ANALYZING THE CHANGES IN TRAVEL MODE BEHAVIOR IN UTTARA MODEL TOWN, DHAKA: A COMPARATIVE STUDY BEFORE AND AFTER THE EMERGENCE OF RIDE-HAILING SERVICES

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ABSTRACT

The urban transportation landscape has witnessed a significant transformation with the advent of ride-hailing services. This study focuses on analyzing the shifts in travel mode behavior in Uttara Model Town, Dhaka, before and after the emergence of ride-hailing services such as Uber, Pathao, Obhai etc. The problem statement centers around understanding the dynamic changes in commuting patterns and the factors that influence the adoption of these ride-hailing platforms as preferred travel modes. Despite the growing popularity of ride-hailing services in Dhaka, there is a research gap in comprehensively assessing the impact of these services on traditional travel modes and uncovering the underlying determinants of users' preference shifts. This study aims to fill this gap by achieving two primary objectives: firstly, examining the alterations in travel mode behavior post the introduction of ride-hailing services; secondly, identifying the key factors driving the adoption of platforms like Uber and Pathao as preferred travel modes within Uttara Model Town. An online questionnaire survey has been done to compare travel patterns to the launch of ride-hailing services to achieve the research goals. This survey aims to gather information on participants' socioeconomic characteristics, changes in preferred modes of transportation, and travel habits. The findings will help make more informed opinions about improving urban transport networks and accommodating people's evolving travel needs in Uttara Model Town and other locations.

Keywords: *Travel mode behavior, Ride-Hailing services, Online questionnaire survey, Urban transportation system.*

1. INTRODUCTION

The transport infrastructure in Dhaka, Bangladesh, faces significant challenges due to urbanization. Travelling in cities is inefficient and time-consuming because of traffic congestion, limited public transportation facilities, and more people owning private cars. Ride-hailing services have emerged as a possible solution to address mobility challenges (Ali et al., 2023). The metropolitan population has experienced exponential growth from 3 million in 1971 to approximately 18 million today (Rahman, 2020).

Ride-hailing services including Uber, Pathao, Amarbike, Taxiwala, Garivara, Chalo, Sohoj Ride, Obhai, and Obon have emerged as probable solutions for the transportation issue. These services offer convenient transportation, personalized travel experiences, and real-time navigation through smartphone apps (Islam et al., 2019). The majority of individuals in Uttara Model Town is employed either in private jobs or have their own businesses. Ride hailing services are popular among users due to their fast service, convenience, and comfort, even though they are more expensive than other transportation choices (Hoque & Saumi, 2021). The primary mode of transportation for travelling between Uttara and other parts of Dhaka is the public bus, Leguna which are part of the mass transport system. Currently, there are several bus services available, but none of them meet the criteria of being fast, reliable, and comfortable for daily commuters. During peak hours, individuals often opt for private cars or CNG as an alternative to crowded public transportation (Hoque et al., 2012).

The plan to build MRT 4, MRT 6, and a BRT line in the town might help with the traffic on the highway. But the existing roadway will be reduced in wide and cause more congestion on internal roads and intersections. The proposed upgrade of Sonargaon Janapath in the Detail Area Plan (DAP) could make traffic worse in Uttara Model Town. Because it is the only road, connects the 3rd phase with the rest of the township. In the 3rd phase, the inhabitants will need good transportation for getting around the community (Kabir and Ibrahim, 2018). We choose this area as its urban dynamics, transportation challenges, and the emergence of ride-hailing services make it an ideal case to analyze shifts in travel behavior. Its relevance extends to policy insights and broader urban mobility discussions.

This paper aims to examine the changes in travel mode behavior in Uttara after the emergence of ride healing services and to identify the factors influencing the adoption of ride-hailing services as travel modes in Uttara. An online questionnaire survey will be used in this study to achieve the objectives of the study. A full knowledge of changes in travel mode behavior will be acquired by triangulating diverse data sources. The survey included participants of different ages, income levels, and professions. Collecting data in the field has limitations. The surveyors have observed that users of ride-hailing services often struggle to identify their location on the road. The data is collected only by app-based ride sharing services. One user can use multiple apps. These researches are conducted before the expressway and metro rail opening in the Dhaka city.

Ride-hailing services, like those seen in Dhaka, demonstrate how technology can transform urban mobility and enhance the quality of life for city residents (Uddin, 2020). This technology helps people who spend a lot of time in traffic. It also creates job opportunities for unemployed young people (Karim et. al., 2020).

