

# **PREDICTING & ANALYZING PUBLIC BUS SERVICE QUALITY IN DHAKA CITY**

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A thesis submitted to the Department of Civil Engineering in partial fulfillment  
for the degree of Bachelor of Science in Civil Engineering



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147/I, Green Road, Dhaka-1215, Bangladesh

Section: 19B

Semester-11<sup>th</sup> (Summer-2023)

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## DECLARATION

It is hereby declared that this thesis/project or any part of it has not been submitted elsewhere for the award of any degree or diploma.

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*Dedicated*  
“Our Parents”

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## **ABSTRACT**

The role of public buses as a primary mode of transportation in Dhaka City is crucial. Due to its affordability, the majority of the city's inhabitants, who belong to the middle and lower classes, heavily rely on bus services. However, despite this heavy reliance, people are generally dissatisfied with the quality of bus services. Nonetheless, due to the lack of viable alternatives, they continue to use buses as their primary means of transportation. Given the current and future conditions of bus services, it is crucial to assess the existing service and strive for improvements in quality.

This study aims to investigate the key factors that affect bus service quality and explore overall passenger satisfaction. A simple methodology was employed, involving a questionnaire survey to collect data for analysis. The survey was conducted at 15 major locations in Dhaka City, utilizing a well-structured questionnaire consisting of 46 service attributes. Participants were asked to provide their opinions on various aspects of public bus service quality, as well as demographic information. After careful scrutiny, a total of 926 respondents' data were considered for analysis.

The study revealed that overall passenger satisfaction with bus services was unsatisfactory, with 64% of respondents rating the quality of service as poor or very poor. The results of this study will greatly assist service providers in identifying areas requiring modification to enhance bus service quality. By addressing these areas, they can improve user satisfaction, retain existing customers, and attract new users to the service.

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## LIST OF ABBREVIATION

<b>Acro nym</b>	<b>Definition</b>
PTS	Public Transportation System
PT	Public Transport
SQ	Service Quality
BSQ	Bus Service Quality
OPS	Overall Passenger Satisfaction
OSQ	Overall Service Quality



# CHAPTER 1

## INTRODUCTION

---

### 1.1 Background and Motivations

#### **General:**

The Public Transportation System (PTS) is a crucial component for improving the living conditions of cities and countries alike. It is a common feature in both developing and developed nations. An effective PTS contributes to a country's development by providing better accessibility to markets, employment opportunities, and other sectors, thus enhancing economic and social opportunities. It is worth noting that countries and cities with more efficient PTS tend to be more developed. Cities like London, New York, Tokyo, Berlin, Singapore, Hong Kong, among others, possess highly efficient PTS systems, and their progress is evident to the world.

Service Quality (SQ) refers to the comparison between the expected service and the perceived service, typically made by customers. According to Parasuraman et al. (1988), service quality is the ability of an organization to meet or exceed customer expectations. Zeithaml et al. (1990) describe it as the difference between customer expectations and their perception of the service received. Service quality plays a crucial role as it is strongly related to customer satisfaction. Kumar et al. (2010) state that service quality leads to customer satisfaction. Measuring SQ is essential as any increase or decrease in service quality significantly impacts customer satisfaction. However, it is important to note that the rating of SQ varies from person to person as everyone has different requirements for achieving satisfaction. Providing better quality public transportation services has been found to enhance satisfaction, as noted by Cats et al. (2015). Research by Eboli and Mazzulla (2008) highlights the significance of service quality, as improving quality levels can attract more users. Given the correlations between SQ and other factors that affect bus service quality, SQ becomes a critical parameter to consider when assessing bus service quality.

Public transport consists of various modes, including buses, trams, passenger trains, and rapid transit, among others. The popularity of different modes varies by region and city. In Dhaka, where the transportation system is mainly road-based, bus service is particularly popular as a medium of transport.

### 1.2 Research Objectives and Overview

#### **Current Situation of Dhaka City:**

Dhaka, the capital of Bangladesh, is a megacity with a population of approximately 21.7 million people residing in an area of 306.4 square kilometers (worldpopulationreview.com, 2023). Being densely populated, Dhaka attracts individuals from across the country in search of better opportunities and improved financial conditions, particularly those from lower socioeconomic backgrounds. This continuous influx of migrants contributes to the city's ever-growing population.

In Dhaka, where the majority of the population consists of middle-class and poor individuals, buses have emerged as a popular means of transportation. However, the service provided by public buses is notably inadequate and of poor quality. This situation has led to a lack of satisfaction among commuters. As a consequence, those who can afford it are increasingly opting for private vehicles as an alternative. Consequently, the number of private vehicles on the roads of Dhaka is steadily increasing.

Overall, despite the popularity of buses among the middle-class and poor residents of Dhaka, the poor quality of service and inadequate availability have resulted in a shift towards private vehicle ownership among those with the means to do so.

**Table 1.1 Number of Registered Motor Vehicles in Dhaka City (Year Wise)**



**NUMBER OF REGISTERED MOTOR VEHICLES IN DHAKA (YEARWISE)**

Sl. No	Type of Vehicles	Upto-2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Up to Feb/2021	Grand Total
1	Ambulance	1277	137	114	188	253	355	284	399	456	548	599	92	4702
2	Auto Rickshaw	6571	112	110	59	56	428	582	42	5637	6839	114	59	20609
3	Auto Tempo	1405	1	0	0	0	0	0	0	0	0	0	0	1406
4	Bus	15018	1498	1217	968	1363	2219	3487	3294	2322	2951	1792	220	36349
5	Cargo Van	3123	477	278	675	600	396	999	1286	1224	3	1	0	9062
6	Covered Van	4505	2033	1250	1916	2422	1940	2673	4068	4386	2529	1688	374	29784
7	Delivery Van	11070	869	601	754	949	1531	1928	2207	1884	1292	967	200	24252
8	Human Hauler	2097	568	145	115	109	502	786	217	211	0	2	0	4752
9	Jeep(Hard/Soft)	17839	1699	1242	1105	1582	3110	4217	4712	4863	5038	4450	997	50854
10	Microbus	44015	3526	2630	2220	3833	4563	5162	4926	3583	3241	2407	666	80772
11	Minibus	8293	135	103	83	136	103	155	158	185	186	133	31	9701
12	Motor Cycle	210879	34707	32808	26330	32891	46758	53718	75251	104051	99252	78551	13993	809189
13	Pick Up (Double/Single Cabin)	18688	7128	5069	4814	7185	7711	8370	10248	9598	8748	8024	1305	96888
14	Private Passenger Car	160170	11421	8179	9232	12972	18423	18013	19570	16318	15016	11150	2529	302993
15	Special Purpose Vehicle	525	59	28	78	50	66	224	233	500	410	144	18	2335
16	Tanker	737	151	85	133	162	143	203	187	323	235	177	48	2584
17	Taxicab	29551	52	43	3	301	53	30	3	94	6	0	0	30136
18	Tractor	7109	4168	2841	1634	1443	1637	2510	2754	3359	2503	2445	560	32963
19	Truck	23836	4078	2740	3390	5704	4334	4306	7010	8725	6228	3327	652	74330
20	Others	8793	786	666	651	961	1300	2559	3145	3593	3382	2283	543	28662
<b>TOTAL</b>		<b>575501</b>	<b>73605</b>	<b>60149</b>	<b>54348</b>	<b>72972</b>	<b>95572</b>	<b>110206</b>	<b>139710</b>	<b>171312</b>	<b>158407</b>	<b>118254</b>	<b>22287</b>	<b>1652323</b>

According to Table 1.1, it is evident that buses and minibuses, which serve as vital means of transportation for the majority of Dhaka City's population, account for only 3.49% of the total registered motor vehicles. Conversely, private passenger cars and jeeps make up 25.22% of the total registered motor vehicles. This indicates that private vehicles, used by a minority of the

population for commuting and personal purposes, outnumber buses and minibuses by more than seven times. The number of private vehicles continues to increase steadily over time.

However, the continuous rise in the number of private vehicles is not a positive development for a megacity like Dhaka. Due to space limitations, this surge contributes to traffic congestion. Even in the absence of a significant presence of buses on the road, traffic jams occur primarily due to private vehicles.



**Figure 1.1 Gulshan-2, Dhaka**  
[Date: May 08, 2023]

On June 20, 2023, there was a situation where no passenger buses were operating nationwide except for the buses of BRTC (Bangladesh Road Transport Corporation). Despite the absence of passenger buses, traffic congestion was still prevalent, highlighting the fact that private vehicles alone have the potential to cause traffic congestion. This observation is supported by Figure 1.1 and 1.2, which clearly depict the impact of private vehicles on traffic congestion. These figures also indicate that the transportation system in Dhaka is currently inefficient.

According to Dhaka Tribune, because of traffic jams, Bangladesh is losing 6 to 10 percent of GDP, and among this, 3(2.9 %) percent is happening because of Dhaka traffic jams only. According to BUET's 2028 Accident Research Institute (ARI), around 5 million working hours were wasted due to traffic jams in Dhaka, which cost the country's economy \$4.35 billion annually, rising to \$6.5 billion in 2020. According to another study by BRAC Institute of Government and Development, by calculating the extra operating cost of human time and vehicles, the annual loss of Bangladesh due to traffic jams in 2018 was 11.4 billion dollars. According to ARI's study, in 2020, loss of working hours, excess fuel consumption, accidents during peak hours, and environmental impact totaled a loss of 153 crore BDT per day to Bangladesh, which is about Tk 56000 crore BDT annually, whereas traffic congestion alone



results in 19 million working hours lost every day worth Tk 137 crore. Therefore, it is imperative to establish an efficient transportation system that can overcome this barrier and ensure the overall development of the country.

### 1.3 Organization of the thesis

#### **Kawran Bazar:**

Kawran Bazar, depicted in Figure 1.2, is renowned as one of the largest wholesale marketplaces in Dhaka city. This bustling area is perpetually crowded due to the presence of the wholesale market. Moreover, Kawran Bazar is home to numerous corporate offices, adding to its vibrant atmosphere. Notably, it houses Hotel Pan Pacific Sonargaon, one of the oldest and prestigious 5-star hotels in Bangladesh.



Figure 1.2 Survey location of Kawran Bazar

## 1.4 Space Efficiency of Bus

In order to achieve an efficient transportation system, it is crucial to utilize the road space effectively. An illustrative example highlighting the space efficiency of different modes of transportation - bus, bicycle, and private vehicle - can be observed in a recreated photo taken in Canberra, Australia, in Posted 7 Feb 2020. The photo involved 90 volunteers, and it demonstrates the space required by each mode of transportation for the same number of passengers.

Figure 1.3 clearly illustrates that buses are the most space-efficient mode of transport among the three. They can accommodate a larger number of passengers while occupying a relatively smaller area on the road. On the other hand, private vehicles are the most inefficient mode, as they require a significant amount of space and contribute to traffic congestion.

This comparison emphasizes the importance of prioritizing and promoting bus transportation as a more efficient and sustainable option, considering the limited road space available. By encouraging the use of buses and reducing reliance on private vehicles, we can mitigate traffic congestion and create a more efficient transportation system.



Figure 1.3 Space efficiency of bus

In April 2020, a well-known transportation photo was recreated in Canada, involving the participation of 90 volunteers. This photo aimed to demonstrate the space required by different modes of transportation – bus, bicycle, and private car – for the same number of passengers. Figure 1.3 provides a clear depiction of the findings, highlighting the efficiency of buses as a means of transport compared to bicycles and private vehicles.

The photo clearly illustrates that buses are the most space-efficient mode of transportation among the three. They can accommodate a larger number of passengers while occupying a relatively smaller area on the road. On the other hand, private vehicles are the least efficient mode, requiring a significant amount of space and often contributing to traffic congestion. This re-created photo serves as a compelling example, emphasizing the importance of promoting bus transportation and reducing reliance on private vehicles. By prioritizing buses as a more efficient mode of transportation, we can effectively utilize road space, alleviate traffic congestion, and create a more sustainable transport system.

### **1.5 Dependency on Public Bus Service**

Dhaka stands out as one of the world's most densely populated cities, with a significant majority of its inhabitants belonging to the middle class or falling below the poverty line. Due to their limited financial resources, these individuals heavily rely on the affordability of public bus services, making it their preferred mode of transportation. Consequently, the demand for public buses as a means.

### **1.6 Objectives**

The objectives of this study are -

- To investigate the key service factors affecting bus service quality.
- To explore the overall passenger satisfaction on bus service quality.

### **1.7 Thesis Outline**

Outline of the thesis paper:

#### **Chapter 1: Introduction**

- Background of the study
- Present condition of Dhaka city
- Space efficiency of bus service
- Dependency of city dwellers on bus service
- Objectives of the study
- Outline of the thesis work

#### **Chapter 2: Literature Review**

- Previous studies on public transport
- Discussion of service quality and customer satisfaction
- Overview of public transport systems in other countries
- Introduction to the ordered probit model (OPM)
- Relevant literature on the topic

**Chapter 3: Research Methodology**

- List of variables considered in the study
- Schedule of questionnaire survey
- Information collected from users

**Chapter 4: Data Analysis**

- Statistical analysis of the data stored in Microsoft Excel
- Evaluation of user opinions on different service attributes

**Chapter 5: Conclusion and Recommendations**

- Summary and conclusion of the study
- Recommendations for the improvement of public transport
- Limitations of the study

# CHAPTER 2

## Literature Review

---

### 2.1 Introduction

Public transportation is an indispensable element of both developing and developed countries, as it facilitates daily mobility for individuals. It serves multiple purposes, including providing convenient, safe, efficient, and cost-effective transportation services to passengers [1]. Public transport plays a vital role in commuting to various destinations such as work, school, shops, and recreational centers [2]. Efficient utilization of public transport contributes to the overall development of a country. Consequently, increasing the usage of public transportation has become a significant agenda worldwide [3]. However, attracting new users, particularly private car owners, proves challenging. This can be attributed to factors such as delays, unclean and unattractive stations, lack of safety and security, long waiting times, inadequate travel information, poor staff behavior, and insufficient facilities for disabled individuals [1]. Today's transit users expect fast, comfortable, affordable, reliable, safe, and secure services. Therefore, high service quality is essential in public transportation to satisfy and meet customer needs [4].

### 2.2 Literature Review Overview

Service quality is defined as an organization's ability to meet or surpass customer expectations. It represents the gap between customer expectations and their perception of the service delivered by suppliers [5]. When performance fails to meet expectations, perceived quality becomes unsatisfactory, leading to customer dissatisfaction [7]. Service quality has been identified as a determinant of customer loyalty [6], as it positively influences the attitude and behavioral intentions of public transport users. Improving the quality of public transportation services has been found to enhance satisfaction.

