EXPLORING THE IMPACT OF SERVICE QUALITY AND CUSTOMER SATISFACTION ON RELIABILITY: A STRUCTURAL EQUATION MODELING APPROACH

Adeeba Naz*[1], Md. Shamsul Haque[2], Rajesh Sharma Arghya[3] and Ifratul Hoque[4]

[1]*Lecturer, Department of Civil Engineering, BUET, Bangladesh, e-mail: adeebanaz0155@gmail.com*
[2] *Undergraduate Student, Department of Civil Engineering, BUET, Bangladesh, e-mail: sayem8443@gmail.com*
[3] *Undergraduate Student, Department of Civil Engineering, BUET, Bangladesh, e-mail: rajesh.176160@gmail.com*
[4]*Research Assistant, BUET - JIDPUS, Bangladesh, e-mail: ifratulhoque1@gmail.com*

***Corresponding Author**

ABSTRACT

Embarking on a transformative journey, Bangladesh inaugurated its first-ever Mass Rapid Transit (MRT) system with the noble intent of unclogging traffic arteries and reclaiming precious hours lost in gridlock. However, the question of whether riders' perceived reliability aligns with the promised standards remains a critical concern. This study delves into the multifaceted aspects of the MRT system's reliability, investigating the impact of service quality and customer satisfaction through a Structural Equation Modeling (SEM) approach. The elevated MRT fares in comparison to alternative transportation options in Dhaka, coupled with the absence of a dedicated feeder service leading to the First-Mile Last-Mile issue, pose a significant threat to the MRT system's ridership, particularly if users' find it unreliable. The success of MRT can be jeopardized regardless of the planning and financing put behind it, if prospective users' don't find it reliable or if the service doesn't satisfy their expectations. To address this, an online Revealed Preference (RP) questionnaire survey was conducted, focusing on passengers' perceived service quality and satisfaction. The study employs Principal Component Analysis to cluster service quality attributes into three latent factors: convenience and safety, accessibility, and operational quality. Subsequently, SEM is applied to identify and discover the interrelationships among the variables used and their influence on the predictor variable- Reliability. The results underscore the critical role of maintaining strict schedule, time headway, ensuring safety and security, and regularity to achieve reliability among users. Furthermore, the study emphasizes the need for proper integration of the MRT system with other modes of transport, addressing the First-Mile Last-Mile issue for seamless connectivity. The insights derived from this study can have valuable implications for policymakers and transportation planners. As the landscape of mobility in Dhaka undergoes transformation, this study serves as a guiding compass for navigating the path forward. By identifying factors that influence and shape MRT's reliability, it provides targeted recommendations to enhance the system's appeal and sustainability.

Keywords: *MRT, Service Quality, Reliability, Principal Component Analysis, Structural Equation Modeling.*

1. INTRODUCTION

The Mass Rapid Transit (MRT) system in Bangladesh represents a significant advancement in urban mobility, designed to alleviate traffic congestion and improve public transportation efficiency. Despite assurances of enhanced connectivity and time-saving advantages, the critical question revolves around whether riders' perceptions of service quality and customer satisfaction align with the promised standards of the MRT. As the MRT seeks to redefine commuting experiences in Dhaka, a key question arises: to what degree do the perceptions of service quality and customer satisfaction match the promised standards, and how does this impact users' perception of MRT's reliability.