2. LITERATURE REVIEW

In the usage of day-to-day life of smart phone, travel like significant event has become very easier than before to operate with security. Safe and sound travel with privacy is now available to operate with technological advancement. All of these considerations, Uber has started its journey to reduce the difficulties of travel (Hunaiti et al., 2018).

In the most significant point of a city, it was expressed that there is some need of emergency movement and safety at the same time. Most of the people do not own the private vehicles to cooperate with the situation where the para- transit vehicles as a form of ride hailing service cope up with the situation (Artuno et al., 2022). Every good finding sometimes carries the limitation as the services provided by ride hailing has showed. The Number of vehicles can create the traffic congestion and the economic consideration of users. Uber ensured the time and safety sustained way but rather than these, people choose public transport sometime (Lee et al., 2022). In the case of preference and economical contribution, Uber has carried a significant performance of about being ranked 1st with 69 billion US dollar. This renamed was for the brilliant managemental co-operation with technological advancement

(Raj et al., 2023). Traveler's behavior matters in the case of choosing the services with the consideration of cost, safety, time etc. In the comparison of 2006 and 2011, it was shown that the usage if public transport reduced and it was the period of when all developed to more crystallization the significance (Shah & Hisashi, 2022). The economy also can be influenced by the service in the case of transportation. This can contribute a lot to reducing the unemployment rate by providing livelihood and mentioning taxes (Sakib & Mia, 2019). Public satisfaction is another vital factor because the review can be significant. The public commitment combined the cost and comfort. The frequency also can keep an impact of the preference. As wellbeing becomes the main goal, the betterment is expected (Li & Zhang, 2022).

A revolutionary change is observed in Dhaka after the Uber and Pathao started their services. The most preferable services provide a cost efficient, safe and prominent services excluded taxi and others. The authentic activities have created the reputation to utilize and develop the service in daily. The sustainability is the moto and ultimate consideration. The green-house gases releasing practice is often showed by transports and as ride hailing is considered as the more technical way, the practice providing services should be in a sustainable way to prevent the degradation of environment (Ghosh, 2019).

3. STUDY AREA PROFILE

The study area is in Uttara Model Town which is 22 km far from Dhaka city center. Uttara Model City has around 179,907 residents. It covers an area of 7 square kilometers. There are 25,701 people in each square kilometer (BBS, 2011). It has 18 sectors. It is on the road to Gazipur, next to Hazrat Shahjalal International Airport. In 1966, Dhaka Improvement Trust wanted to make a new town in Dhaka District. The project was named the North Satellite Town project. In 1980, DIT changed the project's name to Uttara Residential Model Town Project.

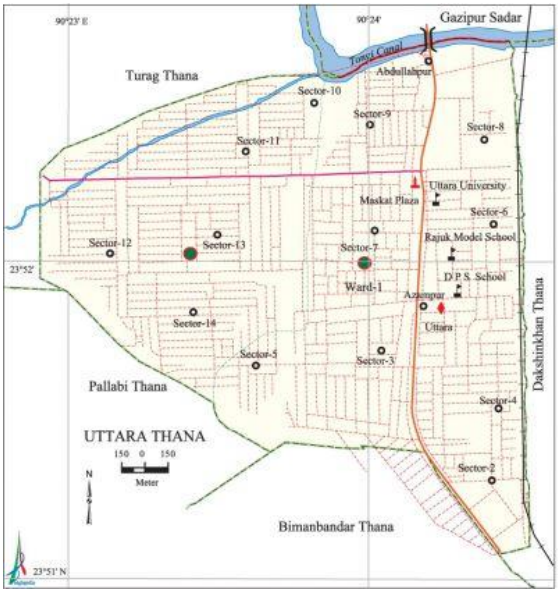

Figure 1: Study Area Profile (Source: Uttara thana map)

4. METHODOLOGY

The methodological framework of this study is given below:

4.1 Selection of the study

The study was selected because it is now at the trend of revolution. Online based ride hailing service is selected as recently it has become a rising issue in traffic system of Dhaka.

4.2 Formulation of objectives

To achieve the objective of the research, the entire study was designed to effectively examine the changes in travel mode behavior and to identify the factors influencing the adoption of ride-hailing services as travel modes in Uttara.

4.3 Literature review

To collect information and relevant data and synthesize it into cohesive summary of the knowledge in this field, related papers and case study were reviewed. This helps in conducting the study. Various literatures were observed and many factors and finding were found for the study.

4.4 Selection of the study area

Uttara Model Town is selected as the study area as it is a suburb of Dhaka city and ride hailing service is frequently used by the residents of this area. People from this place hail the ride services for maintain the communication inside Dhaka the most because it is in the periphery of the city.

