

Service Quality and Factors Influencing the Adoption of Water Taxi Service in Hatirjheel, Dhaka

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Abstract

Dhaka, one of the most congested cities in the world, faces severe transportation challenges due to its heavy reliance on road networks. In response, RAJUK introduced a water taxi service in Hatirjheel and Gulshan Lake in 2016, initially for recreational purposes but now also used for commuting. This study evaluates the current use, service quality, and key factors influencing the adoption of this service. Using the SERVQUAL model and One-way ANOVA, the study assesses service quality, while Exploratory Factor Analysis (EFA) identifies key influencing factors. Findings indicate that the overall service quality is poor, with a significant gap between expected and perceived service levels. However, service quality is rated fair among individuals aged 45 to 60 and businessmen. The study identifies three primary factors influencing user adoption: traffic congestion, comfort, and travel time. While respondents most frequently cited travel time as a key factor, EFA suggests that traffic congestion has the strongest impact on user preference. This highlights that while users seek quicker travel, their primary motivation is avoiding road congestion. The findings emphasize the need for service improvements to enhance user satisfaction and increase adoption. Addressing concerns related to comfort, travel time reliability, and congestion relief could make the Hatirjheel water taxi service a more effective urban transport solution. Future research should explore additional factors such as pricing, environmental benefits, and policy interventions to optimize water-based transportation in Dhaka.

Keywords: Service Quality, Influencing Factor, SERVQUAL, Water Taxi, Hatirjheel

1. Introduction

A water taxi is a transportation service that operates on water. Water taxi services operate similarly to conventional taxi services. A boat can be conveniently ordered at a place equipped with a suitable mooring facility, such as a jetty. The journey commences promptly at the specified time and concludes at the designated arrival jetty as planned (van Berkel, 2020). A water taxi, often referred to as a water bus or water ferry, is a form of transportation that functions on bodies of water, such as rivers, lakes, or coastal regions. It offers a convenient mode of transportation for passengers, typically on a smaller scale in comparison to conventional ferries. Water taxis are commonly utilized for brief journeys and enjoy widespread popularity in tourist hotspots or urban areas boasting waterfront features (*Q Marketing Research*, 2023).

Transportation on waterways is the most ancient form of inland transportation and has historically been the predominant route of travel for an extensive period. Transportation via rivers provided the most optimal means of transportation for both humans and

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commodities. Originally, the transportation of goods over inland waterways was limited to natural rivers and relied on wind power for propulsion. Subsequently, further canals were excavated to accommodate the growing need for water transportation. These newly constructed waterways saw the use of vessels that relied on either horses or manpower for propulsion. Water transport serves two crucial functions. Waterways play a crucial role in the management of water. Canals and rivers serve as extensively utilized sources for water delivery. This water is primarily used for industrial reasons, such as cooling and agricultural uses like irrigation, before being returned to the canal or river. Waterways serve as a means of efficient transportation of water from one region of the country to another, functioning much like a pipeline. Furthermore, canals and rivers serve a crucial role in land drainage. Rivers possess significant tourism and recreational worth. A significant number of individuals enjoy using their free time to engage in various water-related hobbies such as swimming, sailing, fishing, and strolling or cycling beside rivers (Wiegman & Konings, 2017).

In water-based transport, fuel costs are typically cheaper compared to transportation by road, rail, or air. Additionally, the level of environmental pollution is generally lower as well. The canal is inherently accessible, requiring proper management, upkeep, and training. Enhanced Water-based transportation is particularly efficient when the origin and destination are situated along a body of water (Rangaraj & Raghuram, 2007).

Dhaka has a population of about 15 million people inside its 360-square-kilometer territory. Unfortunately, it has become known as one of the most congested, hazardous, and filthy cities in the world. However, there is room for growth in these sectors. The capital city's transportation network is highly dependent on its road network. Nevertheless, the road infrastructure in Dhaka lacks proper planning, design, and operation to adequately cater to the mobility and accessibility requirements of its residents. A significant proportion of Dhaka's extensive 1868 km road network lacks sidewalks, and the existing walkways are characterized by their limited width, inadequate maintenance, and fragmented condition. Buses serve as the sole means of mass transportation in Dhaka, with the majority of bus operators being privately held entities that are fragmented and lack organization. The bus service they provide is significantly insufficient and of extremely low quality (Chowdhury, 2014)

The issue of traffic congestion in Dhaka City is widely recognized as a significant problem. During peak hours, the entire city experienced significant traffic congestion, resulting in substantial economic losses owing to the loss of productive working hours. The city of Dhaka is geographically situated amidst five prominent rivers, namely, the Buriganga, Balu, Tongi, Turag, and Sitolakha. Additionally, several lakes, such as Hatirjheel, Dhanmondi, and Gulshan, are present within the city limits. In light of these geographical features, the introduction of water bus services has been contemplated as a potential remedy to alleviate road traffic congestion in specific areas, catering to the commuting needs of the local populace (Hossain & Rahman, 2013)

Inland navigation plays a significant role in specific countries. A well-developed network of rivers and canals can transport commodities efficiently. Transporting passengers at a low expense over long distances. Notable countries with highly developed inland water transportation systems include Bangladesh, mainland Southeast Asian countries, and China (Bari & Tabassum, 2020).

