dissatisfied with delayed train departures, ticket unavailability, dirty restroom facilities, and information provided by the railway staff (Uddin & De, 2014).

Amidst these challenges, the Dhaka Metro Rail project stands out as a beacon of hope. Part of a 20-year-long Strategic Transport Plan (STP) outlined by the Dhaka Transport Coordination Authority (DTCA), the metro rail project aims to alleviate traffic congestion and enhance urban mobility with a modern approach (The Louis Berger Group Inc., 2005). At the heart of this strategy is the development of an integrated system comprising fully segregated metro rail (MRT) and on-street bus rapid transit (BRT). This decision was informed by considerations such as capital cost, system capacity, and construction feasibility (Sultana, 2013).

The first phase of the metro rail project, known as MRT Line 6, commenced commercial operations in December 2022, connecting the northern suburb of Uttara to the southern business area of Motijheel. This has already been a crucial to the commuters in these areas. Plans are now underway to expand the network further, with MRT Line 1, currently under construction, which will link Hazrat Shahjalal International Airport to Kamalapur, with an additional elevated route connecting to Purbachal. Meanwhile, MRT Line 5, with two routes, aims to improve east-west connectivity, with completion expected between 2027 and 2030. Future expansions include extending Line 6 to Kamalapur and introducing Lines 2 and 4 to connect suburban areas adjacent to the capital city (Dhaka Mass Transit Company Limited, 2023).