Satisfaction refers to customers' assessment of whether a product or service has fulfilled their needs and expectations. When needs and expectations are not met, dissatisfaction arises [5]. Customer satisfaction is based on comparing the perceived performance or outcome of a product/service to one's expectations. If the performance falls short of expectations, customers are dissatisfied. If the performance meets expectations, customers are satisfied, and if it exceeds expectations, customers are highly satisfied or delighted [7].

In summary, customer satisfaction is a critical measure of evaluating the success of a product or service in terms of meeting customer needs and expectations. Failure to do so leads to dissatisfaction, while meeting or exceeding expectations results in satisfaction or even delight [7]. Therefore, providing high-quality public transportation services that align with customer expectations is vital for enhancing satisfaction and fostering customer loyalty.



To achieve this, it is necessary to ensure that public transportation services are efficient, reliable, safe, and comfortable, catering to the demands and preferences of modern transit users. By addressing issues related to service quality and customer satisfaction, public transport operators can improve overall customer experience and encourage greater usage of their services.

Measuring user satisfaction is considered the most effective way to evaluate service quality in public transport. The evaluation of service quality relies on the expectations, perceptions, and experiences of customers [6]. Users are in the best position to assess the quality of service provided by transit agencies [8]. To measure service quality, researchers have developed the SERVQUAL scale, also known as the gap model, which allows for the assessment of different dimensions that influence customers' overall perceptions of quality. These dimensions include reliability, responsiveness, competence, security, access, and communication, and are rated by customers on a five-seven-point Likert scale [8]. The SERVQUAL model has been adapted and used in various studies to evaluate passenger satisfaction with public transport in different cities worldwide.

Although service quality and customer satisfaction may seem similar as indicators of performance, researchers have questioned their conceptual similarity. Studies have shown that these two constructs are conceptually distinct [5]; [6]. The differences between service quality and customer satisfaction can be summarized as follows:

1. Nature of judgment: Service quality judgments are cognitive and rational, while customer satisfaction judgments are affective and emotional [5].
2. Specificity of judgment: Service quality judgments focus on key attributes and are more specific, whereas customer satisfaction judgments are more holistic [9].
3. Influence of price: Satisfaction is influenced by price, whereas service quality is generally not dependent on price [7].
4. Purchase requirement: Satisfaction requires a purchase to be determined, whereas quality judgments can be made without a purchase [8].
5. Role of expectation: Expectations serve as the foundation for defining service quality, whereas expectations act as predictors in defining satisfaction [10].

Although distinct, service quality and customer satisfaction are closely related. Both factors positively influence customer loyalty, repurchase intentions, and positive word-of-mouth [11]. Satisfaction directly influences post-purchase behavior, while service quality has both direct and indirect effects on repurchase intentions through satisfaction [6]. High service quality leads to customer satisfaction, resulting in repeat purchases, loyalty, and positive long-term outcomes [12].

The distinctions between service quality and customer satisfaction can be summarized as follows:

- i. Service quality is associated with cognitive judgment (rational), while customer satisfaction is related to affective judgment (emotional) [Iacobacci et al., 1994].
- ii. Service quality judgments are more specific, focusing on key attributes, whereas customer satisfaction judgments are more holistic in nature [9].
- iii. Satisfaction can be influenced by price, but service quality is generally not dependent on price [7].
- iv. Customer satisfaction requires a purchase to be determined, whereas judging service quality does not necessarily require a purchase [8].
- v. Expectation serves as the basis for defining service quality, whereas it acts as a predictor in defining satisfaction [10].

Although distinct, service quality and customer satisfaction are closely linked. Both factors have a positive influence on repurchase intentions and positive word-of-mouth [11]. Satisfaction also positively influences post-purchase behavior, while service quality directly and indirectly affects repurchase intentions through satisfaction [6]. High service quality leads to customer satisfaction and repeat purchase intentions, with perceived service quality acting as a precursor to satisfaction and resulting satisfaction leading to repurchase and long-term loyalty [12].

As mentioned earlier, ensuring high service quality is essential for public transportation to satisfy and meet customer needs [4]. Evaluating public transport is necessary to achieve this. Studies conducted in various countries, primarily focusing on bus services, have assessed user satisfaction and the attributes affecting service quality, yielding diverse results.

For example, a study in Greece revealed that a well-coordinated and well-structured transportation environment should be the primary focus, along with other attributes such as service frequency, waiting time, accessibility, and vehicle cleanliness. Another study in Qatar found that public bus users did not consider the existing bus transportation services satisfactory, primarily due to issues with reliability, despite affordability and cleanliness.

In Nigeria, a study assessed passenger satisfaction with public bus transport services in Abuja and found that passengers were dissatisfied with the quality of bus services, except for attributes related to passenger safety and the behavior of drivers and conductors. Similarly, an investigation in Ghana using the SERVQUAL model examined customer satisfaction with intercity bus services and found that passengers perceived the service quality as poor, with dissatisfaction regarding 15 out of 26 rated attributes. These studies emphasize the need for bus companies to improve their services to enhance customer satisfaction.

In summary, while service quality and customer satisfaction are distinct concepts, they are closely connected. Public transport systems must strive for high service quality to meet customer needs and expectations. Assessing service quality and understanding customer satisfaction are crucial for identifying areas of improvement and providing better public transportation experiences.

According to a World Bank press release from 2005, the Dhaka Urban Transportation Project highlighted the absence of a well-organized bus or mass transportation system in Dhaka, making it unique among cities of its size. Establishing an efficient and effective urban transportation system can promote urban development and renewal while ensuring adequate access and mobility. In developing countries, cities often serve as major drivers of economic growth, and improvements in Dhaka's transportation system can significantly enhance its efficiency and productivity. Consequently, numerous studies have been conducted on the bus service in Dhaka City.

A study revealed that public buses are the primary mode of transportation in Dhaka, primarily utilized by low and middle-income individuals. However, if the conditions of buses are improved, there is potential for high-income individuals to shift their preference from private cars to buses, ultimately reducing traffic congestion. Unfortunately, Dhaka lacks a well-organized and properly scheduled bus system. The current bus service is inadequate to meet the growing demand and suffers from inefficiency, unproductivity (due to traffic congestion), and safety concerns (due to inexperienced drivers).

Another research survey conducted in five locations of Dhaka city analyzed the data using a discrete choice logit model. The analysis showed that buses have the lowest space consumption per passenger compared to private cars, indicating the significant role of public buses in reducing traffic congestion. However, the study also revealed that more than half of the respondents were dissatisfied with the current conditions of the public bus service. Therefore, there is a need to upgrade the transit system to handle the increasing traffic volume. The transportation infrastructure should be reliable, and the suitability of public transport should be enhanced.

Currently, various models are employed to assess the service quality of mass transit, such as the ordered probit model, multinomial discrete model, least square regression model, and multinomial logit model. However, this study has adopted the ordered probit model for analysis due to its advantages over other models. The ordered probit model is specifically suitable because the dependent variable takes more than two values with a natural ordering. Additionally, this model can account for the unequal differences among the ordinal categories in the dependent variable. Although unordered probability models like standard multinomial discrete models are possible, their use would result in efficiency loss as the ordered nature of the variable would be overlooked and treated as nominal data. Similarly, other methods such

as the multinomial logit model or ordinary least square regression would not adequately address the ordinal nature of the dependent variable. Therefore, the ordered probit model has been recognized as a useful technique for studying the perceived service quality of mass transit and the factors influencing transit ridership.

### **2.3 Summary**

In summary, Dhaka's transportation system is in need of significant improvements, particularly in the bus service sector. Enhancing the quality and reliability of public transportation, along with proper infrastructure and scheduling, is essential to meet the growing demand, reduce traffic congestion, and enhance the suitability of public transport. The use of appropriate analytical models, such as the ordered probit model, enables a comprehensive understanding of service quality and its impact on transit ridership.

The ordered probit model is widely used in various research studies due to its advantages over other models. It has been particularly applied in investigations of service quality in relation to transit and service attributes, as well as passengers' characteristics. Moreover, this model has been utilized in different domains such as analyzing seismic intensity data [9], predicting fragility in the banking sector, and analyzing accident severity on highways in Bangladesh.

Figure 1.4 and Figure 1.5 provide clear evidence of the significant dependence of Dhaka's population on public bus services for their daily commuting needs. These photos were collected from an online portal on June 18, 2021, showcasing the extent of reliance on bus services. It is worth noting that on July 28 and 29, 2021, due to unavoidable circumstances, there were no passenger buses available countrywide except for those operated by BRTC.

Considering the heavy dependence of Dhaka's residents on public bus services, it becomes crucial to enhance the quality of bus services. In order to achieve this improvement, a comprehensive assessment of bus service quality is necessary.

## **CHAPTER-3**

### **Methodology**

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#### **3.1 Introduction**

The purpose of this research is to predict and analyze the bus service quality in Dhaka City. This study adopts a two-step methodology. The first part involves data collection through a questionnaire survey, which includes specific variables. These variables have been selected based on a literature review and expert opinions. The second part focuses on model development and data analysis. Prior to analysis, the collected data is carefully examined.

The model aims to uncover the relationship between overall satisfaction with bus service and various service attributes. The questionnaire survey gathers the opinions of passengers who utilize bus services. Out of the 46 variables, a total of 40 variables are used to capture the user's perspective on bus service.

The questionnaire survey was conducted face to face at fifteen locations within Dhaka city. The locations where the survey took place are as follows:

- Karwan Bazar
- Farm gate
- Green Road & Panthapath
- Kalabagan & Dhanmondi 32
- Mirpur road & Asad Gate
- Dhanmondi 15 & Zigatola
- Gabtoli
- Kallyanpur
- Mirpur-10
- Bijoy Saroni
- Mohakhali
- Banani
- Nilkhet.

#### **3.2 Methodology Overview**

##### **Details of Questionnaire Survey & Survey Schedule:**

The questionnaire survey consisted of seven main parts, excluding user information. Here is a breakdown of each part:

#### Part A: Trip Characteristics

- Questions about the convenience of the service
- Trip purpose
- Time needed to reach the bus stop

#### Part B: Quality of Service

- Questions about the frequency of service
- Punctuality of the transport
- On-road movement flexibility
- Sitting arrangement
- Speed of the bus
- Availability of information
- Ticketing system
- Transportation cost
- Reason for using the bus

#### Part C: Quality of Bus

- Questions about the fitness of buses
- Physical condition of the bus
- Cleanliness of the bus
- Seat comfort level
- Noise level
- Movement flexibility inside the bus
- Lighting facility during evening and night

#### Part D: Quality of Public Bus Stop

- Questions about the safety of the bus stop
- Cleanliness of the bus stop
- Condition of the bus stop
- Accessibility of the bus stop

Part E: Safety and Security of Bus

- Questions about the personal safety of passengers
- Easily accessible entry and exit points
- Security of passengers during off-peak periods
- Driving safety (driver's skills)

Part F: Staff Behavior

- Questions about the demeanor and courtesy of drivers and helpers

Part G: Reliability and Accessibility of Bus

- Question about the reliability of the local bus service
- Waiting time for the service
- Travel time during office days and holidays

These parts cover various aspects of the bus service, including trip characteristics, quality of service, bus quality, bus stop quality, safety and security, staff behavior, and the reliability and accessibility of the bus.

Table 3.1 Shows the list of variables included in the questionnaire survey.[18]

**Table 3.1 List of Variables**

1	Often to Travel by Local Bus	21	Seat Comfort Level
2	Convenience of Service	22	Physical Condition
3	Time for reach Bus Stop	23	Rate the Quality of Bus Services
4	Trip Purpose	24	Safety at Bus Stop
5	Frequency of Service	25	Cleanliness
6	Punctuality of Transport	26	Condition
7	Movement Flexibility (On Road)	27	Accessibility of Bus Stop
8	Sitting Arrangement	28	Mode to Get Bus Stop
9	Speed of Bus	29	Security in Bus stops (Others)
10	Availability of Information	30	Levels of Personal Safety
11	Paying Fare/Ticketing System	31	Entry and Exit Facilities
12	Transport Cost	32	Security of Passengers (Off Peak)
13	Reason of Using Bus	33	Driving Safety (Driver's Skill)
14	Fitness of The Bus	34	Behavior of Driver

15	Seat Condition	35	Courtesy of Helpers/Contactors
16	Cleanness of Bus	36	Reliability of Local Bus Services
17	Buses are always crowded(Load Factor)	37	Waiting Time of the Service
18	Lighting Facility	38	Accessibility of Bus
19	Noise level of the Bus	39	Travel Time (Office Days)
20	Movement Flexibility(Inside Of Bus)	40	Travel Time (In Holidays)

A survey schedule was prepared after selecting the locations for the survey in Dhaka city to ensure the proper completion of the questionnaire. The schedule for the survey is presented in Table 3.3.

**Table 3.2 Questionnaire Survey Schedule in Dhaka City**

<b>Serial</b>	<b>Name of the location</b>	<b>Date</b>	<b>Time (Start)</b>
01	Karwan Bazar & Farmgate	12/05/2023	09.00 am
02	Green Road & Panthapath	21/05/2023	01.00 pm
03	Kalabagan & Dhanmondi 32	26/05/2023	10.30 am
04	Mirpur road & Asad Gate	30/05/2023	01.30 pm
05	Dhanmondi-15 & Zigatola	05/06/2023	10.00 am
06	Kallyanpur & Mirpur-10	08/06/2023	05.00 pm
07	Bijoy Saroni	10/06/2023	09.30 am
08	Kallyanpur & Gabtoli	11/06/2023	03.00 pm
09	Shahabagh	15/06/2023	11.00 am
10	Motijheel	18/06/2023	05.00 pm



### 3.3 Details of Selected Field Survey Locations in Dhaka City:

#### 3.3.1. Farmgate:

Farmgate is a bustling and heavily populated area in Dhaka city, known for being a major transportation hub. It serves as a gateway to various parts of the city, making it a crucial transportation junction. Figure 3.1 illustrates the survey location, Farmgate, which holds significant importance in the transportation network of Dhaka city.



Figure 3.1 Survey location of Farmgate

### 3.3.2 Panthapath:

Panthapath, as depicted in Figure 3.3, holds significant importance as an essential east-west road in Kawran Bazar. It serves as a vital link connecting Old Airport Road and Mirpur Road. This bustling thoroughfare is lined with a plethora of shops, hospitals, and malls, including Bashundhara City, which is one of South Asia's largest shopping centers.