4.5 Selection of the survey method

Collecting the opinion of the users can give us the access to analyze the study with an intellectual and broad way. From variety of survey method, online survey was selected to reach the targeted people efficiently.

4.6 Questionnaire survey

A questionnaire was designed to compile important information and user feedback for the survey. The area's user participation made a substantial contribution to our investigation.

4.7 Determining Sampling Size

Sample size was determined by calculating with Yamane's formula: $n = N/(1+N(e)^2$ and makes the analysis more effective. Simple random sampling method was used for the survey. Here, the population size is 178000, confidence level 90% and margin of error is 10%. So, the sample size is 68.

4.8 Conducting Survey

The survey was conducted entirely online. The survey included participants of different ages, income levels, and professions.

4.9 Data Analysis

After the online survey, collected data and opinion was analyzed using Microsoft Excel.

4.10 Limitation of the study

It will be difficult to identify the users of ride railing services on the physical survey in the study area. Only the ride-hailing services have access to users' information.

4.11 Findings and Recommendation

From data analysis, major findings, causes, effect, factors, and related recommendations were given. From the findings, it can recover the obstacle in the way of the ultimate goal and ensure the user comfort and satisfaction.

4.12 Final Report

Completing all the steps mentioned before, final report was prepared. It is the ultimate expression of the analysis which can be affected in some way to foreseeing the future prediction and evaluation.

5. Data Collection and Analysis

5.1 Demographic profile

This study was conducted to identify the current status, and prospects of ride-sharing services from user perspective and the challenges of the same from ride-haling company.

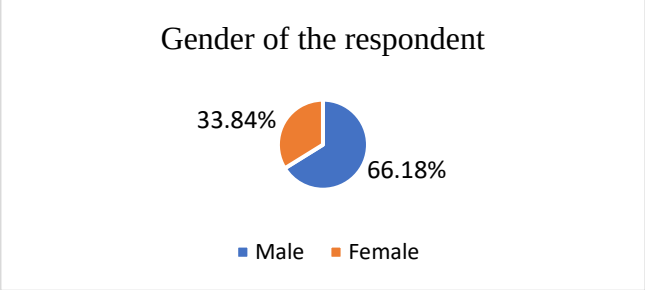

Figure 2: Gender (Author's Survey, 2023)

In the study area, 66.18% of the 68 respondents are male users, and 33.84% are female users. Male uses rides more than females. The reasons for the female travelers are not being able to select a female driver during ride-sharing services. Women might use ride-hailing services less due to safety concerns and discomfort riding alone with unknown male drivers and cases of harassment and assault by drivers, contributing to a lower participation rate compared to male travelers.

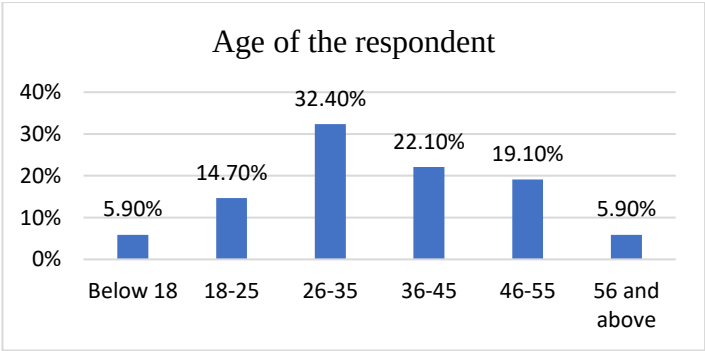

Figure 3: Age (Author's Survey, 2023)

Young people in Bangladesh can use smartphones, which makes them use ride services more. Most people surveyed are aged between 26 and 35, which makes up 32.40 per cent. They work in various jobs, both in the government and private sector. Most people in the 46-55 age range are self-employed. The percentage of self-employed individuals in this age group is 19.10 percent.

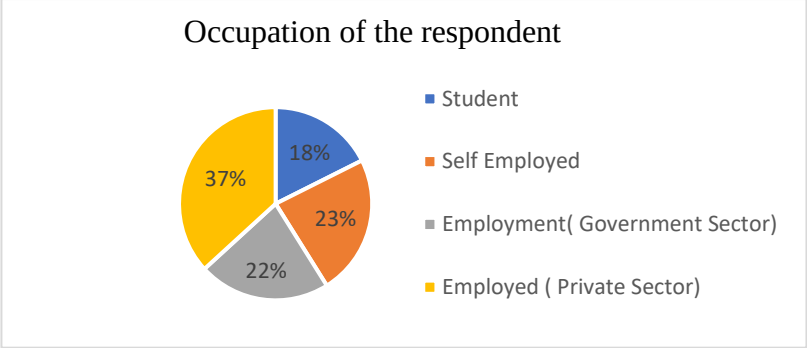

Figure 4: Occupation (Author's Survey, 2023)

The distribution of occupations in Uttara Model Town significantly impacts transportation preferences. Students comprise 17.60% of the population, while self-employed individuals account for 23.50%. The government employs 22.10% and private employment 36.80%. This data underscores the diverse occupational landscape, potentially influencing demand for transportation services. The prevalence of private sector employment suggests a need for convenient and efficient commuting options, while students and self-employed individuals might seek cost-effective modes of transportation within the area.