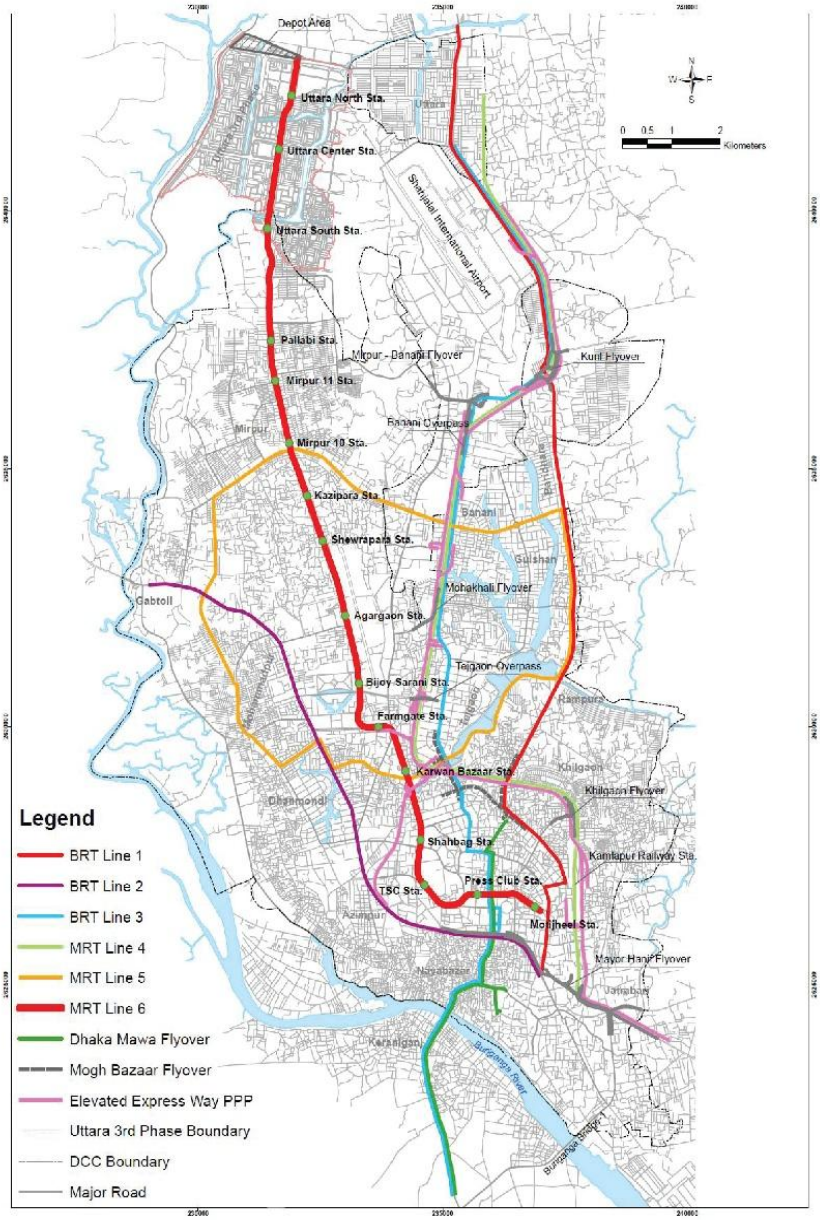

Figure 1: Map of Dhaka's MRT routes and other transit-oriented initiatives.
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The expectations surrounding the Dhaka Metro Rail project were high and multifaceted. Proponents envisioned it as a game-changer, capable of reducing traffic congestion, improving air quality, and enhancing commuter productivity and well-being. Moreover, the metro was expected to promote social equity by providing

accessible transportation for all, fostering a cultural shift towards public transit, and instilling a sense of discipline and punctuality in urban mobility (Morshed, 2022). The multi-modal trip share in Dhaka in 2014 comprised public bus (47%), rickshaw (32%), CNG (9%), car (9%), and motorcycle (3%). With the implementation of MRT and BRT according to the Strategic Transport Plan, modal shares are expected to shift, with public bus rising to 63%, rickshaw decreasing to 12%, and MRT and BRT each at 3%, which, if realized, could do a significant damage control of the current traffic situation (Ahmed *et al.*, 2018).

However, success of such ambitious mega transportation projects, hinges on public perception. Public trust, confidence, and engagement are the cornerstones for bringing these initiatives to life and ensuring they thrive in the long run. A positive public perception paves the way for strong political and public backing. It acts as a powerful tool to overcome hurdles and fosters accountability and transparency in how these projects are managed (Csiszarik-kocsir & Varga, 2023; Slotterback, 2010; Xiao & Hao, 2023).

Gao *et al.*, (2024) conducted a systematic evaluation in Beijing that includes 187 metro areas and found that the construction of metro stations projects mainly focuses on economic aspects and effective transportation but ignores public perceptions and sentiments. However, the study could not incorporate the perceptions of all age groups, especially elderly people which impacts the generalizability of the outcomes of the study.

Unfortunately, there is a dearth of comprehensive studies exploring the public's perception of the Dhaka Metro Rail project. One recent study has shown that factors like environmental concern, favorable attitudes towards metro rail, high perceived behavioral control, age, income, and private vehicle ownership can influence commuters' intentions to shift to the Dhaka Metro Rail from other transportation systems (Saleh *et al.*, 2023). Another conference paper also attempted to gauge public perception about Dhaka Metro Rail, but the results are yet to be published (Tasnim *et al.*, 2022).

These studies, however, have relied on a close-ended approach for data collection, limiting the respondents' ability to fully express their concerns and perceptions. To address this gap, there is a need to employ a mixed-method design to delve deeper into the perception of Dhaka's residents about the Dhaka Metro Rail project. By understanding the public's views, policymakers can identify areas for improving service quality, fostering a sense of ownership among users, and making data-driven decisions to ensure the long-term success and sustainability of this transformative transportation initiative.

This study aims to explore public perceptions of the Dhaka Metro Rail project, focusing on its potential to reduce commute time, ease traffic congestion, and promote sustainable urban mobility. The current study will bring qualitative insights and thus will fill gaps in existing literature.

2. Method

2.1 Study Area

Participants were exclusively chosen from Dhaka city to understand their perceptions of the Dhaka Metro Rail. Given that the Dhaka Metro Rail primarily serves residents of Dhaka, focusing on this demographic ensured that insights gathered were directly relevant to the project's stakeholders.

2.2 Design

The study employed a mixed-method design, consisting of two distinct phases. In the initial qualitative phase, data was collected through a Focus Group Discussion (FGD) with regular mass public transport users in Dhaka. This phase aimed to delve deep into participants' perceptions of the Dhaka Metrorail across various dimensions. Furthermore, it served as a valuable foundation for the development of a structured questionnaire. The subsequent quantitative phase involved administering this questionnaire in the form of a survey to a broader population, allowing for the acquisition of quantitative insights into public perceptions of the Dhaka Metrorail. The qualitative and quantitative data were then analyzed separately. This mixed-method design of data collection helps us to understand the concept in depth and with confidence.