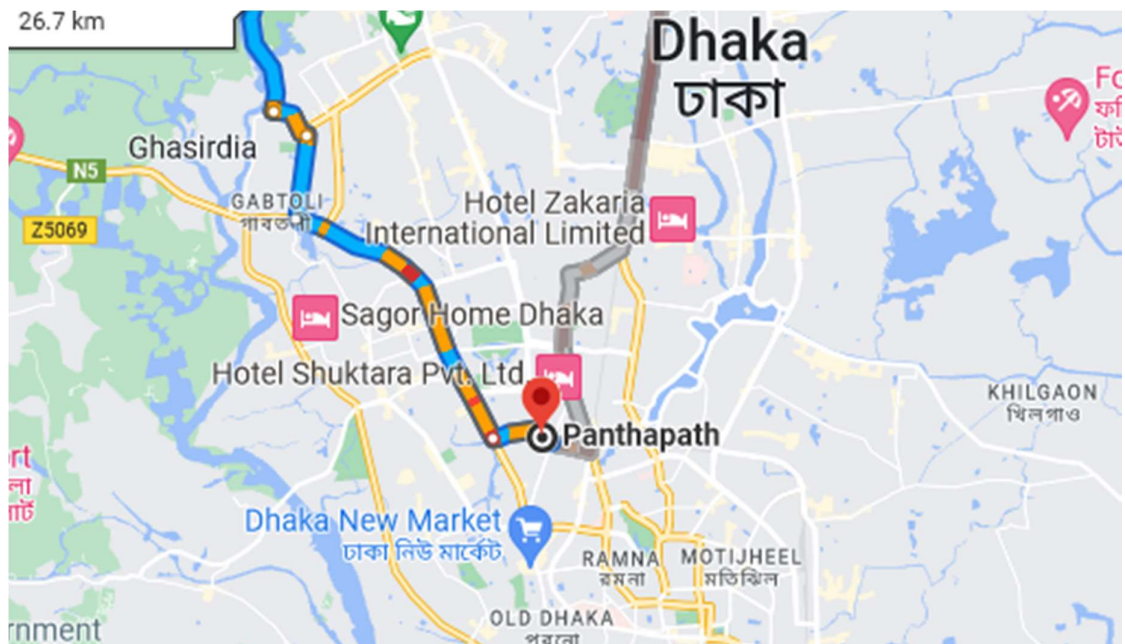


Figure 3.2 Survey location of Panthapath



### 3.3.3 Dhanmondi 6-7-8:

Dhanmondi, depicted in Figure 3.4, is a residential area located in Dhaka City. It is known for its tranquil residential environment and the provision of common social services such as schools and universities. Dhanmondi serves as a popular residential hub, offering a range of amenities and facilities to its residents.

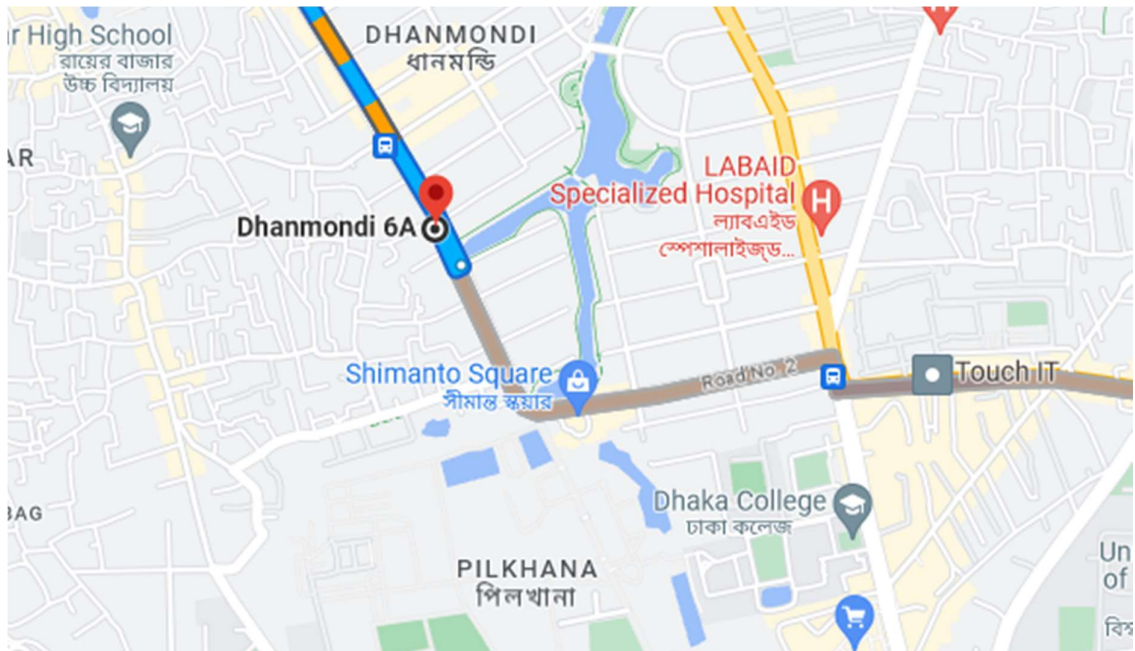


Figure 3.3 Survey location of Dhanmondi 6-7-8

### 3.3.4 Science Lab:

Science Lab, illustrated in Figure 3.4, is a significant north-south road that connects the northern part of Mirpur in Dhaka. It serves as one of the major thoroughfares in the city, traversing through prominent areas such as Shyamoli, Mohammadpur, and Dhanmondi. Known for its bustling nature, Science Lab is among the busiest roads in Dhaka City.



Figure 3.4 Survey location of Science Lab



### 3.3.5 Mohammadpur:

Mohammadpur, depicted in Figure 3.6, is a thana (administrative unit) located in the Dhaka District of Bangladesh. Situated within the division of Dhaka, it holds significance as one of the primary residential areas in Dhaka city. While Mohammadpur initially flourished as a residential neighborhood, it has gradually witnessed the development of commercial establishments as well. Today, Mohammadpur strikes a balance between residential and commercial spaces, catering to the needs of its residents and serving as a bustling hub within Dhaka city.

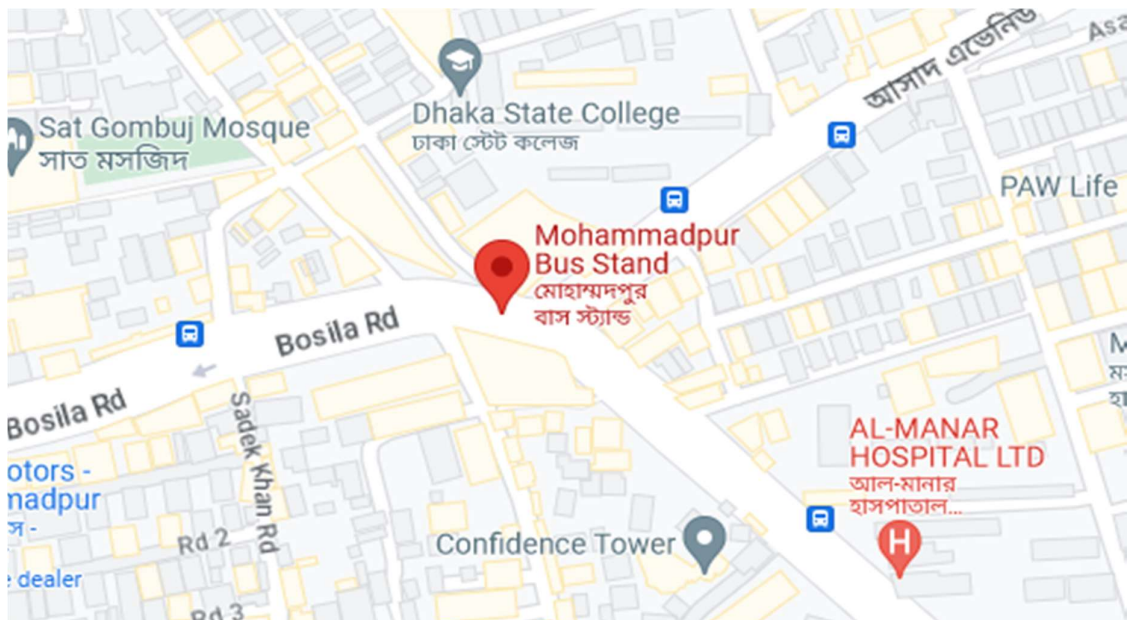


Figure 3.5 Survey location of Mohammadpur

### 3.3.6 Dhanmondi 15 & Zigatola:

Zigatola, depicted in Figure 3.7, is an area located within Dhanmondi, Dhaka. It is widely recognized as a bustling and crowded place, known for its vibrant atmosphere. Zigatola is home to numerous institutions, including schools, colleges, private universities, and hospitals, making it a hub of educational and healthcare facilities. Additionally, this area boasts a multitude of shops and shopping malls, offering a diverse range of retail options. With its lively ambiance and diverse amenities, Zigatola has established itself as a prominent location within Dhaka city.

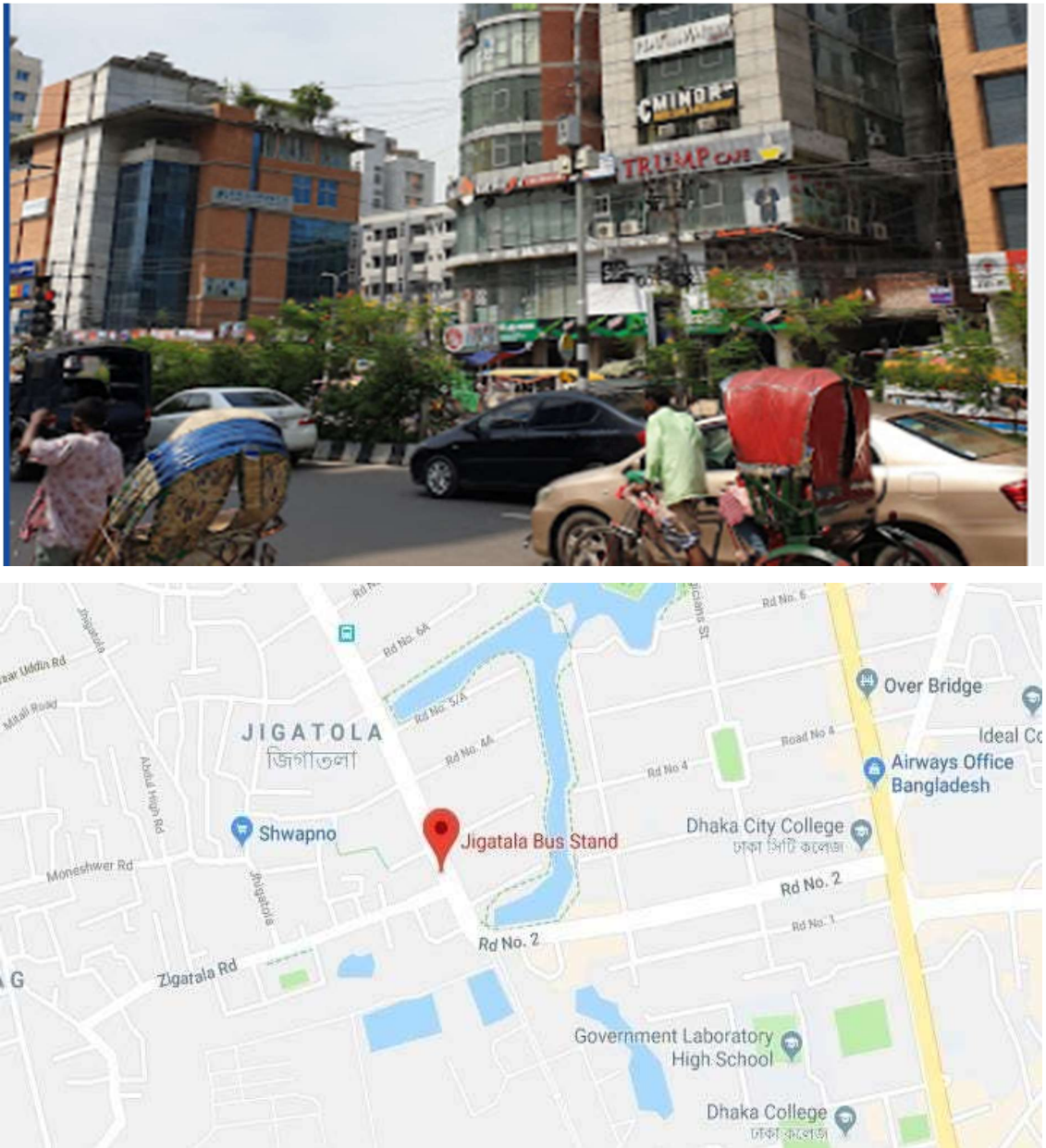


Figure 3.6 Survey location of Zigatola



### 3.3.8 Kallyanpur:

Kallyanpur, as shown in Figure 3.8, is an area situated within Mirpur Thana of Dhaka City. It shares its neighborhood with Shyamoli. Notably, Kallyanpur Girls' School and College, established in 1972, is located in this area. While Kallyanpur initially flourished as a residential area, it has also witnessed the development of commercial establishments over time. This area strikes a balance between residential and commercial spaces, catering to the needs of its residents and contributing to the dynamic landscape of Dhaka City.



Figure 3.7 Survey location of Kallyanpur

### 3.3.9 Mirpur-10:

Mirpur, depicted in Figure 3.9, stands as one of the largest thanas in Dhaka City. It is encompassed by various neighboring areas, including Kafrul Thana to the East, Savar Upazila to the West, Pallabi Thana to the North, and Mohammadpur Thana to the South. Mirpur-10 circle serves as a prominent roundabout within Dhaka City, connecting major roads in the Mirpur area. It serves as a central location where buses of all routes converge, making it a crucial transportation hub. Mirpur-10 holds significance in facilitating convenient travel and transportation for residents and visitors alike in Dhaka City.



Figure 3.9 Survey location of Mirpur-10.



### 3.3.10 Mohakhali:

Mohakhali, showcased in Figure 3.10, holds significant importance as a vital area within Dhaka City. It serves as a hub for numerous important offices and institutions. The Mohakhali Bus Terminal, situated in this area, is one of the most crucial bus terminals in Dhaka City. Every day, a large number of people, especially from the greater Mymensingh region, utilize this terminal for their travel needs. Mohakhali is bordered by Banani to the north, Moghbazaar to the south, and Gulshan to the east, further adding to its prominence and connectivity. With its strategic location and essential facilities, Mohakhali plays a pivotal role in the transportation and commercial activities of Dhaka City.



Figure 3.9 Survey location of Mohakhali.

### 3.3.11 Banani:

Banani, depicted in Figure 3.11, is situated in the northern region of Mohakhali in Dhaka City. It is characterized by having some of the busiest roads in the city. These well-traveled roads serve as important routes for pedestrians to reach significant destinations, including Hazrat Shahajalal International Airport, Uttara, and Gazipur. Banani's strategic location and well-connected road network make it a crucial hub for transportation and facilitate convenient access to key areas within and outside Dhaka City.