The MRT project in Bangladesh is monumental, but its successful integration into daily life depends on whether it meets the riders' expectations or not. This is worsened by the fact that MRT fare is considerably elevated (5 tk/km) as compared to other public transportation modes readily available in Dhaka, especially bus fare which ranges from 2-3tk/km. Furthermore, the absence of a dedicated feeder system in the upstream and downstream of MRT, contributing to the First-Mile Last-Mile issue, poses a substantial threat. This issue not only causes inconvenience but also raises concerns about the success of the MRT, especially if people are dissatisfied with its service quality. Although general people often think service quality and customer satisfaction to mean the same thing, it's crucial to recognize their distinct meanings. Service quality involves a cognitive judgment process, characterized by thinking or judging, while customer satisfaction is dependent on experiencing the service first hand (Oliver, 2010). The recent emphasis on these two factors have been notable in literature. However, considering the fact that MRT in Dhaka is an entirely new mode of transport, there has been limited exploration into how people perceive it. The context in Dhaka is particularly interesting, given the city's struggle with severe congestion. The city has recently been titled the slowest city globally. This congestion issue is primarily attributed to the heavy dependence on private cars and poor condition of public transportation system. A recent study showed that the level of service of the road network of Dhaka city is “D” which indicates a very poor condition (Hoque and Naz, 2023). Because of this, it can be assumed for Dhaka city that people will use the MRT after its opening, leaving their private vehicles behind. But to ensure that people keep using the MRT, the quality of service of MRT needs to be maintained.

For more than twenty years, researchers worldwide have been looking into how people perceive the quality of public transportation services (Işıklı et al., 2017; Nathanail, 2008). These studies also show that it's crucial to pay attention to how satisfied people are with their city's public transit options. If their service quality is not up to the standard, people might start using their own cars instead, which will worsen the congestion issues (Deb and Ahmed, 2018; Singh, 2012). Therefore, people have been eagerly waiting to see how a mode as high functioning as MRT performs in Dhaka. While some still holds optimism, others have already lost all hope in Dhaka's transportation system. Hence, understanding how people now perceive the MRT, especially after its opening, remains an unexplored aspect.

Different factors contribute to how one judges a mode of transportation. Service quality includes various aspects like how often the service is available (Cheng et al., 2015), the time you spend waiting (Awasthi et al., 2011), and how comfortable it is (De Oña et al., 2016a; Machado et al., 2018). These aspects are often then grouped into latent factors. The latent factors can vary significantly. For example, they may be service availability (Díez-Mesa et al., 2018), accessibility of the mode (Allen et al., 2019; De Oña et al., 2013), reliability (Liou et al., 2014), and comfort (Eboli and Mazzulla, 2012)

Wang et al. (2020) used SEM to show that a mode's service quality can be broken down into different latent factors among which service planning and reliability turned out to be the most important. Another study looked at the case of Metro of Seville using SEM and found that the perceived service quality of the users positively influences customer satisfaction, which, in turn, positively affects their mode choice decision (Oña et al., 2015). Machado-León et al. (2017) emphasized the importance of factors such as availability, accessibility, information, time, comfort, and safety in service quality. Isikli et al. (2017) discovered that time headway, crowding in cars, and transportation fare are crucial service quality dimensions. A study on the Jakarta metro found that service quality and consumer satisfaction also significantly impact their decision to use metro.

Similarly, reliability of the mode is also a major decision-making factor. But reliability has not been examined as extensively as the interplays between service quality, satisfaction of customers and their ridership decision. Transport system reliability refers to the likelihood of a transportation system meeting passenger demand without unwanted events caused by vehicle or infrastructure failures or the involvement of other modes of transport. From a passenger's viewpoint, the reliability of a transport system indicates how much they can trust the mode. Therefore, when selecting a mode, reliability plays a significant role.

All the studies mentioned above used SEM to understand the connections between different criteria and factors of a transportation mode. They chose SEM because it has several advantages. Williams et al. (2009) defined SEM as a method that looks at several incidences at once and can figure out cause-and-effect relationships between them, even when these relationships are indirect. Generally, researchers often utilize SEM because it can handle multiple dependent variables, hidden or unobserved factors, and different levels of ideas in a model, i.e., variables in a Likert scale (Astrachan et al., 2014). Because of its effecacy, SEM has become popular in the transportation sector as well over the years. It is considered as one of the best methods for measuring hidden factors and figuring out how they're connected (Chiou et al., 2012). It looks at how hidden variables relate to each other using a combination of perceived variables (Chen, 2008; Golob, 2003). Many studies use SEM to figure out the framework around people's intentions to use public transportation (Jen et al., 2010; Chou et al., 2014). It's a powerful tool for exploring how different variables are connected (Chou and Kim, 2009).