2.3 Participants

The Focus Group Discussion (FGD) comprised 8 individuals with diverse backgrounds who actively uses Dhaka Metro Rail and other public transits, including 2 students, 3 service holders, a business owner, an environmentalist and a homemaker. We sought for this mix of societal roles and backgrounds, as we felt it would lead to a richer discussion and provide us with more comprehensive insights. The participants' ages ranged from 20 to 54, ensuring representation across different life stages. Notably, four participants had prior experience with metro rail systems in other countries, providing valuable cross-cultural insights. The gender distribution within the FGD leaned towards male participants, with only one female participant. All FGD participants were long-time residents of Dhaka (more than 5 years), ensuring a shared understanding of the city's dynamics and public transport challenges. This diverse mix of participants facilitated a dynamic exchange of views on the perception of the Dhaka Metrorail.

For the quantitative phase, data was collected using a paper-and-pencil questionnaire from 200 respondents. The target demographic consisted of Dhaka residents aged 18 and above who frequently used public transit for their daily commutes within the city. Participants were recruited using a convenience sampling approach at two local universities and various commonly used public sites in Dhaka, such as bus stops and metro stations. This approach facilitated us to achieve a diverse pool of commuters fitting the study's criteria. However, it's important to acknowledge that convenience sampling may not yield a fully random sample

representative of the entire Dhaka city population. The following table presents a detailed demographic breakdown of the respondents of the survey.

Table 1: Demographic characteristics of the survey respondents

Demographic characteristics	**n**	**%**
Age		
18-25 years	63	31.50%
26-35 years	59	29.50%
36-50 years	54	27.00%
51-65 years	19	09.50%
65+ years	5	02.50%
Gender		
Male	122	61.00%
Female	78	39.00%
Occupation		
Students	77	38.50%
Working professionals	43	21.50%
Government Employees	29	14.50%
Businessmen	35	17.50%
Others (Unemployed, Retired)	16	08.00%
Socio-economic Status		
High	24	12.00%
Medium	115	57.50%
Low	61	30.50%
Educational Qualification		
Uneducated	4	02.00%
Primary	26	13.00%
Secondary	33	16.50%
Higher Secondary	43	21.50%
Undergrad	55	27.50%
Post-grad	39	19.50%
Previous Experience of Using Metrorail (other than Dhaka Metro Rail)		
Yes	12	06.00%
No	178	89.00%

2.4 Focus Group Discussion

The FGD was facilitated by a moderator, with an additional note-taker present. Before beginning, the facilitator introduced the research project and obtained consent from participants to record the session. This helped create an environment of openness and trust, encouraging the group to share their thoughts freely and honestly.

The facilitator followed a discussion guide and presented discussion topics cantered around the benefits, drawbacks, usability, economic impact, infrastructure development, safety measures, impact on traffic, impact on lifestyle, social

implications, and sustainability of Dhaka Metro Rail. He guided the conversation, probing for deeper insights, seeking clarification when needed and refocusing the group. The discussion lasted 61 minutes. The audio record was then transcribed verbatim in Bangla and went through thematic analysis.

2.5 Questionnaire Development

Based on insights gathered from the literature review and the FGD, a structured questionnaire was developed to measure public perception of the Dhaka Metrorail. The initial questionnaire underwent evaluation by 2 Subject Matter Experts (SMEs), followed by a pilot study involving 20 individuals to assess comprehension and relevance. Subsequent modifications were made to improve clarity and suitability for participants' needs. The final questionnaire comprised 18 closed-ended and an open-ended question, covering aspects such as the perceived usefulness, ticket price, amenities, and riding experience of the Dhaka Metrorail. Additionally, questions related to the anticipated effects, advantages, and disadvantages of the Dhaka Metrorail once fully constructed were included. The environmental effect of Dhaka Metro Rail was asked as an open-ended question. The final questionnaire is provided as a supplementary material.

2.6 Data Collection Procedure

During the qualitative phase, participants joined a focus group discussion upon consenting, which took place in May 2023. We recorded their conversation for further analysis. Then, for the quantitative phase, we used a paper survey, which took place in November 2023. The FGD data collection took one day and survey data collection required for about 3 weeks. Before taking the survey data, we explained to the participants that their answers would be kept confidential and asked for their consent. The questionnaire was distributed among participants for completion. On average, it took participants approximately 10 minutes to complete the questionnaire.