Figure 3.10 Survey location of Banani



### 3.3.12 Shahbagh:

Shahbagh, depicted in Figure 3.12, is a significant neighborhood in Dhaka City. It holds prominence as a junction that connects two contrasting sections of the city, namely Old Dhaka and New Dhaka. Shahbagh is also a major public transport hub, facilitating convenient travel for residents and visitors. This area is home to several renowned educational and public institutions, including the University of Dhaka, Dhaka Medical College, Bangabandhu Sheikh Mujib Medical University, and Bangladesh University of Engineering and Technology. With its central location and the presence of these prestigious institutions, Shahbagh plays a pivotal role in the educational and intellectual landscape of Dhaka City.



Figure 3.11 Survey location of Shahbagh

### 3.3.13 Motijheel:

Motijheel, showcased in Figure 3.13, is a thana located at the heart of Dhaka. It stands as the major business and commercial hub of the city, housing a greater number of offices and business institutions compared to any other part of Dhaka. This area is home to a vast number of corporate headquarters, along with news, magazine, print, and other media publishers. It enjoys proximity to Kamlapur Railway Station, which serves as Dhaka's main railway station. Additionally, Motijheel serves as the headquarters location for most banks in Bangladesh. With its central position and concentration of business activities, Motijheel plays a pivotal role in the economic and financial landscape of Dhaka City.



Figure 3.12 Survey location of Motijheel

### 3.4 User Information

#### 3.4.1 Demographic Information about Public Bus Service Users

For this study, a team of 10 surveyors was involved in collecting data from 15 different locations in Dhaka City. After careful scrutiny, a total of 956 data points were selected and included in this study. The demographic information of the respondents has been presented in Table 3.4.

**Table 3.3 Demographic Information about Bus Service Users**

Characteristics	Statistics	No. of the Respondent (Total: 886)	Percentage
Gender	Male	593	67%
	Female	293	33%
Age	10y -20y	63	7%
	20y -30y	443	50%
	30y -40y	258	29%
	40y -50y	95	10%
	50y -60y	20	3%
	>60	8	1%
Occupation	Students	305	34%
	Private Service	295	33%
	Public Service	102	12%
	Housewife	72	8%
	Labor	15	2%
	Businessman	97	11%
Salary Range (BDT)	<10000	292	32%
	10000-30000	405	46%
	30000-50000	152	17%
	50000-70000	24	3%
	>100000	13	2%
	Bus	735	83%
	Metro Rail	36	4%
	Rickshaw	26	3%

Main Mode of Travel	Para-transit	9	1%
	Motor/Bi-Cycle	35	4%
	Car	45	5%
Allocation for Monthly Travel Expenditure	1%~10%	372	42%
	11%~20%	399	45%
	21%~30%	80	9%
	>30%	35	4%

[ 1 USD = 107.20 BDT (Updated on May18, 2023)

### 3.4.2 Analysis of Demographic Information of Public Bus Service Users

According to the gender classification presented in Figure 3.13, the data indicates that approximately 67% of the respondents in this study are male, while 33% are female.

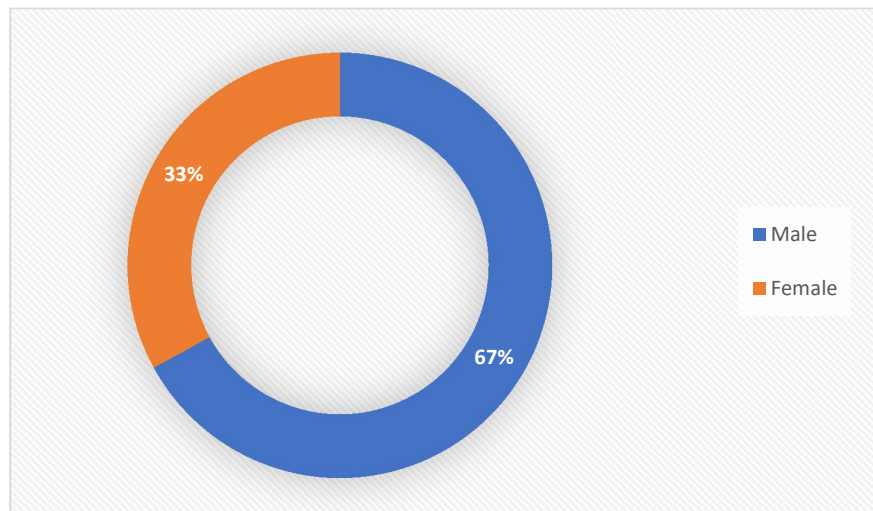


Figure3.13 Users classification according to gender

Based on the classification of users according to their main mode of travel, as shown in Figure 3.14, the majority of the respondents (78%) in this study reported using the bus as their main mode of travel. Conversely, only 2% of the respondents indicated using Para-transit as their mode of travel, which was the least preferred option among the respondents



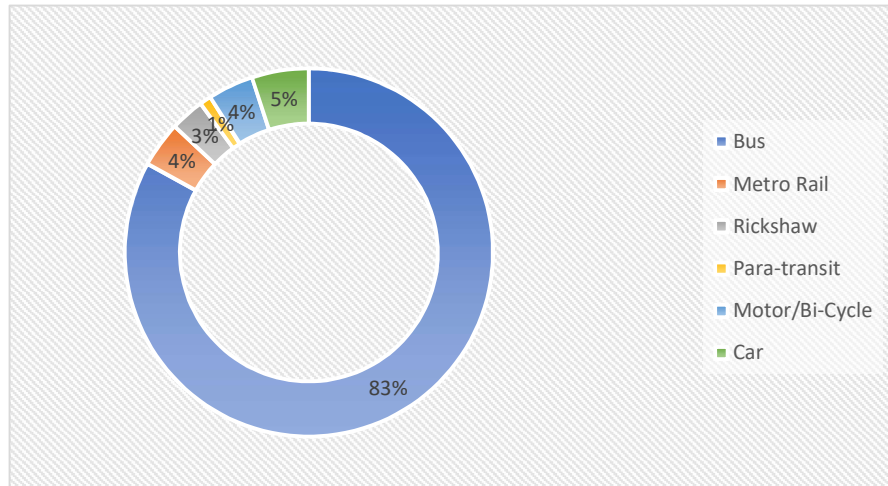


Figure 3.14 Users classification according to main mode of travel.

As depicted in Figure 3.15, the age groups of users are classified accordingly. The data reveals that 45% of the users fall within the age range of 21-35 years old, indicating a significant proportion of young users. Furthermore, 30% of the users are aged between 36-50 years old. On the other hand, senior citizens over the age of 60 comprise the smallest percentage of users, This can be attributed to the fact that older individuals tend to have reduced mobility and may not frequently travel for work-related purposes, resulting in their lower representation among bus service users.

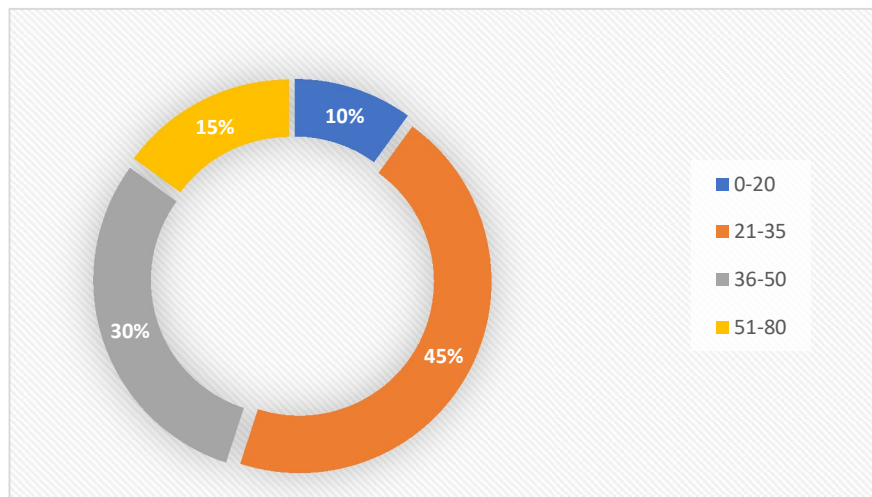


Figure 3.15 Users classification according to age

According to the occupation classification presented in Figure 3.16, the data reveals that the majority of bus users are students, accounting for 34% of the respondents. Additional 38% comprises private service holders. Conversely, the occupation group with the least representation among bus users is labor, making up only 14% of the respondents and others 14%. This suggests that students and private service holders are the primary user groups of the bus service, while the proportion of laborers utilizing this mode of transportation is relatively lower.

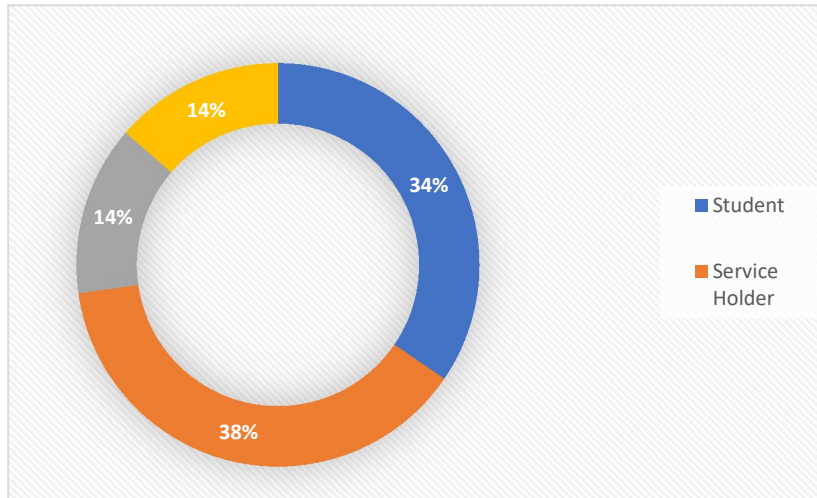


Figure 3.16 Users classification according to occupation

Based on the salary range classification depicted in Figure 3.17, the data reveals that the majority of users, comprising 58% of the respondents, fall within the salary range of BDT10000-BDT30000. On the other hand, only a small percentage (3%) of the users reported earning more than BDT100000. This indicates that a significant portion of bus users in the study have moderate to average income levels, while a smaller proportion falls within the higher income bracket.

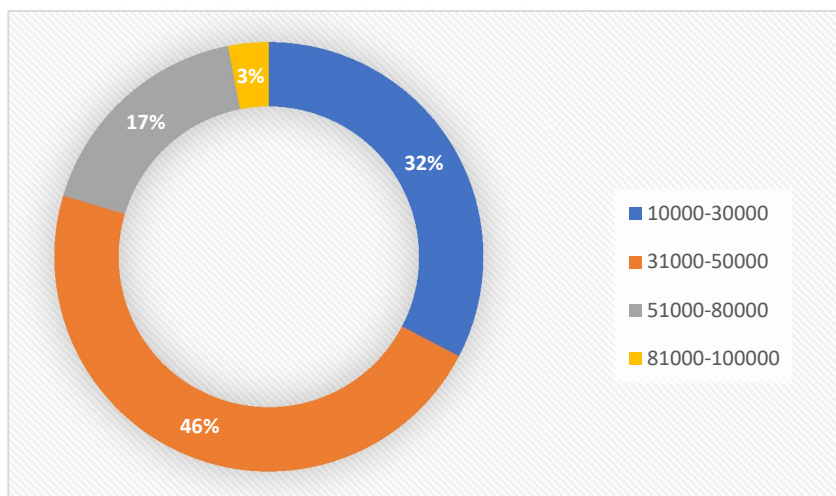


Figure 3.17 Users classification according to Salary Range



According to the classification of users based on monthly expenditure shown in Figure 3.18, the data indicates that approximately 48% of users have a monthly travel expenditure ranging from 1% to 10% of their overall expenses. Additionally, 50% of users reported allocating 16% to 25% of their monthly expenditure towards travel costs. Conversely, only a small proportion (3%) of users have a monthly travel expenditure exceeding 40% of their overall expenses. This suggests that the majority of users tend to allocate a moderate percentage of their monthly budget towards travel expenses, while a smaller portion has relatively higher travel expenditures.

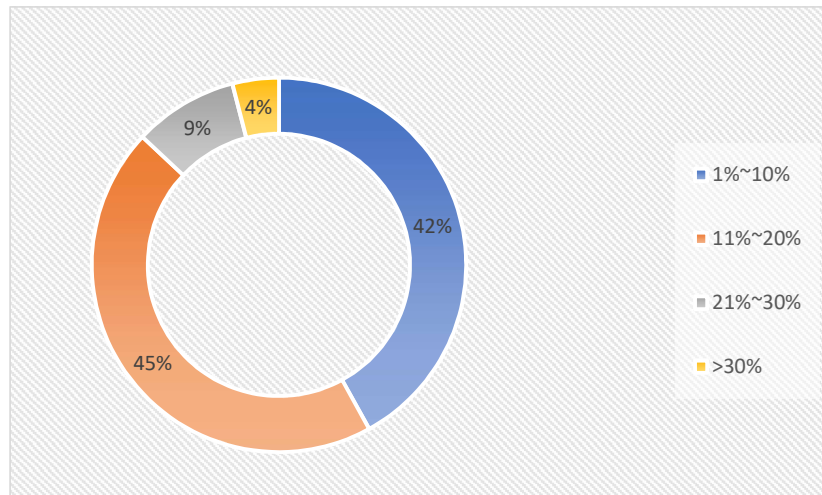


Figure 3.18 Users classification according to monthly travel expenditure

### 3.5 Conclusion

This chapter provides an overview of the survey locations, including their names and details. It also presents the survey schedule used to conduct the study. Additionally, the chapter discusses the total number of respondents and provides an analysis of their demographic information. The demographic information is analyzed in terms of gender, main mode of travel, age groups, occupation, salary range, and monthly expenditure. The findings of the demographic analysis are visually represented using pie charts to provide a clear understanding of the distribution within each category.

# CHAPTER 4

## Result and Discussion

### 4.1 Introduction

The primary aim of this chapter is to examine the gathered data. It encompasses the feedback received from bus users and involves conducting an analysis of the questionnaire survey data.

### 4.2 Process of Data Analysis

A random selection of respondents was made from fifteen various locations across Dhaka City to conduct the survey. After careful scrutiny, data from 956 respondents were chosen and stored in Microsoft Excel. The purpose of analyzing these data was to determine the overall perception of bus service quality in Dhaka City. By utilizing this dataset, the estimation of choice model parameters was performed in order to generate the most suitable solution that aligns with the input data.

### 4.3 Users Rating About Public Bus Service in Dhaka City:

#### Question 1: How often do you travel by public bus?

The survey included a question regarding the frequency of public bus travel among the respondents. According to the findings, 61% of the participants reported using the bus on a daily basis. Additionally, 19% stated that they travel by bus more than twice a week, but not every day. Only a small proportion, 7% of the respondents, indicated that they use the bus less frequently, representing the lowest response rate. Figure 4.1 illustrates the users' opinions regarding the frequency of bus travel.