Water bus services might be seen as a viable solution for mitigating traffic congestion in urban areas that are geographically encompassed by rivers or lakes. BIWTC has initiated a water bus service within the city of Dhaka. The inaugural water taxi service in Bangladesh was introduced by the BIWTC in 2004, namely along the Sadarghat-Aminbazar routes. Following this, in August 2010, the service was restored by the implementation of two waterbuses that operated along the Sadarghat- Swarighat-Kholamura- Gabtoli routes. Nevertheless, following a period of 11 months, the Bangladesh Inland Water Transport Corporation (BIWTC) discontinued the service once again, attributing the insufficiency of navigability as the main factor (Hossain & Rahman, 2013). BIWTC has recently introduced two additional speedboat routes in the region of Dhaka, the nation's capital. The two newly created routes have been named Tongi-Ulukhola and Tongi-Kadda.

Hatirjheel is a prominent lakeshore located in the city of Dhaka. Before 2009, the area was characterized by its impoverished conditions but has since undergone a significant transformation into a recreational space, serving as a viable solution to alleviate traffic congestion (*The Financial Express*, 2016). The government has undertaken an initiative to create more entertainment amenities to enhance the appeal of the Hatirjheel project for visitors. In the fourth amended version of the Hatirjheel Area Integrated Development Project, the authorities have incorporated additional amenities, such as a theater, laser show, and water taxi service, as well as fast-food shops and restaurants. These enhancements aim to provide city residents with opportunities to enjoy leisurely activities and enhance their overall experience in the area. Since its partial launch on January 2, 2013, Hatirjheel has attracted a significant number of visitors due to the limited opportunities for urban residents to engage in outdoor leisure activities (Nowreen, 2018). The project is being implemented by Rajdhani Unnayan Kartipakkha (RAJUK) in collaboration with the LGED, DWASA, and the Special Work Organization (16 Engineers Construction Bridge) of the Bangladesh Army. The implementation of a circular bus and water taxi service is planned to facilitate the movement of visitors inside the project area and provide a means of transportation to the Rampura- Moghbazar-Karwanbazar area for everyday activities (Unb, 2015). On December 16, 2016, RAJUK introduced a water taxi service within Hatirjheel Lake.

The Hatirjheel water taxi service was launched with the primary objective of providing recreational opportunities. Currently, individuals are utilizing this service as a means of transportation in the adjacent areas of Rampura, FDC (Karwan Bazar), Police Plaza (Gulshan), and Gudaraghat (Gulshan). Few studies were conducted about water taxi services in the Hatirjheel area. Some researchers are studying the potential and future of water taxi services. Only a few studies have been completed about factors influencing the adoption of water taxi services around the world. There is a dearth of research on the many elements that exert influence on the adoption of water taxi services in Hatirjheel, Dhaka. To fulfil this research gap, water taxi service on Hatirjheel Lake connecting several Dhaka city areas is considered the study area for this research. The primary research questions guiding this study are: (1) What is the current use, and service quality? (2) What are the key factors behind the adoption of water taxi service in Hatirjheel, Dhaka? This study aims to explore the current use and service quality as well as the key factors behind the adoption of water taxi services in Hatirjheel, Dhaka. The framework of the study is shown in *Figure 1*.

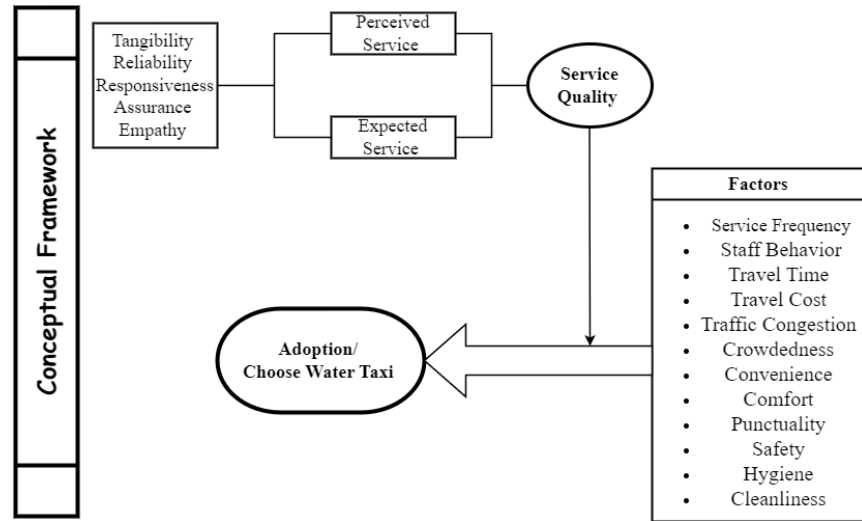


Figure 1: Conceptual Framework of the Study
Source: Author, 2024

2. Methods

2.1 Study Area

The study area of this research is the Hatirjheel Water Taxi Service, which provides service to people in Hatirjheel and Gulshan Lake. More accurately, the 4 stations of the water taxi service are used as the study area. The four stations of the water taxi service, namely FDC, Police Plaza, Rampura, and Gulshan (Gudaraghat). The users of water taxis were the participants of the survey during this study. The jetty of those 4 stations and the running taxi were the survey points of this study. The map of the study area is shown in *Figure 2*.