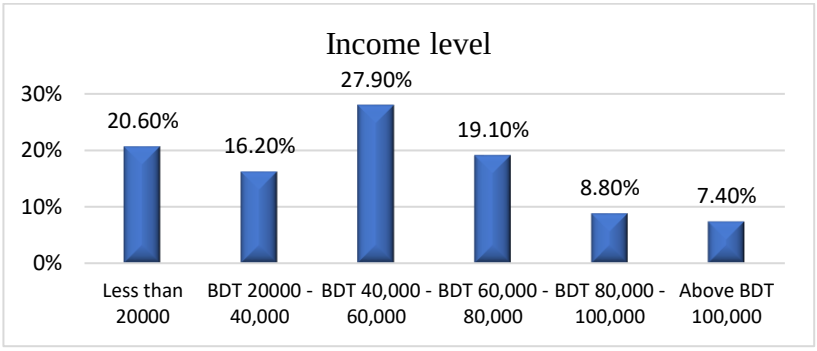

Figure 5: Income Level (Author's Survey, 2023)

The data outlines income distribution among transportation users in Uttara Model Town for vehicle selection. A significant 20.60% earns less than BDT 20,000, while 16.20% fall in the BDT 20,000 - 40,000. Subsequently, 27.90% earn BDT 40,000 - 60,000, with 19.10% in the BDT 60,000 - 80,000 range. Those earning BDT 80,000 - 100,000 make up 8.80%, and higher earners above BDT 100,000 account for 7.40%. This diverse income spread highlights potential influences on vehicle preferences within the study area.

5.2 Travel Mode Behavior Before the Emergence of Ride Hailing Services

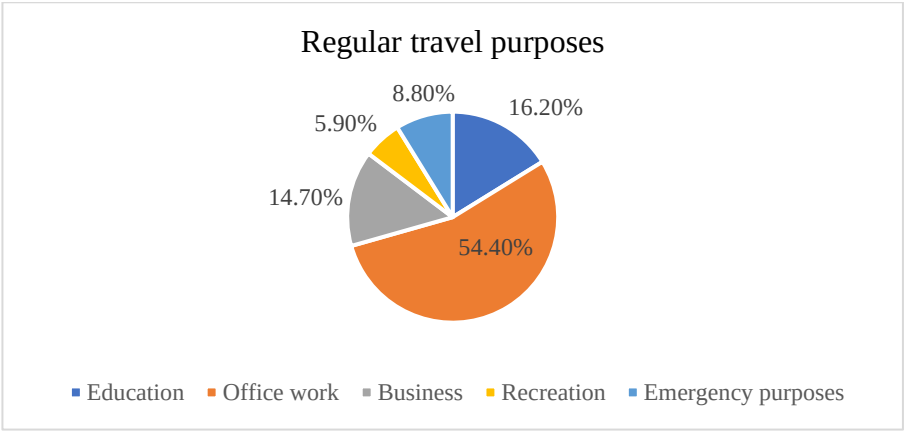

Figure 6: Travel Purposes (Author's Survey,2023)

The data depicts the distribution of regular travel purposes from Uttara Model Town to various areas in Dhaka. Office work makes up the biggest part, which is 54.40%. This shows that there is a lot of travelling involved for professional commitments. Education is important for travel, with 16.20% of people travelling for academic reasons. Business travel is currently at 14.70%. This shows how important it is for economic activities to be mobile. In addition, 5.90% of travel is for fun, and 8.80% is for emergencies. Ride-hailing services offer convenient, on-demand transportation for everyday commutes, errands, and business trips, allowing for greater flexibility and ease of access to locations. They likewise offer a dependable alternative to public transportation, fitting various timetables and locations while providing personalized convenience. Furthermore, for people who do not own a car, ride-hailing becomes a key source of transportation for everyday trips, assuring accessible and timely mobility.