This study aims to identify the factors that may affect the reliability of Dhaka MRT. For this, a Revealed Preference (RP) survey was conducted using an online questionnaire form. The questionnaire was circulated in the social media platform Facebook. The survey was targeted to capture responses from individuals who have rode the Dhaka MRT at least once. It was mentioned boldly in the introduction of the form that, one may participate in the survey only and only if they have first-hand experience of riding the Dhaka MRT. But as people often don't pay focus to the instructions, it was also asked in a mandatory question how often they ride the MRT which had 6 options- Daily (Every working day or more), Frequently (03-04 times a week), Moderate (01-02 times a week), Irregularly (Used a few times only), Used Once and Haven't Used Yet. The option "Haven't Used Yet" was included so that even if someone who hasn't rode the Dhaka MRT fills up the form, it can be filtered out. But, for this survey, no such response was found. A total of 207 responses were collected. The study focuses on grasping passengers' views on MRT service quality, using Structural Equation Modeling (SEM) to analyze how its different aspects interact with each other. If service quality or customer satisfaction falls short, it poses a big risk to the overall success of the MRT project. The stakes are high, as a project as carefully planned and expensive as the MRT could lose its attractiveness if the service experience disappoints. That's why this study is crucial to understand and address the key factors of service quality and how people are perceiving them. As Dhaka's mobility landscape undergoes transformation, the findings of this study will stand as a guiding compass, illuminating the path forward for the continued success and sustainability of the MRT system.

The remainder of the paper follows as such: section 2 describes the data collection process and workflow, followed by section 3 which gives a thorough look into the analysis and results of this study. Then finally section 4 concludes the paper with a conclusion.

2. METHODOLOGY

The progression of this study can be divided into three major parts – survey data collection, principal component analysis and structural equation model building and estimation. Each part is further discussed in the subsequent sub-sections.

2.1 Data Collection

A Revealed Preference (RP) survey was conducted using an online questionnaire form. The online platform was used due to time and resource constraints. The questionnaire form had two sections. In the first section, the respondents were asked about their socio-demographic attributes and in the second part, they were asked about their perception on various service quality factors and about their satisfaction with the MRT. A 5-point Likert scale was used for the questions in the second part which conforms to the criteria delineated in the Table 1.

In the second part, there were 26 observed variables which are waiting time, metro frequency, schedule maintaining, regularity, reliability, platform safety, metro safety, security, safety women, comfortable waiting area, comfort in metro, vibration, noise, over-crowdedness, information availability, information reliability, simple ticketing system, seat availability, comfortable seating arrangement, adequate lifts and escalators, MRT access ease, MRT egress ease, transferability, overall satisfaction, overall comfort, satisfying expectation. A thumb rule for sample size is that a study should have a dataset at least as large as 5 times of the number of variables used (Bentler et al.,1987). Therefore, we needed at least 130 samples. After filtering from 207 responses, 185 samples were retained. But for easier convergence of SEM model, the dataset was oversampled to 370 data as oversampling can contribute to the convergence of the data (Maierhofer and Huybrechs, 2021).