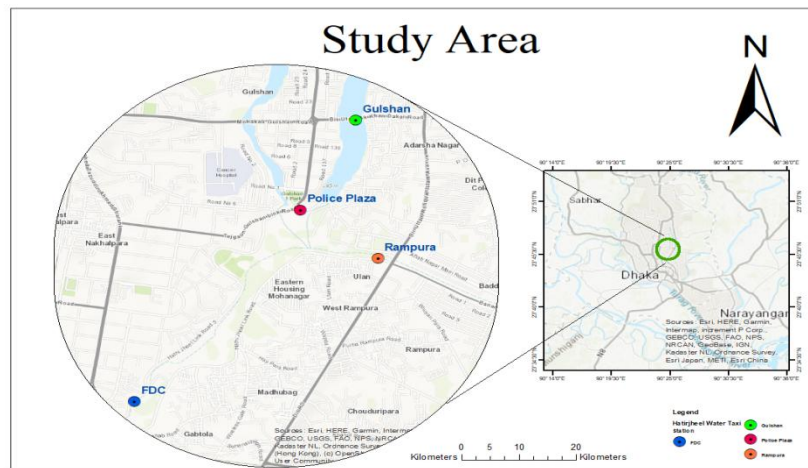


Figure 2: Study Area Map
Source: Author, 2024

2.2 Research Approach

This research follows a quantitative approach to find the answer to the research question. The first objective of this research was interpreted by a service quality measurement model named 'SERVQUAL Model' or 'RATER Model' and also used One-way ANOVA for in-depth analysis. The second objective of this research was interpreted by the 'Exploratory Factor Analysis' by using IBM SPSS (version- 27.0). The variables used in this study were encoded or measured by using different categories and dummy codes (1, 2, 3,) for data analysis.

2.3 Sampling

The term "sampling" refers to the process of selecting a subset of the population to collect data (Taherdoost, 2016). In this study, the target population comprised passengers utilizing the water taxi service. However, as the exact size of this population was unknown, Cochran's formula for sample size determination under conditions of an unknown population was employed, resulting in a calculated sample size of 384 respondents. To select participants, the study adopted a non-probability convenience sampling technique, which allowed for the inclusion of respondents based on their availability and willingness to participate.

2.4 Data Collection

This study primarily relied on primary data collection. A structured questionnaire was developed using Kobo Toolbox for digital administration and Microsoft Word for printing hard copies. The questionnaire comprised three sections. The first section gathered demographic information of the respondents. The second section included 22 questions based on the SERVQUAL model to assess the quality of water taxi services. The final section focused on various factors influencing passengers' choice of the water taxi service. The survey was conducted across four jetty points (FDC, Police Plaza, Rampura, and Gulshan) where passengers typically wait for the water taxi. Data collection was also carried out onboard the water taxis during transit to capture in-journey responses. The survey took place on January 12th, 14th, and 15th, 2024, with January 12th representing a weekend and the latter two dates being weekdays. A team of 13 enumerators, including the author, was involved in data collection. Each enumerator was equipped with a mobile device, internet connectivity, the Kobo Collect application, and access to the digital version of the questionnaire. Additionally, they carried printed copies of the questionnaire to mitigate potential technical issues. Respondents were selected while they were either waiting for the water taxi or traveling between stations. Data collected via the Kobo Toolbox platform were automatically exported to Microsoft Excel, thereby saving time and minimizing manual data entry errors. Responses gathered through hardcopy questionnaires were manually entered into Excel. Subsequently, all data were imported into IBM SPSS for further statistical analysis. The analytical methods employed are discussed in the following sections.

2.5 Analytical Framework

This study uses only primary data and is analyzed through descriptive statistics, One-way ANOVA, and Exploratory Factor Analysis. Data analysis is divided into two steps. In the first step, the socio-demographic characteristics of respondents were analyzed through descriptive statistics (Frequency, Percentage). Service quality was measured by

the SERVQUAL model, and the final analysis of this step was One-way ANOVA in IBM SPSS (version 27.0). The second step has two parts. At first, influencing factors were analyzed through descriptive statistics (Frequency and percentage), and the last part was analyzed through Exploratory Factor Analysis in IBM SPSS (version 27.0). The analytical framework is illustrated in *Figure 3*.

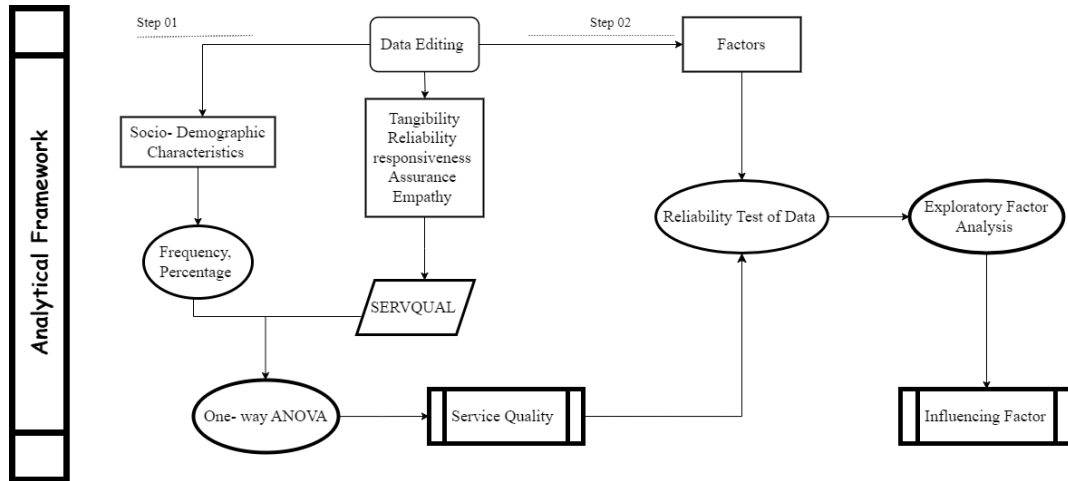


Figure 3: Analytical Framework of the Study

Source: Author, 2024

2.5.1 SERVQUAL Model

Parasuraman et al. (1985) identified 97 characteristics influencing service quality, initially classified into ten dimensions. These were later refined through a two-stage process to select the most impactful items. (Parasuraman et al., 1985). The initial refinement identified ten service quality dimensions, later consolidated into five: Tangibility, Reliability, Responsiveness, Assurance, and Empathy. These were evaluated using 22 assertions from Parasuraman et al.'s work. (1985, p.41-50). The SERVQUAL model is shown in *Figure 4*.