3. Results

The study aimed to understand public perception about the Dhaka Metro Rail project in Dhaka city by combining qualitative and quantitative method. We identified key themes about the public perception of Dhaka Metro Rail, which are presented here alongside relevant quantitative insights.

3.1 Commute time

FGD participant's responses regarding the 'Commute Time' were very positive for Dhaka Metro Rail. All the FGD participants believed, taking the Dhaka Metro Rail instead of other forms of transportation will result in a shorter commute time. One participant commented, "*As the roads are congested with a severely broken traffic management system, we must spend 2 hours to reach a destination which should take only 40 minutes. This Metrorail has no traffic jams, you reach your destination on time, every time. This is a blessing in terms of timesaving*…". The survey also

reflected similar perception, where 92% of the respondents believed that Dhaka Metro Rail will reduce commute time.

Two participants, however, expressed their skepticism about the authority's ability to maintain the trains' departure and arrival time in the future and emphasized on punctuality to guarantee a shorter commute time. "…*because Dhaka is an overcrowded city, when the metro starts its full operation, it would become very difficult for the authorities to maintain a proper schedule. Public congestion might block the train doors and thus delay the departure. I don't think the guards or the authorities are competent enough to handle this*…"

3.2 Impact on existing traffic

Most of the FGD participants were optimistic about the Dhaka Metro Rail's ability to reduce the city's ongoing traffic issue by redirecting a significant amount of the existing traffic volume. As one participant said, "*When the metro rail finally gets completed, I'm pretty sure a lot of people currently taking the bus will switch to the metro. I mean, who wants to deal with that traffic jam? We'll see everyone packing into the metro, and down on the road, no traffic jams whatsoever*". But they also highlighted the need for competent management throughout the entire existence of Metro Rail to ensure the realization of its anticipated benefits for the city's commuters. Moreover, there have been notable concerns regarding the population growth by 2030, when the metro rail is expected to be completely operational, and the possibility that it may not be adequate to alleviate traffic congestion by then. As one participant said, "*You know, we can't just be happy about this management of the metro and call it a day. We've got to keep up this excellent management as long as the metro is running. By 2030, when it's fully up and running, for sure, the metro's transport capacity will increase, but let's face it, Dhaka's population might just hit the moon by then too*."

In the survey, 68% of the participants believed that Dhaka Metro Rail will alleviate traffic congestion. Additionally, 78% of the participants expressed confidence in the management system of Dhaka Metro Rail, while 22% were concerned about future mismanagement.

3.3 Comfort

90% of the survey participants believe that Dhaka Metro Rail is going to offer a comfortable mode of transportation compared to traditional vehicles. Most of the FGD participants also believed that the Dhaka Metro Rail will offer a comfortable ride. One participant said, "*We don't have AC (air conditioning) in the public buses. Metrorail has AC and we are traveling at a constant speed, no sudden break. So, even if I am standing inside the compartment, I consider this much more comfortable than the other transportation systems*."

3.4 Ticket

FGD participants were split on the affordability of Dhaka Metro Rail tickets. Some felt it was expensive for the general population, potentially limiting its use. They

justified their claim by comparing the ticket price with neighboring countries'. Others believed it could cater to only those who are able to afford, still easing traffic congestion and emphasized the need for profitability, acknowledging its inability to serve everyone. Notably, 54% of the survey participants perceived the ticket fare as costly.

One FGD participant also criticized the ticketing system of Dhaka Metro Rail by saying, "…*we all have bKash* (*a mobile financial service*) *nowadays. Just a QR code scan at the entrance and exit would have been more convenient. Queuing up for more than 15 minutes to buy tickets is horrible. Not everyone will buy a monthly ticket*…". Additionally, 50% of the survey respondents thought the ticketing system is difficult to understand for the general people.