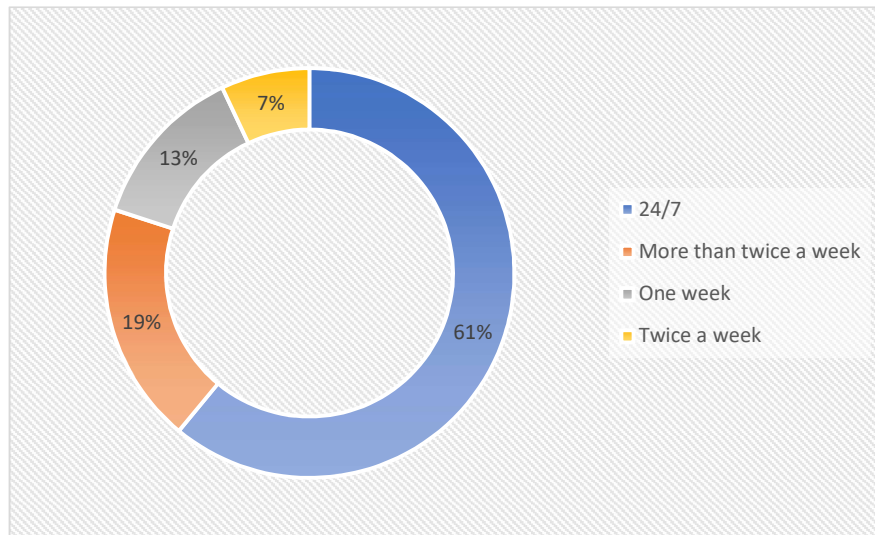


Figure 4.1 Users opinion about frequency of travelling by bus

### Question 2: How was the convenience of service?

The survey included a question regarding the convenience of the bus service, as perceived by the users. The results revealed that 36% of the respondents considered the convenience of service to be poor. Additionally, 28% of the participants rated it as satisfactory. Interestingly, only a mere 2% of the respondents regarded the convenience of service as excellent. Figure 4.2 provides a graphical representation of the users' opinions concerning the convenience of the bus service.

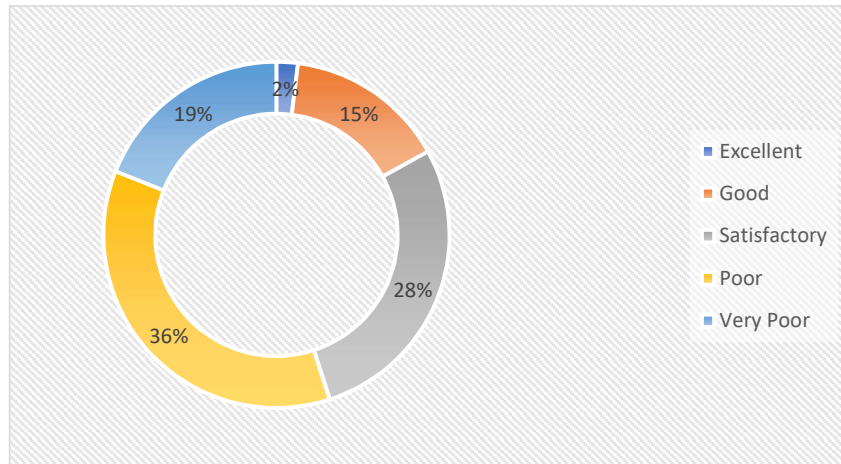


Figure 4.2 Users opinion about convenience of service

### Question 3: How long it takes to reach bus stop?

The survey included a question about the time it takes for users to reach the bus stop. The responses revealed that 48% of the participants reported taking approximately 5 minutes to reach the bus stop, while 26% stated that it takes them around 10 minutes. Interestingly, a small percentage, only 9% of the respondents, indicated that it takes them 25 minutes to reach the bus stop. Figure 4.3 illustrates the users' opinions regarding the time required to reach the bus.

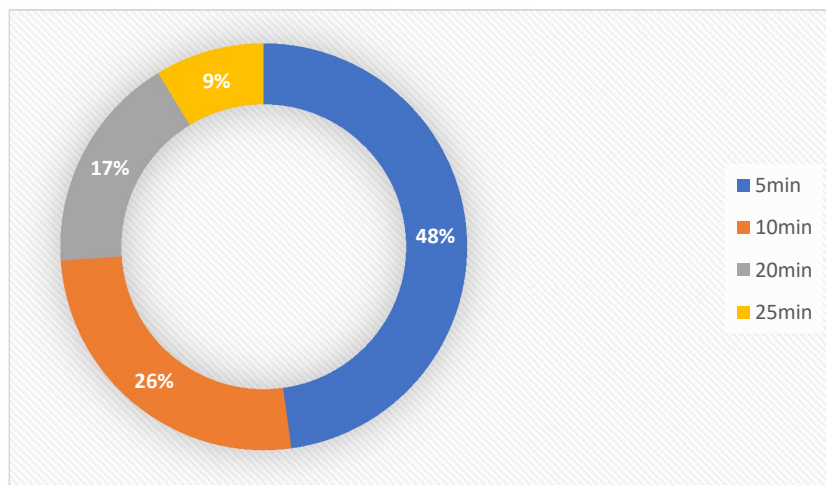


Figure 4.3 Users opinion about time to reach bus stop.

#### Question 4: What is the trip purpose?

The survey included a question regarding the purpose of the users' trips when utilizing the bus service. The findings indicate that the majority, a maximum of 48% of the total respondents, stated that their purpose of the trip was to reach their office. Additionally, 33% of the participants reported that their purpose of using the bus was to reach their school, college, polytechnic, or university. Figure 4.4 provides a graphical representation of the users' opinions regarding the trip purpose.

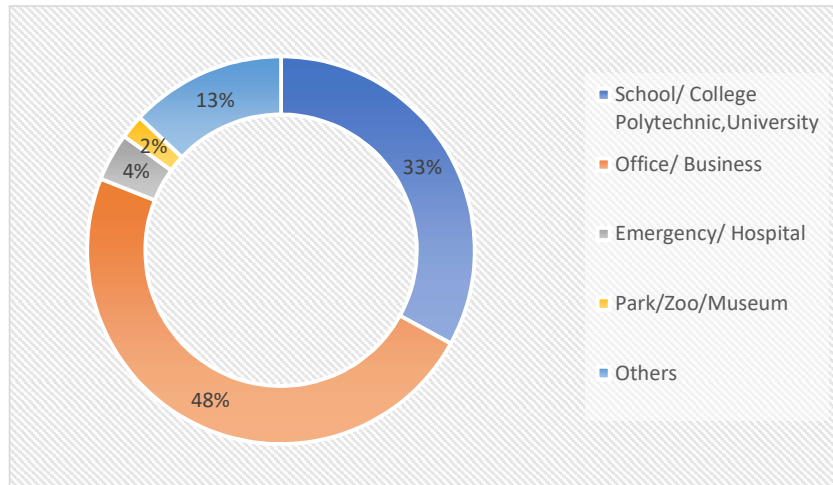


Figure 4.4 Users opinion about trip purpose

#### Question 5: How was the frequency of service?

The survey included a question about the frequency of the bus service as perceived by the users. According to the responses, 33% of the respondents rated the frequency of service as poor. Additionally, 11% of the participants considered it to be Very poor. Interestingly, only a minimal 3% of the respondents rated the frequency of service as excellent. Figure 4.5 provides a graphical representation of the users' opinions regarding the frequency of the bus service.

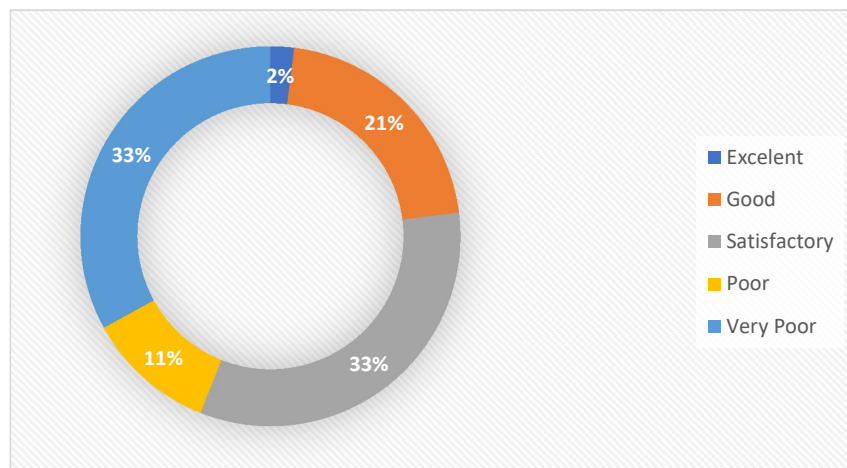


Figure 4.5 Users opinion about frequency of service



### Question 6: How is the punctuality of the public transport?

The survey included a question regarding the punctuality of the transport service, which measures the efficiency of maintaining the time schedule. Out of the total respondents, 46% rated the punctuality of the transport as poor, indicating dissatisfaction with timeliness. Furthermore, 21 % of the participants rated it as Excellent. Surprisingly, very few respondents rated the punctuality of the transport as excellent. Figure 4.6 illustrates the users' opinions regarding the punctuality of the transport service.

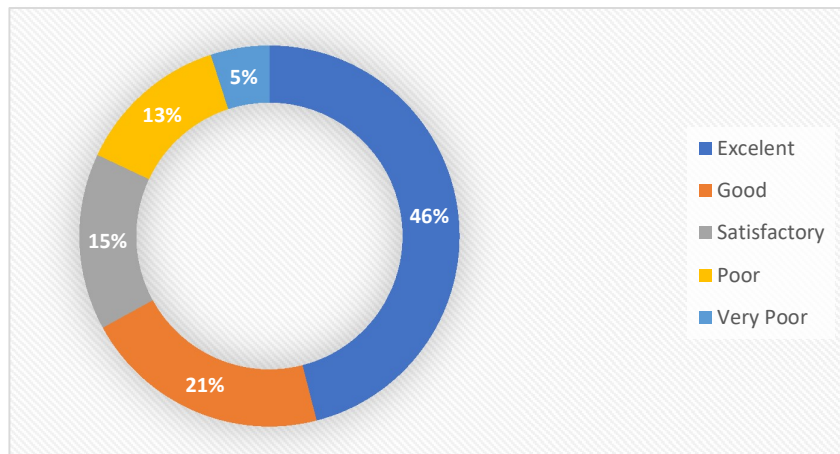


Figure 4.6 Users opinion about punctuality of transport

### Question 7: How was the movement flexibility (On Road)?

The survey included a question concerning the movement flexibility of buses on the road, referring to the ease with which buses can maneuver. The results indicate that 43% of the respondents rated the movement flexibility as poor, expressing dissatisfaction with the buses' maneuverability. Additionally, 26% of the participants rated it as Excellent. Interestingly, very few respondents rated the movement flexibility as excellent. Figure 4.7 visually represents the users' opinions regarding the movement flexibility of buses on the road.

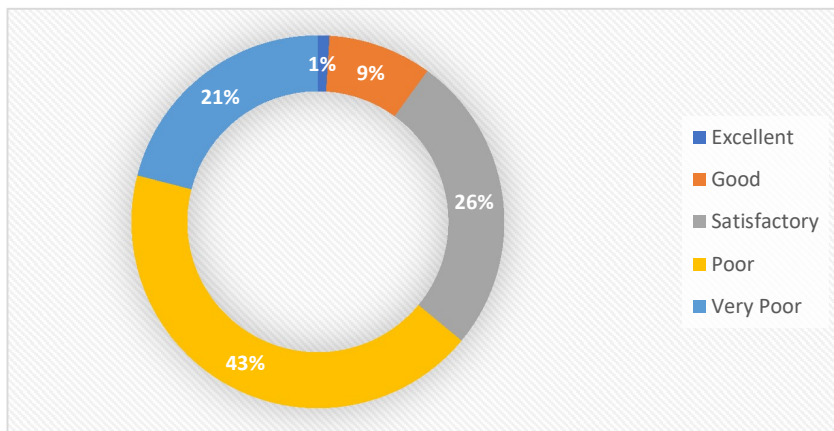


Figure 4.7 Users opinion about movement flexibility on road

### Question 8: What about the accessibility of public bus stop?

The survey included a question regarding the accessibility of the bus stop, assessing users' perceptions of how easily they can reach the bus stop. Interestingly, only a minimal 8% of the respondents rated the accessibility of the bus stop as excellent, suggesting a high level of ease in reaching the bus stop.

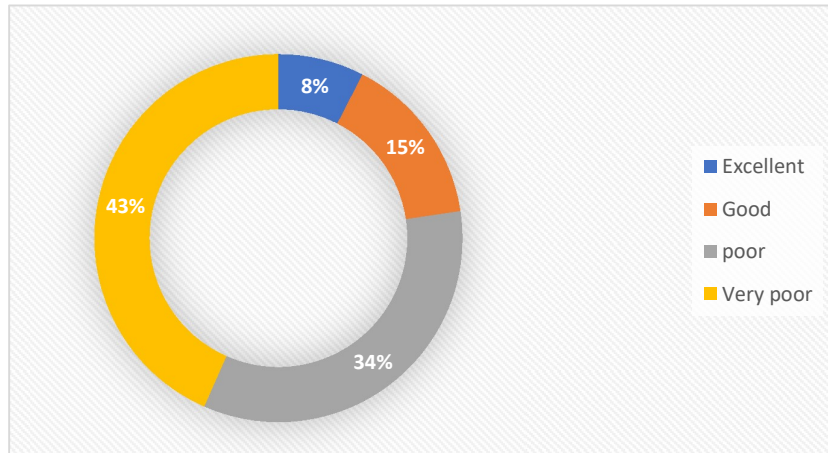


Figure 4.8 Users opinion about accessibility of bus stop

### Question 9: How was the speed of the bus?

The survey included a question regarding the speed of the bus, assessing how respondents perceive the pace of the bus service. According to the responses, 39% of the participants rated the speed of the bus as poor, indicating dissatisfaction with the speed. Additionally, 42% of the respondents rated it as satisfactory. Interestingly, only a small percentage, 4% of the respondents, rated the speed of the bus as excellent. Figure 4.9 visually represents the users' opinions regarding the speed of the bus

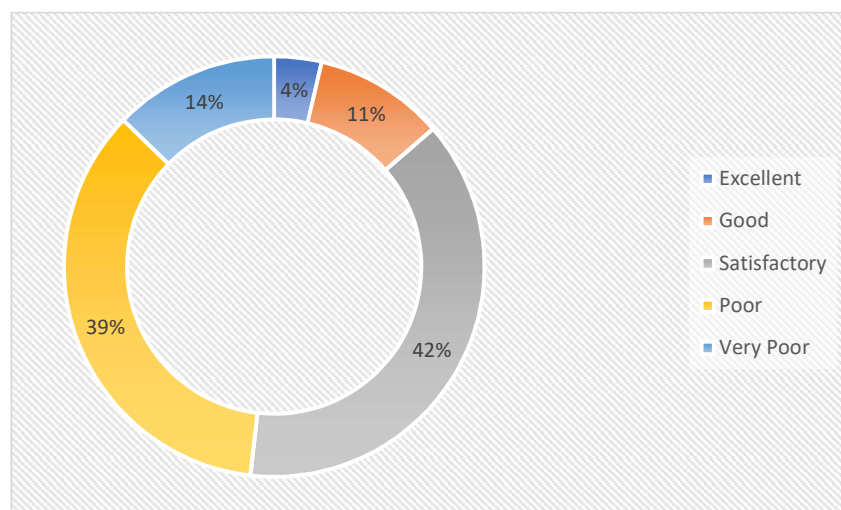


Figure 4.9: Users opinion about speed of the bus

### Question 10: Is the information of the bus service available?

The survey included a question regarding the availability of information about the bus service, assessing how well users perceive the accessibility of relevant details. The results reveal that 38% of the respondents rated the availability of information as poor, indicating dissatisfaction with the information provided. Additionally, 27% of the participants rated it as satisfactory. Interestingly, due to the lack of information availability, very few respondents rated it as excellent. Figure 4.10 visually represents the users' opinions regarding the availability of information about the bus service.