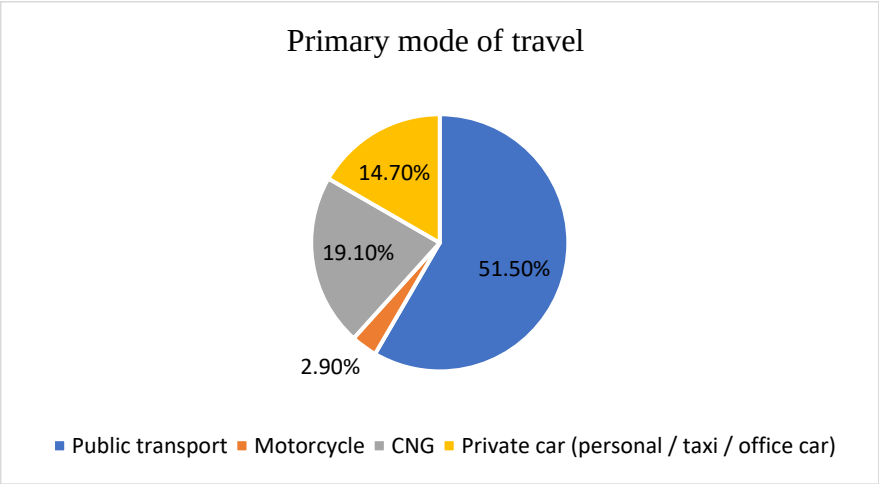

Figure 7: Primary Mode of Travel (Author's Survey, 2023)

Most of the respondents' primary mode is public transport because of the low cost of transportation, easily available, which is 51.50 percent. Public transport means Bus, laguna, easy bike, etc. For convenience and to avoid traffic jams, 19.10 percent of people use CNG as a private vehicle. 14.70 percent of respondents used private cars, which should be personal, taxis, and office-provided. Only 2.90% of people use motorcycles. After the COVID-19 pandemic, motorcycle and private car use in ride healing services and the number of vehicles is increasing.

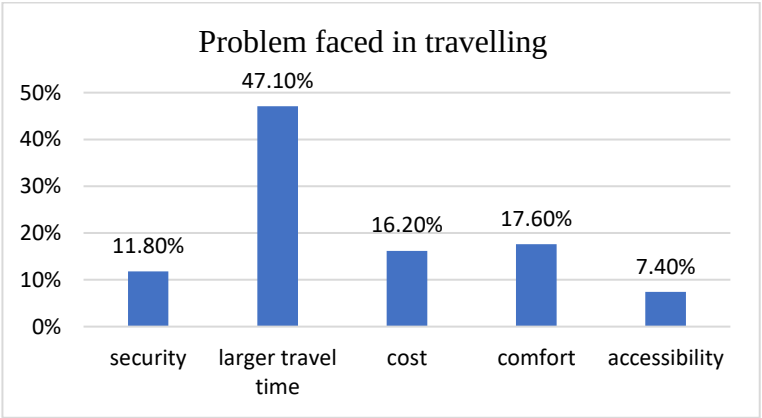

Figure 8: Problem faced while traveling in public transport (Author's Survey, 2023)

A significant proportion, constituting 47.10% of respondents, struggled with longer travel times inherent to public transportation, which often led to inconveniences and delays in reaching their destinations. Moreover, 17.60% of travelers experienced discomfort during their journeys due to crowded or uncomfortable conditions. Cost concerns were prevalent among 16.20% of users, who found public transport fares to be a deterrent. Accessibility was an issue for 7.40% of respondents, reflecting difficulties in reaching their desired destinations conveniently. Furthermore, 11.80% of

travelers expressed security apprehensions, reflecting a lack of safety measures in the pre-ride-hailing era. These challenges underscore the varied problems encountered by individuals using public transport in Uttara Model Town, emphasizing the need for more efficient and user-friendly alternatives like ride-hailing services.

5.3 Travel Mode Behavior after the Emergence of Ride Hailing services.

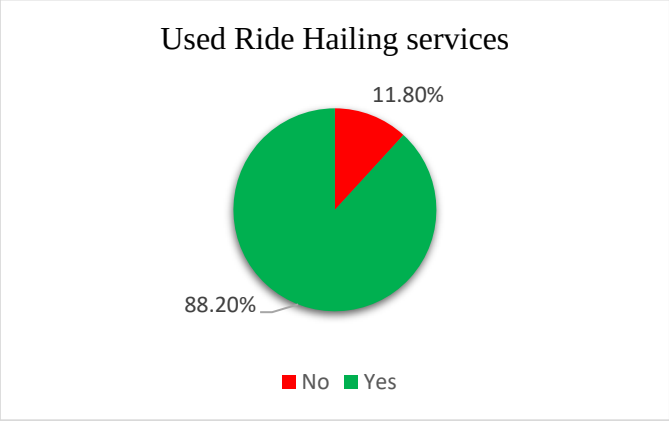

Figure 9: Respondents used Ride Hailing Service (Author's Survey,2023)

Out of the 68 people surveyed, about 88.20% said they use ride-hailing services because they find them easy to use. Older citizens and private vehicle owners don't want to use ride-hailing services. There are no women drivers for cars, motorcycles, or CNG services. The number of women is lower compared to others.