SERVQUAL Equation,

$$\text{SERVQUAL} = \text{Perceived Service} - \text{Expected Service.}$$

$$\text{SQ} = \text{P} - \text{E}$$

If,

Perceived Service = Expected Service = Good Service Quality (Satisfied)

Perceived Service < Expected Service = Poor Service Quality (Dissatisfied)

Perceived Service > Expected Service = Exceptional Good Service Quality (Delight)

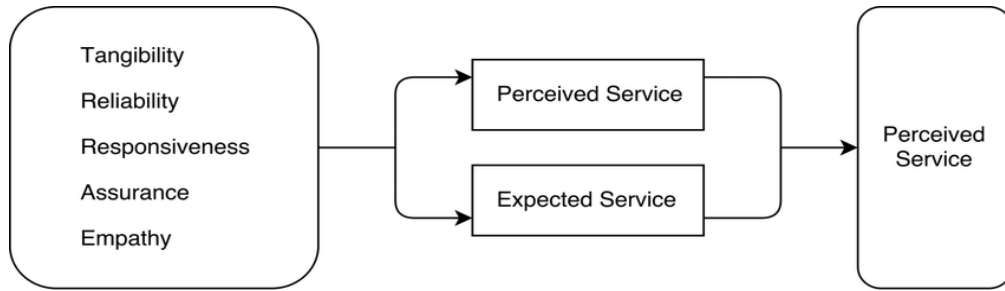


Figure 4: SERVQUAL Model
Source: Parasuraman et al., 1985

This study used the SERVQUAL Model for assessing the service quality of Hatirjheel water taxi service in Hatirjheel, Dhaka.

2.5.2 Service Quality Measurement by SERVQUAL Model

Quantitative information was collected using a standardized questionnaire. The average value for each dimension of SERVQUAL was derived based on perception and expectation. The disparities in average values expose the SERVQUAL assessment.

Service Quality (SQ) = Customers' Perception (P) - Customers' Expectation (E)

In equation form, it can be expressed as follows:

$$Q_i = \sum_{j=1}^k (P_{ij} - E_{ij})$$

Where,

SQ_i = Perceived service quality of individual 'I'

K = Number of service attributes/ items

P = Perception of individual 'I' with respect to performance of service organization's attribute 'j'

E = Service quality expectation attributes 'j' that is relevant norm for individual 'I'

2.5.3 Effect Size Calculation

Perceived service quality may vary in different socio-demographic characteristics like age groups, educational qualification, monthly income level, occupation, etc. Study conducts One-way ANOVA to find the variation. The effect size is calculated by using eta squared. The equation is below (Levine & Hullett, 2002).

$$\text{Effect size, } \eta^2 = \frac{SS_{\text{between}}}{SS_{\text{total}}}$$

Where,

η^2 = Eta squared

SS_{between} = Sum of squares between

SS_{total} = Total sum of square

Cohen's D criteria-

Eta squared = 0.01 = Small effect

Eta squared = 0.06 = Medium effect

Eta squared = 0.14 = Large effect

Analysis of Variance (Between Groups) compares the means between groups. If the null hypothesis is rejected, there is a statistically significant difference in service quality and it affects the service quality. These effects are calculated by eta squared.

3. Results

3.1 Socio-Demographic Characteristics of the Respondents

Table 1: At a Glance: Socio-Demographic Characteristics of Respondents

	Variables	Frequency	Percentage
Gender	Male	257	66.93%
	Female	127	33.07%
	Other	0	0%
Age	Below 18	44	11.46%
	18- 30	185	48.18%
	30- 45	151	39.32%
	45- 60	4	1.04%
	Above 60	0	0%
Occupation	Govt. Service	102	26.56%
	Private Service	102	26.56%
	Business	49	12.76%
	Student	131	34.11%
Education	Primary	0	0%
	Secondary	100	26.04%
	Higher Secondary	47	12.24%
	Graduate	237	61.72%
Income (Monthly)	Under 10000	118	30.73%
	10000- 25000	19	4.95%
	25001- 40000	122	31.77%
	40001- 70000	88	22.92%
	70001- 100000	24	6.25%
	Above 100000	13	3.39%

3.2 Current Usage of Hatirjheel Water Taxi Service

A total of 384 samples were collected to assess the current usage patterns of the Hatirjheel Water Taxi Service. Every respondent's response about their trip purpose. Primarily, 4 types of purposes are identified such as work, going home, education, and recreation. A total 62 percentage respondent use this service to go their daily work followed by 20 percentage respondents use this service to go their educational institutions. On the other hand, only 18 percent of respondents use water taxi for recreation purposes. The trip purpose of the users is shown in *Figure 5*. From this analysis, the study finds that people use the Hatirjheel Water Taxi service as transportation mode now.