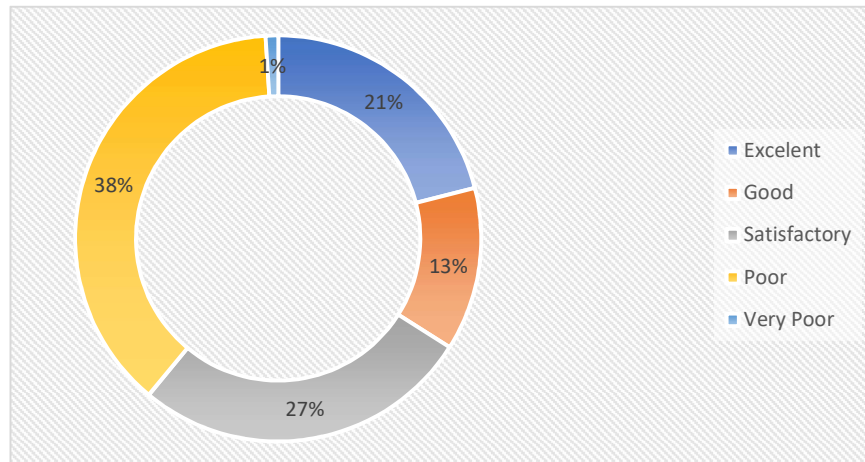


Figure 4.10: Users opinion about availability of information of the bus service

### Question 11: How was the transport cost?

The survey included a question soliciting users' opinions regarding the transport cost. The findings reveal that 39% of the respondents considered the transport cost to be fair, rating it as satisfactory. However, a significant proportion, totaling 42% of the respondents, believed that the cost was higher than it should be. Among this group, 29% rated it as poor and 13% rated it as very poor. Interestingly, only a minimal 1% of the respondents rated the cost as excellent. Figure 4.11 visually represents the users' opinions regarding the transport cost

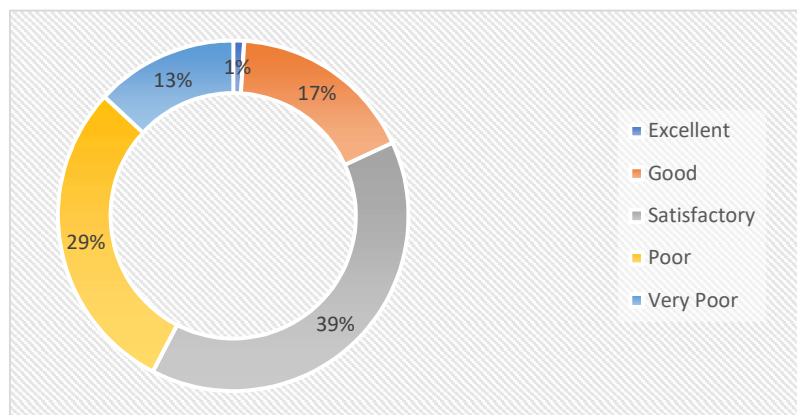


Figure 4.11 Users opinion about transport cost

### Question 12: What was the reason of using public bus?

The survey included a question asking users about the reasons for using the local bus service. The results indicate that 33% of the respondents use the local bus due to its low cost, emphasizing affordability. Similarly, another 29% mentioned the lack of personal transportation as the reason for utilizing the local bus service. Additionally, 21% of the respondents indicated that they had no other option but to use the local bus, suggesting limited alternatives. Figure 4.12 provides a visual representation of the users' opinions regarding the reasons for using the local bus.

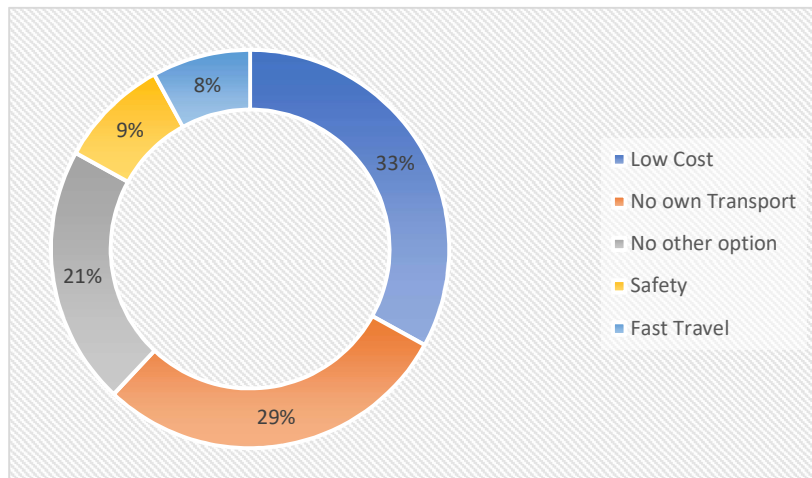


Figure 4.12 Users opinion about reason of using local bus

### Question 13: How was the fitness of the public bus?

The survey included a question regarding the fitness of the bus, assessing users' perceptions of its condition and maintenance. The findings reveal that 35% of the respondents rated the fitness of the bus as poor, expressing dissatisfaction with its overall condition. Additionally, 27% of the participants rated it as satisfactory. Interestingly, only a minimal 2% of the respondents rated the fitness of the bus as excellent.

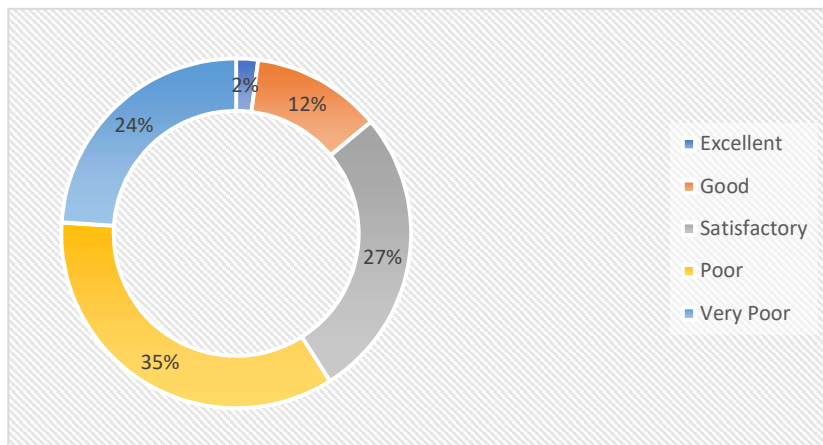


Figure 4.13 visually represents the users' opinions regarding the fitness of the bus.



#### Question 14: What about the seat condition of public bus?

The survey included a question regarding the seat condition of the bus, evaluating users' opinions on the quality and comfort of the seats. According to the responses, 43% of the respondents rated the seat condition of the bus as poor, indicating dissatisfaction with the state of the seats. Additionally, 29% of the participants rated it as satisfactory. Surprisingly, only 2% of the respondents rated the seat condition of the bus as excellent.

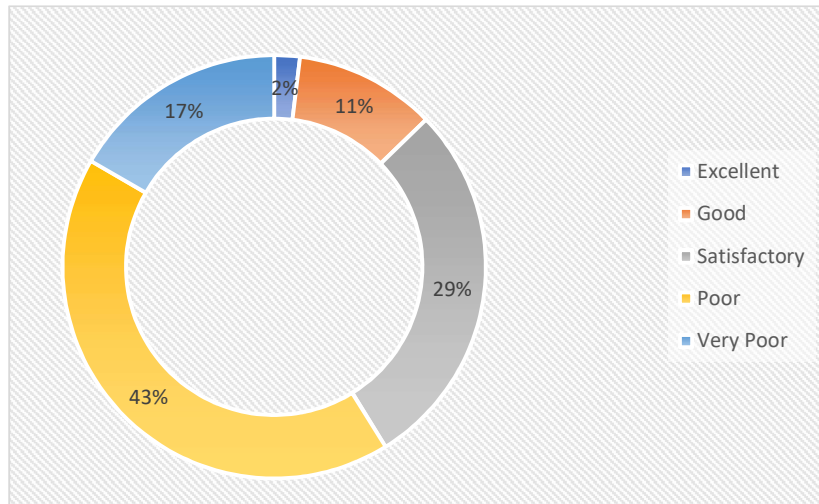


Figure 4.14 visually illustrates the users' opinions regarding the seat condition of the bus.

#### Question 15: How was the movement flexibility (Inside)?

The survey included a question regarding the movement flexibility inside the bus, assessing users' perceptions of the ease of movement within the bus. The findings reveal that 34% of the respondents rated the inside movement flexibility as poor, indicating limited freedom of movement. Additionally, 27% of the participants rated it as very poor, suggesting severe constraints. Interestingly, only a minimal 1% of the respondents rated the inside movement flexibility as excellent, implying a highly flexible and spacious interior.

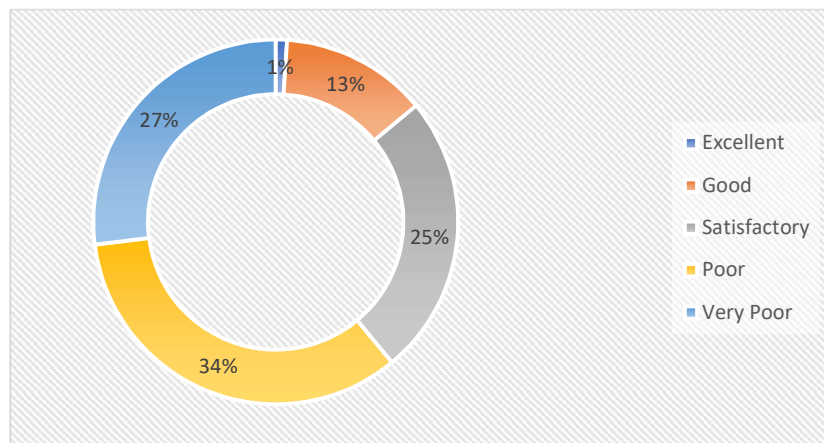


Figure 4.15 Users opinion about movement flexibility (Inside)

### Question 16: How was the seat comfort level of public bus?

The survey included a question regarding the seat comfort level of the bus, assessing users' perceptions of the comfort provided by the seats. The results indicate that 42% of the respondents rated the comfort level of the bus as poor, indicating dissatisfaction with the comfort of the seats. Additionally, 23% of the participants rated it as satisfactory. Interestingly, only a minimal 2% of the respondents rated the comfort level of the bus as excellent, suggesting highly comfortable seating.

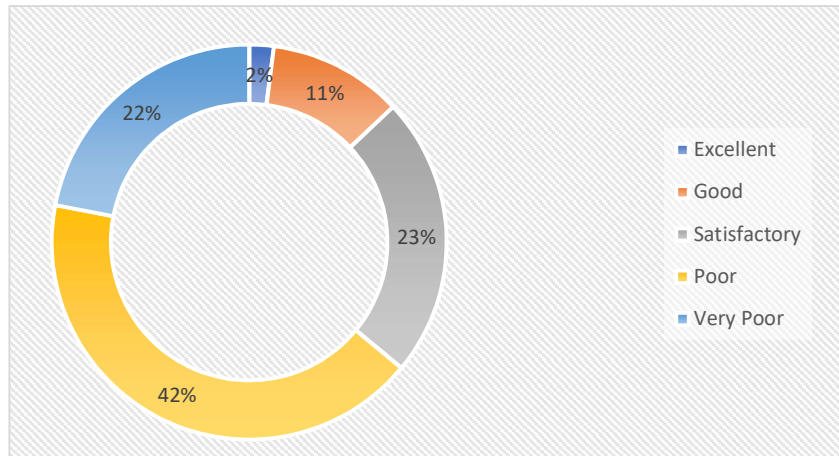


Figure 4.16 Users opinion about comfort level

### Question 17: How was the physical condition of public bus?

The survey included a question regarding the physical condition of the bus, assessing users' perceptions of its overall state and appearance. The findings reveal that 45% of the respondents rated the physical condition of the bus as poor, indicating dissatisfaction with its physical state. Additionally, 25% of the participants rated it as satisfactory. Interestingly, only a minimal 1% of the respondents rated the physical condition of the bus as excellent, suggesting a well-maintained and visually appealing bus.

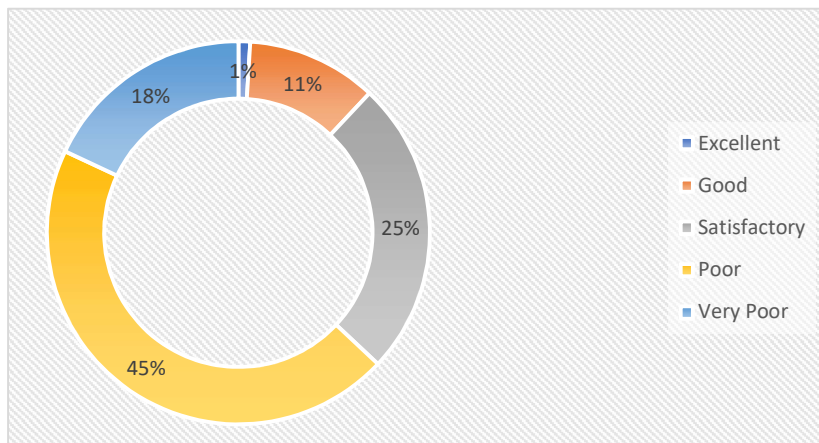


Figure 4.17 Users' opinions regarding the physical condition of the bus

### Question 18: What about the safety of bus stop?

The survey included a question regarding the safety of the bus stop, evaluating users' perceptions of its security and safety measures. The results indicate that 42% of the respondents rated the safety of the bus stop as poor, expressing concerns about its safety standards. Additionally, 25% of the participants rated it as satisfactory. Interestingly, only a minimal 1% of the respondents rated the safety of the bus stop as excellent, suggesting a high level of confidence in its safety measures.