Table 1: Variable Used along with their Qualitative Scale

Variable Name[1]	Qualitative Scale	Variable Name[1]	Qualitative Scale
Waiting Time	Very poor to very good	Metro Comfort	Very poor to very good
Metro Frequency	Very poor to very good	Information Availability	Very poor to very good
Schedule Maintaining	Very poor to very good	Simple Ticketing System	Very poor to very good
Regularity	Very poor to very good	Access Ease	Very poor to very good
Vibration	Very poor to very good	Egress Ease	Very poor to very good
Noise	Very poor to very good	Transferability	Very poor to very good
Platform Safety	Very poor to very good	Over Crowdedness	Very poor to very good
Metro Safety	Very poor to very good	Adequate Lift & Escalators	Very poor to very good
Security	Very poor to very good	Overall Satisfaction	Very dissatisfied to very satisfied
Safety Women	Very poor to very good	Overall Comfort	Very dissatisfied to very satisfied
Comfortable Waiting Area	Very poor to very good	Satisfying Expectation	Very dissatisfied to very satisfied

[1] Numerical Scale for the Variables ranges from 1 to 5

2.2 Principal Component Analysis

At first, two tests were carried out to check the requirement and acceptability of Principal Component Analysis (PCA) which are Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's Sphericity Test. KMO is a statistical measure to check the suitability of the data for factor analysis. The standard range for KMO is 0.8-0.9. For this study, the KMO measure was found to be 0.8401 as shown in Table 2 which is well within the acceptable range and hence, the data is suitable for factor analysis. On the other hand, the standard for Bartlett's Sphericity Test is p-value < 0.05 and for this study p-value was found to be lower than 0.05 and hence Bartlett's Sphericity Test is also in the acceptable range.

Table 2: KMO and Bartlett's Test Results

Measures	Analysis Values	Standard
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.840	0.8-0.9
Bartlett's Test of Sphericity Approx. Chi-Square	0.00	<0.005

After ensuring that the dataset is suitable for factor analysis, PCA was employed. Among the 26 observed variables, 23 were service quality attributes including the predictor variable. Leaving the predictor variable out, the remaining 22 variables were first divided into 3 latent factors or components using PCA in STATA 13. VARIMAX rotation was used in the process. The variables for which factor loadings were greater than 0.3, were taken as significant loader of the corresponding component. And if any variable had factor loadings greater than 0.3 in more than one component, then it was included in the component for which it had the greatest factor loading.

2.3 Structural Equation Modeling

Structural Equation Modeling (SEM) was implemented after principal component analysis to explore the relationship among the observed and latent variables. The model was built and estimated using the Graphical User Interface (GUI) of STATA13, as depicted in Figure 1.