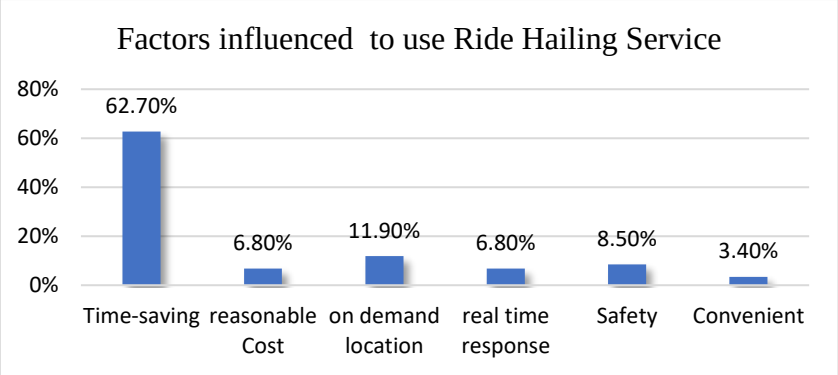

Figure 10: Factors influence to use Ride Hailing Service (Author's Survey,2023)

Approximately 62.70% of people use ride-hailing services as it helps them save time during peak hours. These services provide faster and more direct routes for their journeys. Also, 11.90% of users choose ride-hailing because it is convenient to get picked up and dropped off wherever they need to go. Some users think ride-hailing services are safe and that's important to them. 8.50% of users feel this way. Additionally, users like the quick response time (6.80%) and affordable cost (6.80%) of the service compared to other options. Lastly, only 3.40% of users find ride-hailing services convenient for their travel experience.

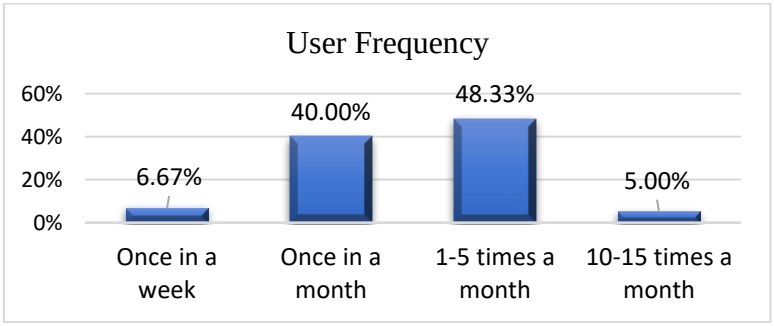

Figure 11: User Frequency (Author's Survey,2023)

The study focuses on user frequency, revealing distinct patterns. A significant portion, constituting 48.33% of respondents, use these services 1-5 times a month, indicating a moderate yet consistent usage rate. Moreover, 40 % of users opt for a monthly usage pattern, possibly due to sporadic transportation

needs. Interestingly, 6.67% exhibit a higher frequency by using the services once a week, suggesting a preference for convenience and efficiency. The least prevalent category encompasses those who utilize these services 10-15 times a month, accounting for 5 % of respondents.

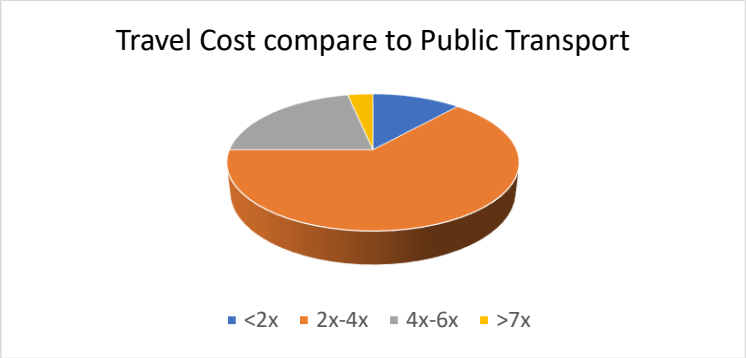

Figure 12: Travel cost of ride hailing services compared to public transport (Author's Survey, 2023)

A significant 63.33% of respondents perceive ride-hailing services to be 2 to 4 times costlier than public transport, indicating a prevalent sentiment of higher costs associated with these platforms. Additionally, 21.67% of users consider the cost difference to fall within the range of 4 to 6 times, reinforcing the notion of higher expenses. A smaller segment, constituting 11.67%, believes that ride-hailing services are less than double the cost of public transport. Interestingly, a mere 3.33% of participants hold the view that these services are more than 7 times priced.