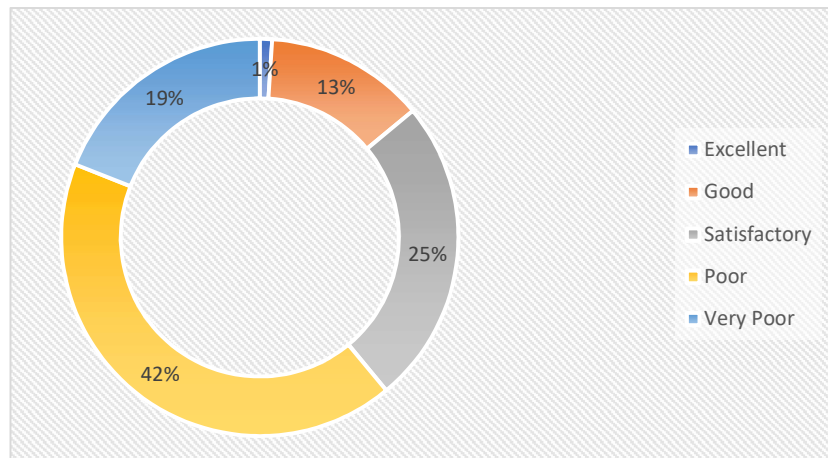


Figure 4.18 visually represents the users' opinions regarding the safety of the bus stop

### Question 19: Which mode are used to reach public bus stop?

The survey included a question regarding the mode of transportation used by users to reach the bus stop. The results reveal that 49% of the respondents reported reaching the bus stop by walking, emphasizing the use of pedestrian mode. Additionally, 36% of the participants mentioned using a rickshaw to reach the bus stop.

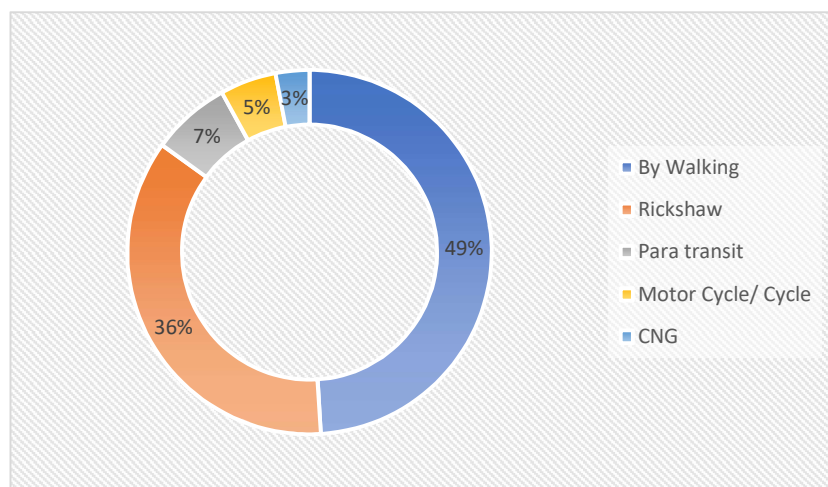


Figure 4.19 users' opinions regarding the mode of transportation to reach the bus stop

### Question 20: What are the levels of personal safety in public bus?

The survey included a question regarding the levels of personal safety, evaluating users' perceptions of their own safety. The results indicate that 13% of the respondents rated the level of personal safety as fairly poor, expressing concerns about their safety. Additionally, 32% of the participants rated it as neither good nor poor, indicating a satisfactory level of personal safety. Interestingly, only 3% of the respondents rated the level of personal safety as excellent, suggesting a high level of perceived safety

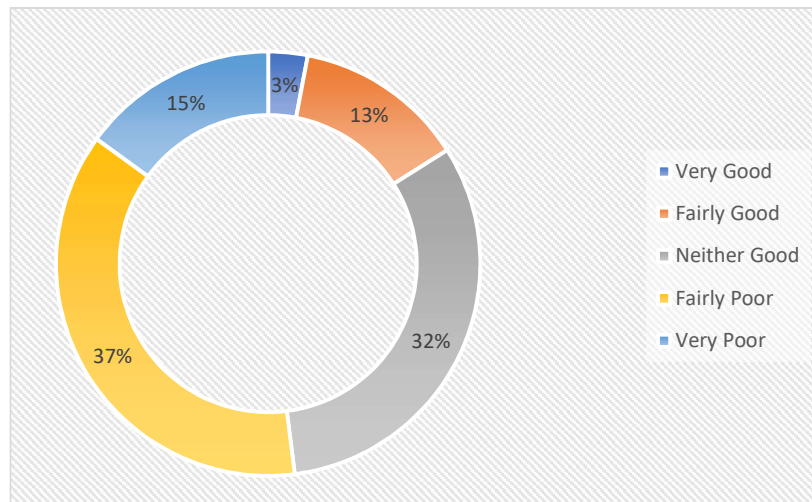


Figure 4.20:Users opinion about personal safety in public bus

### 4.4 Conclusion

This chapter provides an overview of the survey locations, including their names and details. It also presents the survey schedule used to conduct the study. Additionally, the chapter discusses the total number of respondents and provides an analysis of their demographic information. The demographic information is analyzed in terms of frequency of travelling by bus, convenience of service, time to reach bus stop, about trip purpose ,frequency of service, punctuality of transport, movement flexibility on road, accessibility of bus stop, speed of the bus, about availability of information of the bus service, transport cost, reason of using local bus, regarding the fitness of the bus, seat condition of the bus, movement flexibility (Inside),comfort level, the physical condition of the bus, safety of the bus stop, mode of transportation to reach the bus stop. The findings of the demographic analysis are visually represented using pie charts to provide a clear understanding of the distribution within each category.

# CHAPTER 5

## Conclusions & Future Work

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### 5.1 Conclusion

The primary objective of this study was to analyze and predict the quality of public bus service in Dhaka City. Specifically, the study aimed to investigate the key service factors that impact bus service quality and explore overall passenger satisfaction. The major findings from this study are summarized below.

According to the respondents, the following aspects were rated as poor in terms of bus service quality: convenience, frequency, punctuality, movement flexibility, sitting arrangements, availability of information, ticketing system, fitness, seat condition, cleanliness of the bus, noise level, movement flexibility inside the bus, comfort level, physical condition of the bus, safety at the bus stop, cleanliness of the bus stop, condition of the bus stop, accessibility of the bus stop, security in the bus stop, level of personal safety, entry and exit procedures, travel time on office days, security of passengers during off-peak hours, driver safety, courtesy of helpers/contractors, reliability of the local bus service, and accessibility of the bus.

On the other hand, the speed of the bus, transport cost, lighting facility of the bus, behavior of the driver, accessibility of the bus, and travel time during holidays were rated as satisfactory by the respondents.

Overall, 64% of the respondents rated the bus service quality as unsatisfactory.

Based on the findings, this study provides several recommendations to improve the bus service quality in Dhaka City. Furthermore, suggestions for future research in this area are also provided in this chapter.

### 5.2 Recommendation for Improving Public Bus Service Quality

To enhance bus service quality based on the identified factors, attention should be given to improving the seat comfort level. Since passenger's value comfort during their bus journeys, focusing on enhancing the comfort of the seats will contribute to an overall improvement in bus service quality.

To further enhance bus service quality, the following actions can be taken:

1. Ensuring Safety at Bus Stops: Safety measures should be implemented at bus stops, considering the concerns of both male and female passengers. Special attention should be given to women's safety, as it is a major concern for them. By increasing safety measures at bus stops, overall bus service quality can be improved.
2. Improving Seat Conditions: The condition of bus seats directly affects the comfort level for passengers. It is often observed that the seat conditions are poor and uncomfortable. Therefore, efforts should be made to improve the seat conditions and provide comfortable seating arrangements to enhance the overall bus service quality.
3. Enhancing Physical Condition and Fitness of Buses: Regular maintenance and upkeep of buses are essential to improve their physical condition and fitness. This includes ensuring



proper cleanliness, addressing any mechanical issues promptly, and maintaining a well-functioning fleet of buses. By improving the physical condition and fitness of buses, the overall bus service quality can be enhanced.

4. **Enhancing Convenience and Accessibility:** Measures should be taken to improve the convenience of the bus service, such as providing clear and easily accessible information to passengers. Additionally, efforts should be made to improve the accessibility of buses, ensuring that they are accessible to all passengers, including individuals with disabilities.

5. **Improving Movement Flexibility:** In a congested city like Dhaka, where traffic jams are a major concern, improving the movement flexibility of buses is crucial. This is especially important for student and working passengers who are often in a rush to reach their destinations on time. By increasing the movement flexibility, such as implementing efficient routing and managing traffic congestion, the overall bus service quality can be significantly improved.

By addressing these areas of improvement, the bus service quality in Dhaka City can be enhanced, leading to increased passenger satisfaction and a better overall experience for bus users.

In addition to the mentioned factors, several other variables need to be fulfilled to improve bus service quality. These variables may include:

1. **Timeliness and Punctuality:** Ensuring buses adhere to a schedule and arrive and depart on time is crucial for improving service quality. Passengers rely on buses to be punctual to minimize waiting times and maintain efficient travel plans.

2. **Information and Communication:** Providing accurate and up-to-date information regarding bus routes, schedules, delays, and disruptions can significantly improve the overall user experience. Clear communication channels and real-time updates will help passengers make informed decisions and reduce uncertainties.

3. **Staff Training and Professionalism:** Enhancing the professionalism and customer service skills of bus staff, including drivers, conductors, and customer service representatives, can contribute to a positive and pleasant passenger experience. Well-trained staff members who interact politely and provide assistance when needed can greatly improve service quality.

4. **Integration with Other Modes of Transport:** Promoting seamless integration between different modes of transportation, such as connecting bus routes with train or metro networks, can offer passengers more convenient and efficient travel options. Coordinated schedules, intermodal ticketing, and well-designed transfer points can enhance the overall travel experience.

By improving bus service quality, the goal is to retain existing users and attract new ones. If the bus service can consistently satisfy users in all aspects, people will be more inclined to choose it over other modes of transportation, including private vehicles. This shift towards utilizing buses instead of private vehicles can have several positive outcomes.

Firstly, it can help alleviate traffic congestion to some extent by reducing the number of private vehicles on the roads. This reduction can lead to smoother traffic flow and a reduction in overall traffic jams.

Secondly, improved bus service quality can contribute to environmental sustainability by reducing carbon emissions associated with private vehicles. The shift towards using buses can help lower pollution levels and promote greener transportation options.

Therefore, enhancing bus service quality is of utmost importance as it not only improves the overall travel experience for passengers but also has broader positive impacts on traffic congestion, environmental sustainability, and the overall livability of the city.

### **5.3 Limitation of the Study & Recommendation for Future Study**

Despite the thoroughness of the study, there were certain limitations that should be acknowledged:

1. **Gender Bias:** The data collected exhibited a gender bias, with only one-third of the participants being female. To ensure a more balanced representation, future studies should strive for greater participation from women.
2. **Limited Number of Variables:** The study included a total of 46 variables. To obtain more comprehensive results, future research should consider increasing the number of variables to capture a wider range of factors influencing bus service quality.
3. **Sample Size:** The analysis was conducted using data from 956 respondents. Increasing the number of respondents in future studies would provide a more robust and representative sample for more accurate findings.
4. **Limited Survey Locations:** The study focused on 15 specific locations for data collection. To obtain a more comprehensive understanding of bus service quality across the city, future studies should aim to include a larger number of survey locations.
5. **Respondent Engagement:** There were instances where respondents may not have been enthusiastic or sincere in their responses. Efforts should be made in future studies to ensure greater respondent engagement and sincerity to obtain more reliable data.

The findings from this study can be utilized by city transportation officials in Bangladesh to improve the overall service quality of buses and attract more users. Service providers can also utilize these findings to identify areas that require improvement to better satisfy users and attract new ones. Therefore, the results of this study are valuable and can assist in making informed decisions to enhance bus service quality.

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## Appendix

### List of Existing Bus Routes in Dhaka City

Sl.	Name of the Buses	Routes
01	Akik Poribohon	Gabtolı ⇌ Mirpur 1 ⇌ Mirpur 10 ⇌ Kalshi ⇌ Jamuna Future Park ⇌ Natun Bazar, ⇌ Badda
02	Trust Line	Mirpur 10 ⇌ Cantonment ⇌ Banani ⇌ Notun Bazar
03	Tetulia Poribphon	Shiya Masjid ⇌ Shyamoli ⇌ Agargaon ⇌ Mirpur 10 ⇌ Kalshi ⇌ Bisshoroad ⇌ Airport ⇌ Uttara ⇌ Abdullahpur
04	Jabale Noor Poribohon, Ovijat Poribohon	Agargaon ⇌ Mirpur 10 ⇌ Kalshi ⇌ Bisshoroad ⇌ Airport ⇌ Uttara ⇌ Abdullahpur
05	Alif Poribohon, Rois Poribohon	Mirpur Sony Cinema Hall ⇌ Mirpur 10 ⇌ Kazipara ⇌ Shewrapara ⇌ Mohakhali ⇌ Gulshan 1 ⇌ Badda ⇌ Rampura ⇌ Bonoshri
06	Himachol Poribohon	Mirpur Sony Cinema Hall ⇌ Mirpur 10 ⇌ Kazipara ⇌ Shewrapara ⇌ Mohakhali ⇌ Gulshan 1 ⇌ Badda ⇌ Rampura ⇌ Khilgaon Khidma Hospital
07	Projapoti Poribohon, New Pallabi Express, Konok Poribohon	Gabtolı ⇌ Mirpur 1 ⇌ Mirpur 10 ⇌ Kalshi ⇌ Bisshoroad ⇌ Airport ⇌ Uttara ⇌ Abdullahpur
08	Bosumoti Poribohon, BRTC	Gabtolı ⇌ Mirpur 1 ⇌ Mirpur 10 ⇌ Kalshi ⇌ Bisshoroad ⇌ Airport ⇌ Uttara ⇌ Abdullahpur ⇌ Tongi ⇌ Gazipur
09	Robrob Poribohon	Gabtolı ⇌ Mirpur 1 ⇌ Mirpur 10 ⇌ Kalshi ⇌ Banani ⇌ Gulshan 2 ⇌ Gulshan 1 ⇌ Badda Link Road
10	Jabale Noor Poribohon 2	Gabtolı ⇌ Mirpur 1 ⇌ Mirpur 10 ⇌ Kalshi ⇌ Kuril Flyover ⇌ Natun Bazar
11	BRTC	Gabtolı ⇌ Mirpur 1 ⇌ Mirpur 10 ⇌ Kazipara ⇌ Shewrapara ⇌ Mohakhali ⇌ Kakoli ⇌ Banani ⇌ Gulshan 2 ⇌ NatunBazar ⇌ Badda ⇌ Rampura
12	Everest Poribohon	Roopnagar Abasik ⇌ Mirpur 2 ⇌ Mirpur 1 ⇌ Khamarbari ⇌ Farmgate ⇌ Gulistan ⇌ Keraniganj