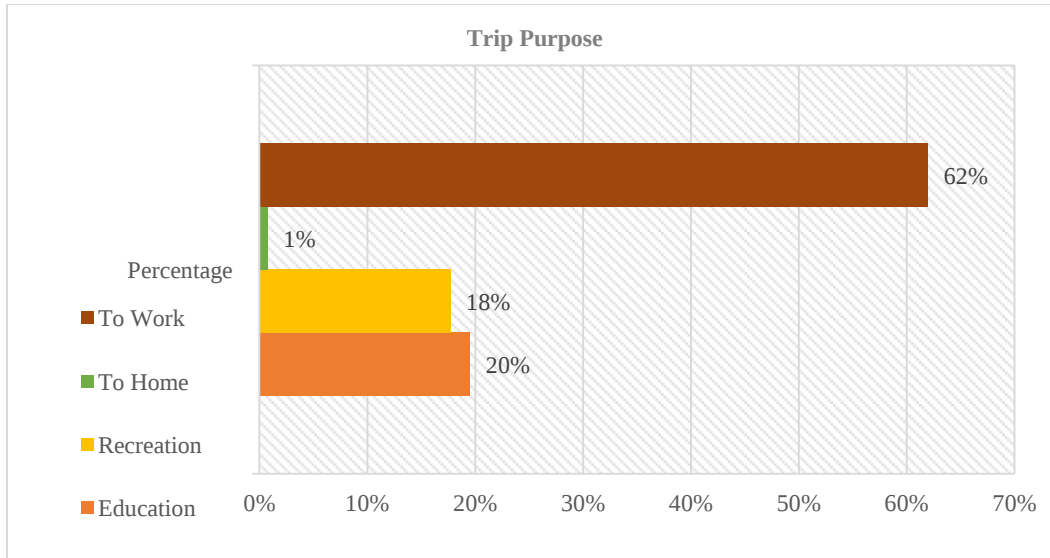


Figure 5: Current Usage of Hatirjheel Water Taxi Service

3.3 Gap Between Perceived and Expected Service Quality

3.3.1 Average Gap Between Perceived and Expected Service Quality Based on Question

Average perceived and expected service quality gap scores based on 22 questions of SERVQUAL model are shown in *Table 2*. Question no. four of tangibility (materials associated with service should be visually appealing) has the maximum gap (-2.112) followed by question no. Five of reliability (Company keeps accurate records) average gap (-1.794). On the other hand, question no. five of empathy ((The employees of company understand customers' specific needs) has minimum gap (-0.929) followed by question no. two of assurance (Customers feel safe in transactions with the company) average gap (-1.111).

Table 2 shows that all 22 questions of SERVQUAL model have a negative gap between perceived and expected service quality. Users' expected service is higher than perceived service.

Table 2: Average Gap of Service Quality between Expected Service and Perceived Service Based on Question

Variables	Question Code	Average Expected Service	Average Perceived Service	Difference or Service Quality Gap
Tangibility	T1	6.546875	4.799479167	-1.7474
	T2	6.130208333	4.700520833	-1.42969
	T3	6.34375	4.588541667	-1.75521
	T4	6.359375	4.2421875	-2.11719

Variables	Question Code	Average Expected Service	Average Perceived Service	Difference or Service Quality Gap
Reliability	R1	6.533854167	4.953125	-1.58073
	R2	6.4375	4.924479167	-1.51302
	R3	6.385416667	4.856770833	-1.52865
	R4	6.4296875	4.955729167	-1.47396
	R5	6.388020833	4.59375	-1.79427
Responsiveness	Rs1	6.401041667	4.888020833	-1.51302
	Rs2	6.34375	4.6640625	-1.67969
	Rs3	6.236979167	4.765625	-1.47135
	Rs4	6.276041667	4.669270833	-1.60677
Assurance	A1	6.315104167	4.8359375	-1.47917
	A2	6.3046875	5.192708333	-1.11198
	A3	6.153645833	5	-1.15365
	A4	6.161458333	4.515625	-1.64583
Empathy	E1	6.481770833	4.7890625	-1.69271
	E2	6.333333333	4.9296875	-1.40365
	E3	6.059895833	4.533854167	-1.52604
	E4	6.002604167	4.231770833	-1.77083
	E5	5.815104167	4.885416667	-0.92969

3.3.2 Average Gap Between Perceived and Expected Service Quality Based on Variables

Average perceived and expected service quality gap scores based on 5 variables of the SERVQUAL model are shown in *Table 3*. The tangibility variable has maximum gap (-1.762), and the Assurance variable has minimum gap (-1.347). Besides, the average service gap of reliability and responsiveness is very close. Reliability and responsiveness have -1.578 and -1.567 average gap, respectively. The average expectation and perception of service quality in all five variables have a negative service gap. Average expected service exceeds the average perceived service of Water taxi users.

All five variables of SERVQUAL model have a negative gap between perceived and expected service quality (shown in *Table 3*). Water taxi users' expected service is higher than perceived service.

Table 3: Average Gap of Expected and Perceived Service Quality Based on Variables

Variables	Expected Service	Perceived Service	Gap
Tangibility	6.345052	4.582682	-1.76237
Reliability	6.434896	4.856771	-1.57812
Responsiveness	6.314453	4.746745	-1.56771
Assurance	6.233724	4.886068	-1.34766
Empathy	6.138542	4.673958	-1.46458

3.3.3 Service Quality of Hatirjheel Water Taxi Service by SERVQUAL Model

The details service quality equation was described in sub-section 2.5.1, 2.5.2, and 2.5.3. According to those sub-sections, the service quality gap is -1.5440886 . Here, the service quality gap is negative (-1.5440886) and perceived service is less than expected service. This service quality is poor, and users are dissatisfied with this service. The Hatirjheel water taxi service operator can't fulfill their users' expectations. Users rated this as poor-quality service. On the other hand, several people from Gulshan, Baridhara, Badda, Rampura, and Karwan Bazar use this water taxi service. Their expectation may be too high on only water taxi service in Dhaka.