Table 1: Fare details of different Ride Hailing Service

	Uber Premier	Uber X	Pathao Car	Uber Moto	Pathao Bike	Shohoz Rides
Base fare	90.47	68.82	40	35	25	35
Delay / minute	3.97	3.42	3.5	0	0.5	0.5
Cost per km	22.19	19.12	22.5	12	15	15

(Sources: Uber, Pathao, Shohoz website, 2023)

Here it is seen that, average fare price of Ride Hailing service range from 12-22.5 TK/Km. But, for public transport, the fare of bus is set to 2.40 Tk/km from 2022 (DTCA) which is very low compared to Ride Hailing service. And if we consider Toma taxi, it costs 34 TK/Km which is very costly than Ride Hailing service. Ride-hailing services offer promo codes and the GP Star and online payment services benefit from such a period to get payment discounts. Pathao has the 'pay later' option, which means pay later within 30 days without hidden charges. In 'offer your fare' services, the user gives a reasonable amount, and the driver will peak.

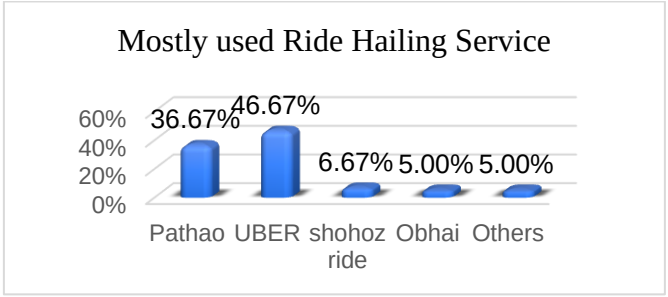

Figure 13: Mostly used Ride Hailing Service(Author's Survey,2023)

The data presented indicates that Uber and Pathao are the most widely used ride-hailing service in Uttara Model Town, Dhaka, with a 46.67% and 36.67% market share respectively, while shohoz ride and obhai have a 6.67% and 5.00% market share, respectively.

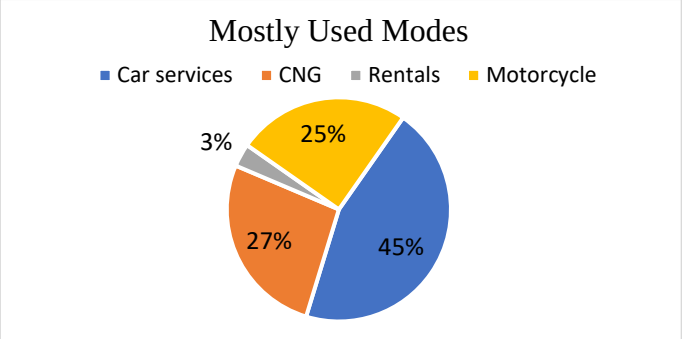

Figure 14: Mostly used Modes (Author's Survey,2023)

In figure 14, Car services are chosen by most users (45%), indicating a clear preference for private and comfortable transportation. Furthermore, 26.67% of consumers select CNG transportation, demonstrating a strong inclination towards economical and environmentally sustainable choices. Additionally, 25 % of users choose motorcycles, possibly driven by factors such as speed and maneuverability, especially in congested urban settings. Interestingly, only 3.33% of users prefer rental services, which could be due to a variety of reasons including specific trip requirements or pricing considerations.

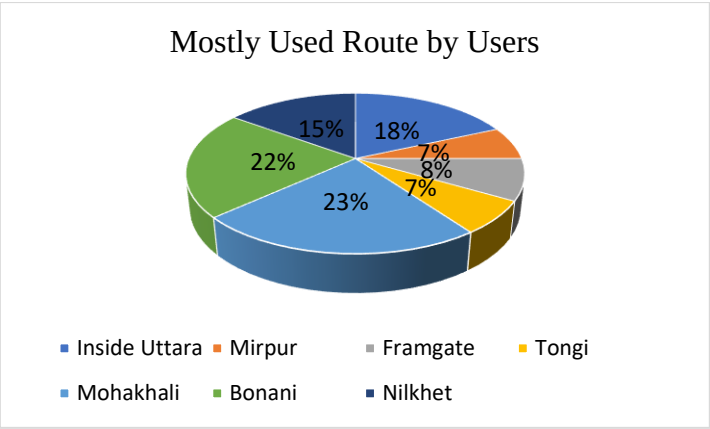

Figure 15: Most used Route by Users (Author's Survey,2023)