3.5 Structure

In the focus group discussion, most of the participants expressed optimism regarding the anticipated utility of the completed MRT lines of Dhaka Metro Rail for their daily commuting needs. They held a favorable view of the strategically chosen station locations and the overall layout and design of the Dhaka Metro Rail. Nonetheless, three participants voiced concerns about the significant space occupied by the landing stairs on the footpaths, creating inconvenience for pedestrians passing by. They highlighted the potential hassle this might cause and suggested the need for careful consideration of the placement and design of these elements to ensure smooth pedestrian flow and minimal disruption. "…*I've read on the news that certain escalators in specific stations are obstructing the walkways. Now, the most harmful aspect of any development project is when you disrupt something else while developing something. This is an indication of unplanned development*."

Similarly, in the survey, a large majority of the participants (80%) perceived the structure of Dhaka Metro Rail as well-planned, indicating confidence in its design and infrastructure. Moreover, 60% of the respondents found the routes of the metro rail system convenient for their transportation needs.

3.6 Safety and Facilities

The FGD participants showed a high degree of faith in the safety measures put in the Dhaka Metro Rail project. They thought Dhaka Metro Rail seemed to be socially and structurally safe, with a far lower accident rate than other city commuting options. The participants agreed that the system's overall safety was greatly enhanced by the strict security measures taken both in the stations and on the trains. As one participant said, "*I've got to tell you, the metro rail is the safest option compared to other modes of transportation. Whether we're talking about accident rates, police security, or even the safety of goods, the metro rail is just better in every aspect*". The FGD members also praised and highlighted the ease of access and convenience offered to women, people with disabilities, and children, recognizing the availability of facilities designed to meet the particular requirements of these groups. Another participant added, "*They've even designated a separate compartment for women and disabled people. Why wouldn't I consider it safe?*".

The survey revealed that 80% of participants considered the Dhaka Metro Rail to be a safe mode of transportation. Regarding facilities for women and disabled population, 69% of respondents believed that the Metro Rail offered sufficient facilities, while 31% indicated that more amenities were required.

3.7 Environmental Impact

Most of the FGD participants had a positive view for the long-term environmental effects of the Dhaka Metro Rail project chiefly depended on the adoption of sustainable energy sources, which would lead to decreased fossil-fuel usage. As one participant said, "… *if the metro rail runs on electricity, there's a good chance that electricity is generated from burning coal or gas. That's not exactly eco-friendly, is it? But imagine if that electricity came from renewable sources like solar, wind, or hydro power. That would be a game changer for the environment! I think if Metrorail is still relying on fossil fuels, it's high time we switch it to renewable and eco-friendly energy sources*." The anticipated result of these actions was considered a positive step in stopping environmental damage and encouraging sustainable behaviors in the city. Also, they believed that Dhaka Metrorail would have an impact on the number of vehicles on the city road. Another participant added, "*It's pretty clear that the Metrorail is becoming a popular choice for many people. I've noticed fewer buses on the roads these days. That's got to be reducing our carbon emissions.*"

While most people were optimistic about how the Dhaka Metro Rail would affect the environment in the long term, four participants were worried about the possibility that environmental factors were overlooked during the construction phase of the project, especially when it came to pollution control measures during the building stage. "*In overseas, they've got strict environmental guidelines for construction. But here in Bangladesh, even if we have them, they're not enforced. We're seeing haphazard development causing environmental harm. Even when we build eco-friendly projects, the process itself damages the environment. It's like we're just breaking even, or maybe even falling behind*".

Quite similarly, 64% survey respondents believed that Dhaka Metro Rail will contribute to decrease environmental pollution by reducing air and noise pollution.

4. Discussion

The present study intended to understand the perceptions and opinions of Dhaka city dwellers concerning Dhaka Metro Rail. To know such point of views, a Focused Group Discussion (FGD) and a subsequent Survey was conducted, consistent findings derived from these two different methodologies indicating stronger generalizability.

The findings indicate that participants have generally favorable perceptions of the Dhaka Metro Rail, and it has addressed important issues like traffic congestion, safety concerns, and environmental impact. The participants also stressed the necessity of continuously evolving management strategies, careful

planning, and environmental responsibility in order to ensure continuing success of Dhaka Metro Rail in the context of the city's changing dynamics. The following major opinions derived from the study:

- Frustration with the current road conditions and traffic management.
- Strong positive perception about Dhaka Metro Rail regarding reduction of commute time.
- Positive sentiment towards a more comfortable mode of transportation.
- Diverse opinion on the affordability of metro tickets.
- Not many complaints about structure and design.
- Safest transportation option considered by a significant majority.
- Call for strong environmental regulations and responsible practices throughout the project's lifecycle.