3.4 Perceived Service Quality Among Different Socio-Demographic Characteristics

Perceived service quality may vary in different socio-demographic characteristics like age group, educational qualification, monthly income level, occupation, etc. In this section, this study tries to find out the perceived service quality among different socio-demographic characteristics of respondents by using One-way ANOVA.

3.4.1 Service Quality Among Age Groups

At first, the study set a hypothesis to conduct One-way ANOVA.

- Null hypothesis (H_0) = There is no difference in perceived service quality among age groups.
- Alternative hypothesis (H_1) = There is a difference in perceived service quality among age groups

A One-way between-groups analysis of variance (ANOVA) was employed to examine the impact of the age group (Under 18, 18- 30, 30- 45, 45- 60) on the perceived quality of service. Examining the skewness, kurtosis, and Shapiro-Wilk statistics revealed that the assumption of normality for the dependent variable (perceived service quality) was not violated. Levene's statistic was nonsignificant; thus the assumption of homogeneity of variance can be assumed.

Table 4: ANOVA of Perceived Service Quality Among Age Groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.300	3	1.100	2.843	.038
Within Groups	147.047	380	.387		
Total	150.347	383			

There was a statistically significant difference at the $p < .05$ level in perceived service quality for the four groups: $F(383) = 2.843$, $p = 0.038$. So, the null hypothesis is rejected. This ANOVA test proved a significant difference in perceived service quality among age groups.

The people from the 45- 60 age group rated perceived service quality (5.08) to be better than any other age group followed by the under 18 and 30-45 age groups respectively. Besides, the 18- 30 age group rated perceived service quality (4.685) as slightly good, but worse than any other age group.

Although the difference in mean scores between the groups was statistically significant, the mean of the difference was relatively small. The effect size, calculated using eta squared, is 0.022. This has a small effect on perceived service quality among different age group.

3.4.2 Service Quality Among Educational Qualification

At first, the study set a hypothesis to conduct One-way ANOVA.

- Null hypothesis (H_0) = There is no difference in perceived service quality among education levels.
- Alternative hypothesis (H_1) = There is a difference in perceived service quality among education level

A one-way between-groups analysis of variance (ANOVA) was employed to examine the impact of education levels (Secondary, Higher Secondary, and Graduate) on the perceived quality of service. Examining the skewness, kurtosis, and Shapiro-Wilk statistics revealed that the assumption of normality for the dependent variable (perceived service quality) was not violated. Levene's statistic was nonsignificant, $p=.057$, thus the assumption of homogeneity of variance can be assumed.

Table 5: ANOVA of Perceived Service Quality Among Education Levels

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.157	2	.578	1.477	.230
Within Groups	149.190	381	.392		
Total	150.347	383			

There was no statistically significant difference at the $p < .05$ level in perceived service quality for the three groups: $F(383) = 1.477$, $p = 0.230$. So, the null hypothesis is accepted. This ANOVA test proved no significant difference in perceived service quality among education levels.

3.4.3 Service Quality Among Monthly Income Levels

At first, the study set a hypothesis to conduct One-way ANOVA.

- Null hypothesis (H_0) = There is no difference in perceived service quality among monthly income levels.
- Alternative hypothesis (H_1) = There is a difference in perceived service quality among monthly income level

A one-way between-groups analysis of variance (ANOVA) was employed to examine the impact of monthly income levels (Under 10000, 10000- 25000, 25001- 40000, 400001- 70000, 70001- 100000, Above 100000) on the perceived quality of service. Examining the skewness, kurtosis, and Shapiro-Wilk statistics revealed that the assumption of normality for the dependent variable (perceived service quality) was not violated. Levene's statistic was nonsignificant, thus the assumption of homogeneity of variance can be assumed.

Table 6: ANOVA of Perceived Service Quality Among Monthly Income Level

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.057	5	1.211	3.174	.008
Within Groups	144.290	378	.382		
Total	150.347	383			

There was a statistically significant difference at the $p < .05$ level in perceived service quality for the six groups: $F(383) = 3.174$, $p = 0.008$. So, the null hypothesis is rejected. This ANOVA test proved a significant difference in perceived service quality among monthly income level.

The people from 40001- 70000 income level rated perceived service quality (4.942) to be better than any other age group followed by 10000- 250000 income level and 70001-100000 income level respectively. Besides, the under 10000 income level people rated perceived service quality (4.615) as slightly good, but worse than any other age group.

Despite reaching statistical significance, the difference in mean scores between the groups was quite small. The effect size, calculated using eta squared, was 0.04. According to Cohen's D criteria, this has a small effect on perceived service quality among different income levels (monthly).

3.4.4 Service Quality Among Occupation

At first, the study set a hypothesis to conduct One-way ANOVA.

- Null hypothesis (H_0) = There is no difference in perceived service quality among occupations.
- Alternative hypothesis (H_1) = There is a difference in perceived service quality among occupation

A one-way between-groups analysis of variance (ANOVA) was employed to examine the impact of occupation (Govt. service, private service, business, and student) on the perceived quality of service. Examining the skewness, kurtosis, and Shapiro-Wilk statistics revealed that the assumption of normality for the dependent variable (perceived service quality) was not violated. Levene's statistic was nonsignificant, thus the assumption of homogeneity of variance can be assumed.

Table 7: ANOVA of Perceived Service Quality Among Occupation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.736	3	4.579	12.736	.001
Within Groups	136.611	380	.360		
Total	150.347	383			

There was a statistically significant difference at the $p < .05$ level in perceived service quality for the four groups: $F(383) = 12.736$, $p = 0.001$. So, the null hypothesis is rejected. This ANOVA test proved a significant difference in perceived service quality among occupation.