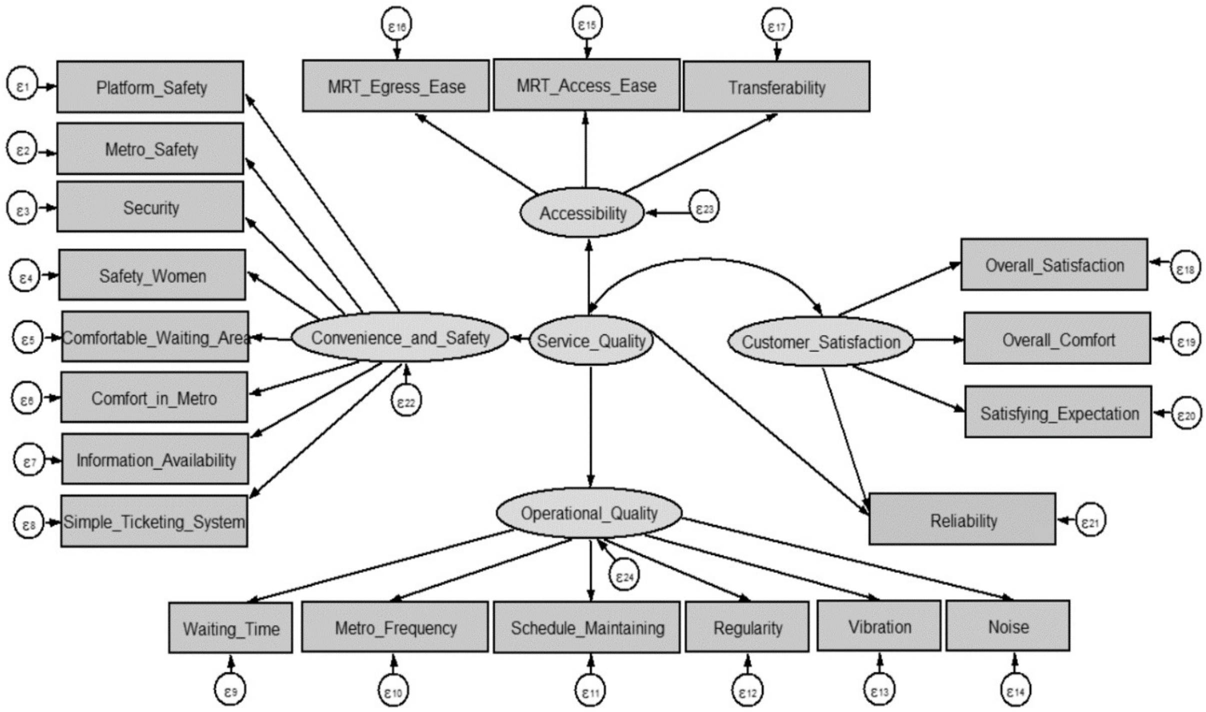

Figure 1: Structural Equation Model developed.

Two-tailed t-test with a 95% confidence interval was then employed to verify the significance of the parameters. And finally, the overall goodness-of-fit of the model was also examined.

3. ANALYSIS AND RESULT

3.1 PCA Interpretation

The factor loadings provided by the PCA analysis is shown in Figure 2. The observed service quality variables were categorized into three latent attributes: Comp1 (Convenience and Safety), Comp2 (Accessibility), and Comp3 (Operational Quality). In Figure 2, all the factor loadings for all the components are shown. Then, in Figure 3, variables with absolute loadings less than 0.3 have been replaced with blanks for visual clarity.

Variable	Comp1	Comp2	Comp3	Unexplained
Waiting_Time	-0.0200	0.0348	0.3977	.4843
Train_Freq~y	-0.0126	0.0279	0.4363	.373
Schedule_M~g	0.0650	0.1045	0.3302	.367
Regularity	0.1219	-0.0252	0.3495	.3383
Platform_S~y	0.2782	-0.0977	0.1826	.3026
Metro_Safety	0.3091	-0.1824	0.1634	.2882
Security	0.3450	-0.1112	0.0043	.3901
Safety_Women	0.3533	-0.0711	0.0210	.2954
Comfortabl~a	0.3268	-0.0538	-0.0758	.5036
Comfort_in~o	0.2922	-0.0579	0.1213	.3393
Vibration	0.0101	0.0736	0.3613	.4706
Overcrowde~s	0.2208	0.1607	-0.2559	.6154
Noise	-0.0169	0.1941	0.2707	.542
Inf~lability	0.2571	0.1065	-0.0245	.4744
Inf~iability	0.2401	0.1572	-0.0900	.5121
Simple_Tic~m	0.2815	0.0365	-0.0388	.5179
Seat_Avail~y	0.1996	0.2850	-0.1959	.4301
Comfortabl~t	0.1794	0.2688	-0.0996	.4672
Adequate_L~s	0.1923	0.2258	-0.0449	.4729
MRT_Access~e	-0.0547	0.4676	0.0386	.3116
MRT_Egress~e	-0.0749	0.4785	0.0687	.2734
Transferab~y	-0.0414	0.4020	0.0568	.4588

Figure 2: Factor loadings of service quality variables.

Variable	Comp1	Comp2	Comp3	Unexplained
Waiting_Time			0.3977	.4843
Train_Freq~y			0.4363	.373
Schedule_M~g			0.3302	.367
Regularity			0.3495	.3383
Platform_S~y				.3026
Metro_Safety	0.3091			.2882
Security	0.3450			.3901
Safety_Women	0.3533			.2954
Comfortabl~a	0.3268			.5036
Comfort_in~o				.3393
Vibration			0.3613	.4706
Noise				.542
Overcrowde~s				.6154
Inf~lability				.4744
Inf~iability				.5121
Simple_Tic~m				.5179
Seat_Avail~y				.4301
Comfortabl~t				.4672
Adequate_L~s				.4729
MRT_Access~e		0.4676		.3116
MRT_Egress~e		0.4785		.2734
Transferab~y		0.4020		.4588

Figure 3: Factor loadings of significant service quality variables.