The current study states that, both positive and negative perspectives exist regarding Dhaka Metro Rail project. The prime positive opinion about Dhaka Metro Rail is the reduction of travel time within the city and saving valuable working hours. The Dhaka Metro fulfils people's need for swift movement without delays caused by traffic congestion on roads. Consequently, it has become a popular transportation mode due to its reliability and shorter travel times. However, it's worth noting that, while travel time is important, it doesn't necessarily determine travel satisfaction, as users take low travel times for granted. As it was seen in the case of Santiago metro of Chile, factors like station and ticketing facilities mediated user satisfaction about a metro rail more than the travel time (Pineda & Lira, 2019). Dhaka Metro Rail seems to succeed in some such areas, where other metro systems faced criticism. For example, in contrast to the Los Angeles Metro, where issues like crime safety, cleanliness, and station location are major concerns (Shin, 2023), the Dhaka Metro Rail has received positive perceptions in these aspects.

Dhaka Metro Rail shares similarities with the Jakarta metro rail, particularly in terms of traffic situation, where reliability and comfort are pivotal for commuters (Dahlan & Fraszczyk, 2019). This is true for the passengers of Dhaka Metro Rail as well, as we found here, they perceived it to be reliable and comfortable. In terms of social demography, Kolkata metro rail resembles Dhaka Metro rail closely. Commuters in Kolkata prioritize qualitative attributes such as the pedestrian environment and the type of visual guidance available to the commuters for movements over the ticket fare (Sadhukhan *et al.*, 2015). One study conducted in Dhaka, before the commercial operation of Dhaka Metro Rail found that ticket fare would be negatively correlated to the ridership (Alom, 2022). In our study, following the commencement of commercial operations for Dhaka Metro Rail, we found opinions on the affordability are divided. Some believe it's justified for profitability, while others fear it might affect its popularity. The need for user friendly ticketing system has also emerged. An easy solution could be a free and easy to use mobile application. Use of modern technology can prompt youth to choose metro rail as the core way of transportation, thus, can contribute to reduce

the environmental pollution and corruption associated with transportation system (Saha & Akhter, 2019).

Many participants viewed the Dhaka Metro Rail as a highly secure mode of transportation suitable for all, including senior citizens, individuals with special needs, and women. Despite concerns about potential future mismanagement, the majority viewed Dhaka Metro Rail as a well-planned infrastructure. Public concerns also highlighted environmental issues during the construction phase, with Islam & Hossain (2024) indicating a high risk of air and noise pollution at construction sites. To ensure sustainability and maximize the project's long-term environmental benefits, strict adherence to environmental regulations and promotion of environmentally friendly practices are essential.

People in Dhaka viewed Dhaka Metro Rail as timesaving, comfortable, well-planned, and secure, with the expectation that it will reduce traffic congestion and be environmentally friendly but remained concerned about future mismanagement and ticket affordability. The current findings will add value in terms of reviewing the success of the project and bring additional changes in the project where necessary and applicable.

One of the limitations of the current study is, the participants might have expressed only the opinions that are socially acceptable and desirable during the Focused Group Discussion (Smithson, 2000). Another limitation could be, most of the participants in this study represent the educated cluster of the society, thus the findings are less generalizable. Despite having a few limitations, the findings of the study can be vastly convenient for the policy makers to fetch any suitable modifications in the project and make majority of the travelers satisfied with the advancement of the Dhaka Matro Rail.

For future studies, a varied group of participants can be incorporated for a larger survey. Also, using other methodologies, such as experiment or observation along with Focused Group Discussion can obtain more information about the real experiences of city dwellers who travel via Dhaka Metro Rail.

5. Conclusion

Unfortunately, Dhaka city is well-known for longer traffic jam. Dhaka Metro Rail, no doubt, has brought hope among city dwellers to bring more comfort moving around within the city. The present study has tried to configure the fact how much the project has been successful to satisfy the expectations of general people of Dhaka city. Most of the general city dwellers who are expected to travel regularly via metro rail, are satisfied with the comfort, safety and less possibility of environmental pollution. Although, expectations remain to get better amenities, lower ticket price, easier ticketing system and better management.

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