Businessmen rated perceived service quality (5.186) to be better than any other occupation. Private service holders rated perceived service quality (4.832) as better than govt. service holder and student. Besides govt. service holder and student rated perceived service quality (4.629, 4.619) as slightly good but worse than businessman and private service holder respectively.

Despite reaching statistical significance, the difference in mean scores between the groups was quite small. The effect size, calculated using eta squared, was 0.09.

According to Cohen's D criteria, this has a medium effect on perceived service quality among different occupation.

3.5 Identifying the Key Influencing Factor

In this section, the study tries to identify the key factor that influence people to choose Hatirjheel water taxi service. At first, the study identifies key factors by using descriptive statistics (Frequency, and percentage). Then the factors are identified through Exploratory Factor Analysis by using IBM SPSS (version 27.0).

3.5.1 Frequency and Percentage of Influencing Factors

Respondents choose multiple factors that influence them to use water taxi. A total of 384 respondents choose 13 factors in 1390 times. Then it analyzes in IBM SPSS by multiple responses. This frequency and percentage of influencing factors are shown in *Table 8*. A total of 69.8% of respondents choose travel time as an influencing factor which frequency is 268. That means people go from one place to another place in a short time than another vehicle. Then study claimed that water taxi needs less time to reach their destination. The second influencing factor, chosen by the respondent is traffic congestion. It is picked 263 times by respondents. People often seek to avoid traffic congestion, and water taxis offer a congestion-free travel alternative. Comfort is chosen 199 times by respondents. Water taxi is more comfortable than other vehicles. Some other factors have a small influence to use water taxi. The least influencing factor are hygiene, followed by cleanliness, punctuality, staff behavior, safety, service frequency, etc which are shown in *Table 8* and *Figure 6*. From this analysis, these factors were not considered significant influencers by the respondents. In conclusion, People try to save travel time, avoid traffic congestion, and travel in comfortable transportation in their journey.

Table 8: Influencing Factors Frequencies and Percentage

		Responses		Percent of Cases
		Frequency	Percentage	
Factors	Service Quality	165	11.9%	43.0%
	Service Frequency	62	4.5%	16.1%
	Staff Behavior	37	2.7%	9.6%
	Travel Time	268	19.3%	69.8%
	Travel Cost	77	5.5%	20.1%
	Traffic Congestion	263	18.9%	68.5%
	Crowdedness	126	9.1%	32.8%
	Convenience	102	7.3%	26.6%

	Responses		Percent of Cases
	Frequency	Percentage	
Comfort	199	14.3%	51.8%
Punctuality	25	1.8%	6.5%
Safety	46	3.3%	12.0%
Hygiene	3	0.2%	0.8%
Cleanliness	17	1.2%	4.4%
Total	1390	100.0%	362.0%

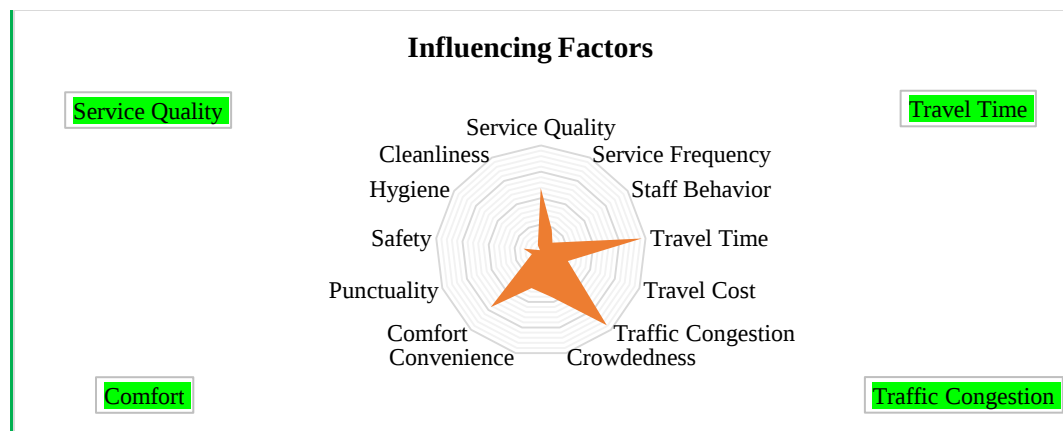


Figure 6: Influencing Factors

3.5.2 Exploratory Factor Analysis

In *sub-section 3.5.1*, the study finds out the key influencing factors. In this sub-section, Exploratory Factor Analysis is conducted to verify whether the factors discussed in the above sub-section influence users.

The influencing factors of Hatirjheel water taxi service are examined using Principal Axis Factoring (PAF) with Promax rotation. The initial inspection of the R-matrix indicated a substantial number of the coefficients were above 0.30. The Kaiser-Mayer-Olkin (KMO) index was 0.673, exceeding the recommended value of 0.6 (Kaiser, 1970), and Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance, indicating that collected data was suitable for factor analysis. Some factors are eliminated for low communalities and cross-loading. These are service frequency, staff behavior, travel cost, punctuality, safety, hygiene, and cleanliness. Finally, six factors' items are analyzed through EFA.

The results of the initial analysis revealed three factors with Eigenvalues over 1. However, the Scree plot suggests a clear break after the second factor (*Figure 7*). The Scree plot suggests that maximum two factors will be loaded.