Among the 22 observed service quality variables, variables such as over-crowdedness, information reliability, comfortable seating arrangement, adequate lifts and escalators were eliminated since their factor loading in all the components were lower than 0.3. Despite having loadings less than 0.3 (but more than 0.25) in Comp1 (Convenience and Safety), platform safety, comfort in the metro, information availability, and ticketing system simplicity were kept because of their theoretical significance. Using SEM and two-tailed t-test of parameter significance, it was later discovered that these variables were significant. Similarly, noise was kept in Comp3 (Operational Quality) despite having a loading of 0.2707 which was found to be significant. So, a total of 17 service quality attributes were included as explanatory variables. And the predictor variable was reliability which is also a service quality attribute.

So, finally, after the PCA, the chosen service quality variables are:

Comp1 (Convenience and Safety): Platform safety, Metro safety, Security, Safety of women, Comfortable waiting area, Comfort in metro, Information availability, Simple ticketing system.
Comp2 (Accessibility): Access ease, Egress ease, Transferability.
Comp3 (Operational Quality): Waiting time, Frequency, Schedule, Regularity, Vibration, Noise.

After this, these three latent variables form a second-degree latent variable which has been termed "Service Quality". On the other hand, the other 3 remaining observed variables (overall satisfaction, overall comfort, satisfying expectation) feed into another latent variable termed "Customer Satisfaction". Finally, "Service Quality" and "Customer Satisfaction" are used to predict the target variable "Reliability as shown in Figure 1 by SEM.

3.2 SEM Interpretation

The significance of each parameter was assessed using a two-tailed t-test with a 95% confidence interval, as outlined in Table 3.

Table 3. Model Outputs (Metro Rail)

Latent Variables	*Observed Variables*	*Parameters estimated from model*			*Rank*
		Coefficient	**z-value**	**p-value**	
Convenience and Safety	Safety in platform	.831	43.19	0.000	3
	Safety in metro	.834	44.27	0.000	2
	Security	.743	28.70	0.000	5
	Safety of women	.851	48.71	0.000	1
	Comfortable waiting area	.638	19.20	0.000	6
	Comfort inside metro	.781	33.97	0.000	4
	Information availability	.559	14.79	0.000	8
	Simplicity of ticketing system	.612	17.52	0.000	7
Accessibility	Ease of accessing metro	.886	42.16	0.000	1
	Ease of reaching destination from metro	.883	41.80	0.000	2
	Integration with other modes	.688	22.16	0.000	3
Operational Quality	Waiting time	.563	14.95	0.000	5
	Frequency of metro	.647	19.98	0.000	3
	Maintaining schedule	.855	51.27	0.000	2
	Regularity	.900	69.60	0.000	1
	Vibration	.597	16.65	0.000	4
	Noise	.485	11.44	0.000	6
Customer Satisfaction	Overall satisfaction	.930	75.27	0.000	1
	Overall comfort	.871	54.94	0.000	2
	Meeting expectation	.834	44.06	0.000	3
Observed Variable	**Latent Variables**	**Coefficient**	**z-value**	**p-value**	**Rank**
Reliability	SQ	1.080	13.94	0.000	1
	CS	-.268	-3.21	0.001	2

The analysis of the latent variable "Convenience and Safety" indicates that issues pertaining to women's safety, safety within the metro system, and safety on the platform are crucial elements to be taken into consideration. The need of ensuring women's safety is especially notable, considering the significant proportion of women (33.24%) in our sample. It is worth mentioning that the primary form of public transportation in Bangladesh, the public bus system, does not effectively guarantee the safety of women. As a consequence, a significant number of Bangladeshi women exhibit a reluctance to utilize this mode of transportation, which ultimately undermines its reliability. As a result, there is an increased focus on safeguarding the protection of women within the metro system.