13	Mirpur Mission Poribohon Limited	Chiriyakhana ⇌ Mirpur 1 ⇌ Khamarbari ⇌ Farmgate ⇌ Press Club ⇌ Motijhil
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14	Itihas Poribohon	Mirpur 10 ⇌ Mirpur 2 ⇌ Mirpur 1 ⇌ Gabtoli ⇌ Savar ⇌ Nobinogor ⇌ Chondra
15	Bihongo Poribohon	Mirpur 12 ⇌ Mirpur 11 ⇌ Mirpur 10 ⇌ Kazipara ⇌ Badda ⇌ Shewrapara ⇌ Mohakhali ⇌ Gushan 1 ⇌ NatunBazar
16	Dhaka Metro Service	Mirpur 1 ⇌ Kolyanpur ⇌ Shyamoli ⇌ Asadgate ⇌ Shukrabad ⇌ Kolabagan ⇌ Science Lab ⇌ New Market ⇌ Nilkhet ⇌ Azimpur
17	Ashirbad Poribohon, Bihongo Poribohon	Roopnagar Abasik ⇌ Mirpur 2 ⇌ Mirpur 1 ⇌ Kolyanpur ⇌ Shyamoli ⇌ Asadgate ⇌ Shukrabad ⇌ Kolabagan ⇌ Science Lab ⇌ New Market ⇌ Nilkhet ⇌ Azimpur
18	New Vision	Chiriyakhana ⇌ Mirpur 1 ⇌ Khamarbari ⇌ Farmgate ⇌ Press Club ⇌ Motijhil
19	Dishari Poribohon	Chiriyakhana ⇌ Mirpur 1 ⇌ Gulistan ⇌ Keraniganj ⇌ Babubazar Bridge
20	Trans Silva Limited	Mirpur 1 ⇌ Technical ⇌ Kolyanpur ⇌ Asadgate ⇌ Kolabagan ⇌ Science Lab ⇌ Shahbag ⇌ Press Club ⇌ Gulistan ⇌ Motijhil ⇌ Jatrabari
21	Bikolpo Service 1/E	Mirpur 14 ⇌ Mirpur 1 ⇌ Technical ⇌ Kolyanpur ⇌ Asadgate ⇌ Kolabagan ⇌ Science Lab ⇌ New Market ⇌ Nilkhet ⇌ Azimpur ⇌ TSC ⇌ Shahbag ⇌ Press Club ⇌ Gulistan ⇌ Tikatuli ⇌ Jatrabari
22	Alif (Bengal) Poribohon	Mirpur 10 ⇌ Mirpur 1 ⇌ Mazar Road ⇌ Beri Badh ⇌ Ashuliya ⇌ Fantasy Kingdom ⇌ Nondon Park
23	Pollobi Local Service	Asadgate ⇌ Shyamoli ⇌ Kolyanpur ⇌ Technical ⇌ Mirpur 1 ⇌ Mirpur 2 ⇌ Mirpur 6 ⇌ Cholontika Mor ⇌ Mirpur 7 ⇌ Mirpur 11 ⇌ Mirpur 12
24	Brihottor Mirpur, Titas Poribohon	Chiriyakhana, ⇌ Mirpur 1 ⇌ Gabtoli ⇌ Savar ⇌ Nobinogor ⇌ Chondra

25	Etc Poribohon	Kalshi ⇌ Mirpur Sare 11 ⇌ Mirpur 10 ⇌ Kazipara ⇌ Shewrapara ⇌ IDB ⇌ Khamarbari ⇌ Farmgate ⇌ Karwanbazar ⇌ Shahbag ⇌ Gulistan ⇌ Sadarghat
26	Shokolpo Poribohon	Chiriyakhana ⇌ Mirpur 1 ⇌ Mirpur 10 ⇌ Agargaon ⇌
27	Nobokoli Poribohon	Mirpur 1 ⇌ Kolyanpur ⇌ Shyamoli ⇌ Agargaon ⇌ Notun Rasta ⇌ Mohakhali Flyover ⇌ Banani ⇌ Gulshan 2 ⇌ Notun Bazar
28	Boishakhi Poribohon	Savar ⇌ Gabtoli ⇌ Kolyanpur ⇌ Shyamoli ⇌ Agargaon ⇌ Notun Rasta ⇌ Mohakhali ⇌ Gulshan 1 ⇌ Badda Link Road ⇌ Notun Bazar
29	Desh Bangla Poribohon, Rupkotha Poribohon	Gabtoli ⇌ Abdullahpur
30	Konok Poribohon	Mirpur 12 ⇌ Mirpur 10 ⇌ Kakoli ⇌ Airport ⇌ Uttara ⇌ Abdullahpur
31	Provati Bonoshri Poribohon Limited	Gulistan ⇌ Polton ⇌ Malibag ⇌ Mogbazar ⇌ Saatrasta ⇌ Nabisko ⇌ Mohakhali ⇌ Bonani ⇌ Airport ⇌ Uttara ⇌ Abdullahpur ⇌ Tongi ⇌ Gazipur ⇌ Kaliyakoir
32	6 Number Motijhil Banani Transport Limited (Local)	1. Motijhil ⇌ Gulistan ⇌ Polton ⇌ Malibag ⇌ Mogbazar ⇌ Karwanbazar ⇌ Farmgate ⇌ Bijoy Sarani ⇌ Mohakhali ⇌ Gulshan 1 ⇌ Gulshan 2 ⇌ Notun Bazar 2. Motijhil ⇌ Gulistan ⇌ Polton ⇌ Malibag ⇌ Mogbazar ⇌ Saatrasta ⇌ Nabisko ⇌ Mohakhali ⇌ Gulshan 1 ⇌ Badda Link Road ⇌ Notun Bazar
33	4 Number Alike Transport & BRTC Articulated (Wi-Fi Bus)	Balughat ⇌ Cantonment ⇌ Bijoy Sarani ⇌ Farmgate ⇌ Banglamotor ⇌ Shahbag ⇌ Polton ⇌ Gulistan ⇌ Motijhil
34	3 Number Airport – Bangabandhu Avenue Poribohon (Local)	Bongo Bazar ⇌ High Court ⇌ Shahbag ⇌ Farmgate ⇌ Mohakhali ⇌ Banani ⇌ Bisso Road ⇌ Airport ⇌ Uttara ⇌ Abdullahpur
35	9 Number Bus	College Gate ⇌ Shyamoli ⇌ Technical ⇌ Mirpur 1 ⇌ Mirpur 1
36	Torongo Bus Company, BRTC	Mohammadpur ⇌ Asadgate ⇌ Farmgate ⇌ Mohakhali ⇌ Titumir College ⇌ Gulshan 1 ⇌ Badda ⇌ Notun Bazar
37	Torongo Plus Transport Limited	Mohammadpur Bus Stand ⇌ Shankar ⇌ Dhanmondi 15 ⇌ Jhigatola ⇌ Science Lab ⇌ Shahbag ⇌ Kakrail ⇌ Malibag
38	Projapoti Poribohon	Gabtoli ⇌ Mohammadpur ⇌ Asadgate ⇌ Mirpur 1 ⇌ Mirpur 10 ⇌ Kalshi ⇌ Bisshoroad ⇌ Airport ⇌ Uttara ⇌ Abdullahpur
39	Bahon Poribohon Limited	Mirpur 14 ⇌ Mirpur 10 ⇌ Mirpur 1 ⇌ Technical ⇌ Kolyanpur ⇌ Asadgate ⇌ Science Lab ⇌ Shahbag ⇌ Press Club ⇌ Motijhil ⇌ Komlapur ⇌ Mugda ⇌ Khilgaon
40	Nisorgo Poribohon Limited	Mirpur 14 Bus Stand ⇌ Mirpur 10 ⇌ Kazipara ⇌ Agargaon ⇌ Shyamoli ⇌ Asadgate ⇌ Mohammadpur ⇌ Dhakmondi 15 ⇌ Jhigatola ⇌ Science Lab ⇌ Dhaka College ⇌ New Market ⇌ Nilkhet ⇌ Eden College ⇌ Azimpur

41	Shotabdi Poribohon Limited	Mirpur 14 Bus Stand ⇌ Mirpur 14 ⇌ Mirpur 1 ⇌ Shyamoli ⇌ Asadgate ⇌ Mohammadpur ⇌ Shankar ⇌ Dhanmondi 15 ⇌ Jhigatola ⇌ Katabon ⇌ Shahbag ⇌ Gulistan ⇌ Motijhil ⇌ Notre Dame College
42	Cantonment Mini Service	Mirpur 14 ⇌ Kochukhet ⇌ Soinik Club ⇌ Kakoli ⇌ Banani
43	Rongdhonu Express	Adabor ⇌ Shiya Masjid ⇌ Shyamoli ⇌ College Gate ⇌ Asadgate ⇌ Kolabagan ⇌ Science Lab ⇌ Shahbag ⇌ Kakrail ⇌ Fokirapul ⇌ Motijhil ⇌ Doyaganj
44	Borak Poribohon	Polashi ⇌ Meghna Ghat
45	Rajdhani Express	Shaymoli ⇌ Asadgate ⇌ Kolabagan ⇌ Science Lab ⇌ Katabon ⇌ Shahbag ⇌ Gulistan
46	Super Bus	Gulistan ⇌ Shahbag ⇌ Farmgate ⇌ Shyamoli ⇌ Gabtoli ⇌ Savar ⇌ Nobinogor ⇌ Nandan Park
47	Dhaka Poribohon	Gulistan ⇌ Shahbag ⇌ Farmgate ⇌ Banani ⇌ Uttara ⇌ Gazipur ⇌ Shib Bari
48	Bolaka Poribohon	Motijhil ⇌ Komlapur ⇌ Malibag ⇌ Mogbazar ⇌ Nabisko ⇌ Mohakhali ⇌ Banani ⇌ Khilkhet ⇌ Airport ⇌ Uttara ⇌ Tongi ⇌ Board Bazar ⇌ Gazipur ⇌ Shib Bari
49	Himaloy Transport	Modonpur (Narayanganj) ⇌ Jatrabari ⇌ Bangladesh Bank ⇌ Mogbazar ⇌ Mohakhali ⇌ Tongi Bridge
50	Labbayek Poribohon	Jatrabari ⇌ Sayedabad ⇌ Mugda ⇌ Khilgaon ⇌ Malibag ⇌ Mogbazar ⇌ Karwan Bazar ⇌ Farmgate ⇌ Asadgate ⇌ Shyamoli ⇌ Gabtoli ⇌ Savar
51	Mirpur Poribohon Service Limited	Mirpur 12 ⇌ Shewrapara ⇌ Gulistan Golap Shah Mazar
52	Mirpur United Service Limited, Bihongo Poribohon Limited	Mirpur 12 ⇌ Sadarghat Victoria Park
53	BRTC	Mirpur 12 ⇌ Mirpur 10 ⇌ Agargaon ⇌ Farmgate ⇌ Shahbag ⇌ Motijhil
54	Bikolpo Auto Service	Mirpur 12 ⇌ Mirpur 10 ⇌ Agargaon ⇌ Farmgate ⇌ Shahbag ⇌ Motijhil
55	Hazi Transport	Mirpur 12 ⇌ Mirpur 10 ⇌ Agargaon ⇌ Farmgate ⇌ Shahbag ⇌ Motijhil ⇌ Notre Dame College
56	Winner Transport Co Ltd	Eden College (Azimpur) ⇌ Kolabagan ⇌ Karwan Bazar ⇌ Nabisko ⇌ Mohakhali ⇌ Gulshan 1 ⇌ Badda Link Road ⇌ Kuril Bissho Road
57	Dip Bangla Poribohon Ltd	Azimpur ⇌ City College ⇌ Kolabagan ⇌ Panthopoth ⇌ Karwan Bazar ⇌ Nabisko ⇌ Gulshan Link Road ⇌ Gulshan 1 ⇌ Kuril Bissho Road
58	Suchona Brf	Azimpur Etimkhana Mor ⇌ Kolabagan ⇌ Asadgate ⇌ Farmgate ⇌ Mohakhali ⇌ Banani ⇌ Uttara House Building
59	Falgun Art Transport Private Limited	Azimpur Girls School & College ⇌ Science Lab ⇌ Shahbag ⇌ Kakrail ⇌ Mouchak ⇌ Malibag ⇌ Rampura ⇌ Badda ⇌ Kuril Bissho Road ⇌ Uttara House Building

60	BRTC	Eden College ⇌ Science Lab ⇌ Kolabagan ⇌ Asadgate ⇌ Khamarbari ⇌ Kakoli ⇌ Bonani ⇌ Abdullahpur
61	Suprova Poribohon	Sadarghat Victoria Park ⇌ Kakrail ⇌ Mouchak ⇌ Malibag Railgate ⇌ Badda ⇌ Notun Bazar ⇌ Basundhara ⇌ Kuril ⇌ Uttara ⇌ Tongi ⇌ Gazipur
62	Azmery Glory Limited, Skyline Express Limited	Sadarghat Victorial Park ⇌ Gulistan ⇌ Kakrail ⇌ Malibag ⇌ Mogbazar ⇌ Mohakhali ⇌ Airport ⇌ Abdullahpur ⇌ Gazipur Bypass ⇌ Chondra
63	Raja City Poribohon Limited, FTCL Moitri Poribohon Limited	Mohammadpur ⇌ Shankar ⇌ Star Kabab ⇌ Jhigatola ⇌ City College ⇌ Science Lab ⇌ Shahbag ⇌ Press Club ⇌ Gulistan ⇌ Arambag ⇌ Notre Dame College
64	ATCL	Mohammadpur ⇌ Asadgate ⇌ Shukrabad ⇌ Kolabagan ⇌ City College ⇌ Science Lab ⇌ Katabon ⇌ Shahbag ⇌ Press Club ⇌ Gulistan ⇌ Arambag ⇌ Notre Dame College
65	Swapno	Mohammadpur ⇌ Farmgate ⇌ Mohakhali ⇌ Gulshan ⇌ Damra staff ⇌ Quarter
66	Shadin	Mohammadpur ⇌ Asadgate ⇌ Kawranbazar ⇌ Banglamotor ⇌ Eskaton
67	Welcome	Motijheel ⇌ Science Lab ⇌ Shahabagh ⇌ Gabtoli ⇌ Savar ⇌ Nobinogor ⇌ Chondra