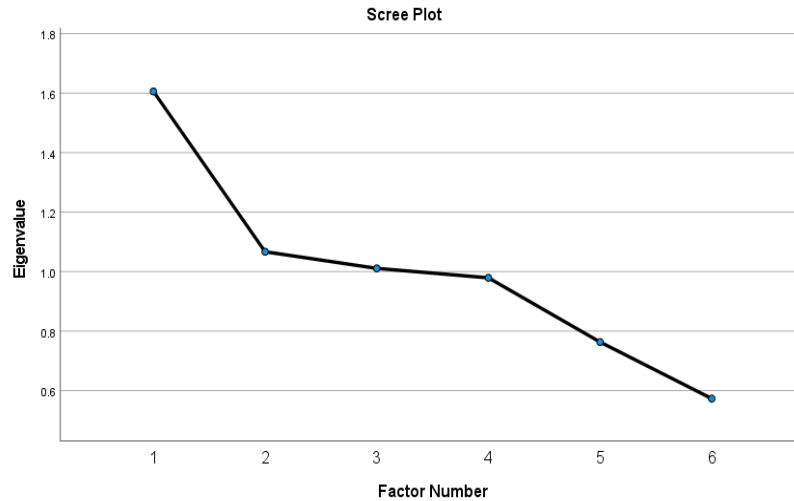


Figure 7: Scree Plots of Exploratory Factor Analysis

Following the item retention outlined at the outset, three-factor items were retained for the final factor item with two influencing factors. Two items (Traffic Congestion, and Comfort) are loaded on factor 1, and one item (Travel Time) is loaded on factor 2 (shown in *Table 9*). EFA indicates traffic congestion, comfort, and travel time are the key factors that influence people to use water taxi.

Table 9: Standardized Factor Loadings from the Exploratory Factor Analysis

Items	Factor	
	1	2
Travel Time		.301
Traffic Congestion	.990	
Comfort	.897	

4. Discussion

4.1 Discussion of Service Quality

According to SERVQUAL model, the service of Hatirjheel water taxi service is poor service quality. This service quality is overall service quality. The study tries to find the service quality among different socio-demographic characteristics. Service quality varies in different socio-demographic characteristics. Service quality of Hatirjheel water taxi varies among the different age groups, income levels (monthly), and occupations. Service quality doesn't vary among education levels. Among the socio-demographic variables, only occupation has a medium effect on perceived service quality. On the other hand, age group, and income level have a small effect on perceived service quality. The analysis reveals that Only 45- 60 years age group and businessmen rated this service quality as good. The rest of the category marked service quality as fair. The key findings of service quality are presented in *Table 10*.

Table 10: Key Findings of Service Quality

Socio-demographic Characteristics		Average SQ	Service Quality
Age Group	45 to 60	5.08	Good
Occupation	Businessmen	5.186	Good
Others	All	Less than 5	Fair

4.2 Discussion of Influencing Factor

Based on respondents' preferences, travel time, traffic congestion, and comfort were identified as the primary factors influencing the adoption of the Hatirjheel water taxi service. On the other hand, EFA indicates Comfort, traffic congestion, and travel time are the key influencing factors to adopt with Hatirjheel water taxi service. Both analyses claimed that these three factors highly influence people to use water taxi, but people choose travel time as most influencing factor and EFA says traffic congestion is most influencing factor. People have picked travel time most time, but they have given it a lower rating than traffic congestion, and comfort. Finally, the study found out the three key factors that influence people to adopt with Hatirjheel water taxi service.

4.3 Limitations of the Study

This study has several limitations that should be acknowledged. First, due to the unknown population size of water taxi users in Hatirjheel, non-probability convenience sampling was used. While practical, this method limits the generalizability of the findings as it may not fully represent all user groups. Second, the study focused on service quality and influencing factors, but did not directly measure user satisfaction, which is closely related and would offer a more complete understanding of service performance. Third, while the SERVQUAL model is widely used, it has known limitations. Measuring both expectations and perceptions can be challenging, and its five fixed dimensions may not fully capture user experiences in all contexts, particularly in Dhaka's unique urban setting. Additionally, the study was confined to four stations within Hatirjheel and conducted over a short period, which may not reflect seasonal or weekly usage variations. Future studies should address these gaps by adopting broader sampling methods, integrating satisfaction measures, and considering policy-level variables for a more comprehensive analysis.

5. Conclusion

This study assessed the current use, service quality, and key factors influencing the adoption of the Hatirjheel water taxi service in Dhaka. Findings from the SERVQUAL model indicate that the overall service quality is poor, with a significant gap between expected and perceived service levels. While users recognize the potential of the service, their expectations remain largely unmet. However, the service quality was rated fair among individuals aged 45 to 60 and businessmen, suggesting that certain user groups find it more acceptable. Key factors influencing water taxi adoption were analyzed using both frequency analysis and Exploratory Factor Analysis (EFA). The results highlight traffic congestion, comfort, and travel time as the most critical determinants of user

preference. While respondents most frequently cited travel time as an influencing factor, EFA ranked traffic congestion as the most significant. This suggests that while users prioritize quick travel, their dissatisfaction with road congestion strongly motivates them to choose water transport. Authorities may consider expanding routes, improving service reliability, and promoting water taxis as part of a multi-modal transport solution. The findings underscore the importance of improving service quality to enhance user satisfaction and attract more commuters. Addressing key concerns such as comfort, travel time reliability, and congestion relief could help the Hatirheel water taxi service become a more viable transportation alternative in Dhaka. Future research could explore additional factors such as pricing strategies, environmental benefits, and policy interventions to further develop the city's water-based transport network.

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