In contrast to initial expectations, the factors of information availability and the simplicity of the ticketing system exhibit minimal impact on the reliability of the metro system. The aforementioned observation is of particular interest, especially when taking into consideration the comparatively low rate of literacy in Bangladesh. The risk of potential issues related to the utilization of ticket vending machines is not alarming according to its coefficient. Therefore, the inclusion of digital vending machines at future MRT stations can be considered without hesitation.

In addition, variables related to accessibility, egress, and the ability to integrate with other modes demonstrate significant coefficients, indicating the importance attributed to these factors by users. Elevated MRT stations without dedicated feeder service, parking facility, paratransit stand, bus lay-by can worsen the accessibility to MRT. Therefore, when planning for the development of future MRT lines, it is imperative to improve accessibility.

In the realm of operational quality, several criteria such as maintaining schedule, regularity and the frequency of metro services are identified as crucial determinants. Maintaining the desired level of service quality requires an effort to ensure consistent operations, minimize interruptions, and uphold standards regarding operating hours, scheduling, and time headways. To provide updated and real-time information to the people waiting for metro at stations ITS technologies can be used (Naz and Hoque, 2023). Disregarding to adhere to this practice could result in a reduction of ridership.

Interestingly, it appears that waiting time has a very small impact compared to regularity and maintaining schedule. It suggests that the people of Dhaka have become accustomed to the prolonged and uncertain waiting times that are typical of public buses. As, in the case of public buses in Dhaka, schedule and regularity is very commonly hampered due to frequent road congestions and other delays. Hence, people are more concerned about these two attributes. This finding indicates that if schedule and regularity is maintained people may even agree to higher time headways or higher waiting times. But if the declared waiting time is not maintained, then it would have a significant negative impact. Therefore, time headways have to be tuned carefully and the waiting time displayed on the station's digital screen has to be maintained strictly so that schedule can be followed. As, the introduction of the MRT has significantly reduced overall travel duration, as seen in the journey time from Uttara to Motijheel now standing at a mere 31 minutes, a substantial improvement from the previous 105 minutes (Report, 2023). This performance surpasses that of the pre-existing public transportation system. Consequently, individuals may exhibit an elevated level of flexibility towards waiting durations, given that the mass transit system serves to minimize overall travel time. Also, factors such as noise and vibration have a lower significance compared to the other factors of operational quality which also passively underscores the importance of time maintenance. In general, the services provided by the metro are met with satisfaction by customers.

In summary, the results suggest that service quality has a significantly stronger impact on reliability compared to customer satisfaction. Hence, in order to guarantee the efficacy of the MRT system, it is imperative to prioritize the enhancement of service quality traits.

3.3 Model Fit

The performance of the model was examined using an overall goodness-of-fit assessment, and the corresponding indices are provided in Table 4. The Root Mean Squared Error of Approximation (RMSEA) value of the model is greater than the standard value of 1. It may be because of the oversampling of the data. However, it is not significantly higher than the standard value, and the other fit indices closely align with the expected values, confirming that the model demonstrates reasonably favorable fit indices (Hu and Bentler, 1999). Standardized Root Mean Square Residual (SRMR) was found to be 0.081 which is less than 1 and hence conforms to the standard. CFI and TLI values were found to be 0.781 and 0.750 respectively which is below 0.95. This may be because of the scarcity of data. The results can still be taken as moderate fit as they are not too far off from the standards.

Table 4. Goodness of Fit

Fit Indices	Model Result	Standard
Absolute Fit Index		
Root Mean Squared Error of Approximation (RMSEA)	0.137	0.08-0.1
Standardized Root Mean Square Residual (SRMR)	0.081	<0.1
Incremental Fit Index		
Comparative Fit Index (CFI)	0.781	0.95
Tucker_Lewis Fit Index (TLI)	0.750	0.95

4. CONCLUSIONS

The research findings indicate that the primary concerns of metro passengers are largely focused around its convenience and safety. In this study, critical elements such as safety of women, safety inside the metro rail, safety on the platform and security emerge as major factors that influence users' perception of reliability of MRT. Improving the reliability of the metro system therefore requires prioritizing safety measures, which can be obtained through increasing the number of security staff and installing CCTV cameras in the station and inside the metro. These measures will help to enhance consumers' reliance in the system. Also, many Bangladeshi women hesitate to use public buses, primarily due to safety concerns. Improved safety in MRT will give them a safe public transportation option. This will help dilute the congestion problem of the city too by taking residents away from private modes and to the public transport modes.

Moreover, accessibility to/from the metro emerged as an extremely significant factor which shows that the proper integration of MRT with paratransit and other modes are of absolute necessity. If there is hassle on both ends of MRT, it will deter people from using MRT too. Therefore, authorities need to ensure easy access to MRT stations. Car parking space, paratransit stands, bus lay-bys can be provided to address these issues. Also, proper and uninterrupted footpath network should be developed to help people reach MRT stations from their residence or other places without extra cost of access-egress.
Also, to maintain the esteemed standard of MRT, authorities need to stick to declared schedules and emphasise punctuality. As many people measure reliability based on fluctuation of the waiting time, this is of utmost importance. Proper and strict time headway needs to be maintained between successive metros. Also, updated, precise and reliable information regarding arrival, departure, stops of metros needs to be ensured too.

Following the inauguration of the MRT, concerns and speculations were going around regarding a concern that people may find the digital ticketing system complex and this may impact metro ridership negatively. The transition to a fully digital ticketing process from conventional manual methods, requiring individuals to operate ticket vending machines independently, was a new experience in Dhaka. However, the study indicates that people did not find the ticketing system overly complex or burdensome. It is crucial to note that the survey respondents, having accessed the form online, are likely to be more adept at navigating digital systems than less advantaged people. Future investigations may explore the perspectives of individuals with limited online presence, particularly those educationally disadvantaged, to provide their opinion on their perception of the ticketing system.

In light of the findings of this paper, it is evident that the enhancement of service quality is integral to ensuring the reliability and success of the MRT system. To address this, rigorous efforts should be directed towards improving the overall passenger experience. Increasing the presence of security staff and deploying CCTV cameras throughout stations and inside the metro cars will significantly contribute to the overall safety of the system. Additionally, implementing stringent safety protocols and training programs for staff will further fortify the security measures. Implementing real-time monitoring systems for train operations and maintenance can reduce unexpected breakdowns and delays, thereby bolstering the system's dependability. Additionally, regular maintenance serviced should be rigorously followed to minimize service disruptions so that regularity of metro is not questioned. Also, integrating technology to provide real-time updates to passengers regarding upcoming metros and potential delays can also enhance transparency and user satisfaction. By prioritizing these measures, authorities can proactively address the identified concerns and pave the way for a more reliable and satisfactory metro system in Dhaka.

One notable limitation of this study is the constrained dataset. Subsequent research endeavours could enhance the scope by using a larger dataset either by a hybrid or entirely offline questionnaire survey. Such studies may uncover new and interesting insights and enrich the findings of this study.

In summary, the comprehensive data analysis reveals that service quality exerts a significantly stronger impact on reliability compared to customer satisfaction. This insight necessitates a strategic shift in priorities to guarantee the efficacy of the MRT system, with an imperative focus on enhancing service quality traits. The research findings, therefore, provide a clear roadmap for policymakers and urban planners to navigate the path towards establishing the new MRT lines in Dhaka city.

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