Among the surveyed routes, the most frequented was the Mohakhali route, accounting for 23.33% of the user base. This suggests a significant demand for ride-hailing services for commuting to and from the Mohakhali area, which could be attributed to its commercial and office-centric nature. Another notable route is Banani, which constitutes 21.67% of the users. This emphasizes the prominence of this upscale neighborhood as a common destination for the surveyed purposes, possibly due to its numerous office complexes and commercial centers. The data also indicates that 18.33% of users prefer rides within Uttara, the residential zone under consideration, hinting at the convenience of ride-hailing services for intra-neighborhood travel. Moreover, the data reveals that other routes like Nilkhet, Inside Uttara, and Framgate are also popular among users, each contributing 15.00%, 8.33%, and 6.67% respectively. However, Mirpur and Tongi routes constitute 6.67% each, possibly indicating that these areas might have relatively lower demand for ride-hailing services compared to others.

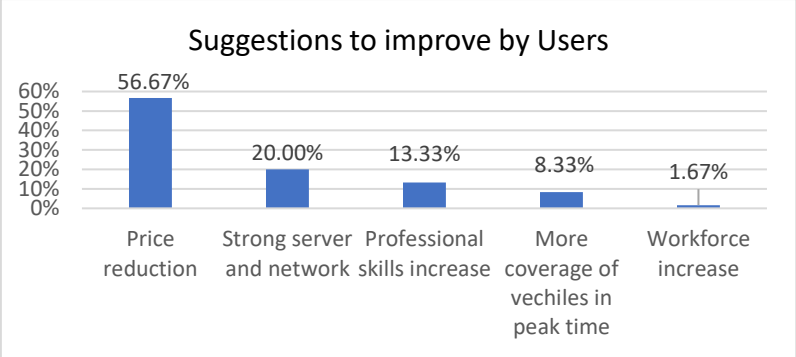

Figure 16: Suggestions to improve by users (Author's Survey,2023)

The data illustrates that a significant portion of users, constituting 56.67%, advocate for a reduction in prices, indicating that cost remains a crucial factor in their decision-making process. The demand for enhanced server reliability and network stability is emphasized by 20 % of respondents, underscoring the significance of seamless app experiences. Notably, 13.33% of users emphasize the importance of elevating the professionalism of drivers, suggesting a need for improved customer interactions and others.

Ride sharing problem faced now a days

From (The Daily Star, 2023) report, the bike drivers are not interested in using apps. They prefer to pick up passengers informally from the side of the road. This is because the apps charge a fee of 20-25% per ride. There are many unwanted problems seen in that case. Users who like to keep their money digitally and pay for their trips online face the most common problem. Most riders will either cancel the rides or act rudely. The 'pay later' feature on Pathao helps me when I'm in a hurry. But sometimes, when I don't pay my bills on time, the riders make mean comments about me. During busy hours, when I tell them the correct direction over the phone, they often cancel the trip without a good reason. Women often feel anxious when using ride-sharing services because they worry about their safety.

Probable Solution

Uber attempted to allow drivers to see the payment method and destination of a ride before they decide to accept it. Uber uses a trusted contract number in the user app for security. When a driver picks up a customer, they receive a verification code in the app. The driver then submits this code to their device. This helps reduce the number of canceled rides.

7. Conclusions

The findings of this comparative study on assessing changes in travel mode behavior in Uttara Model Town, Dhaka, following the debut of ride-hailing services, have offered useful insights into the city's growing dynamics of urban mobility. This study emphasized the aspects impacting ride-hailing service acceptance, such as cost-effectiveness, time savings, comfort, and convenience of use. While ride-hailing services have been useful in many ways, there are still issues that must be addressed. Because of the rising demand for these services, there are worries about traffic congestion created by ride-hailing cars. User feedback provides valuable insights for service enhancement, focusing on areas such as pricing adjustments, server reliability improvements, and driver professionalism enhancements. The positive intention expressed by a substantial portion of users to continue using ride-hailing services emphasizes the importance of sustained quality enhancements for user satisfaction and sector growth. These findings offer valuable implications for both academia and industry, informing strategies to elevate urban transportation options and promote the development of the ride-hailing sector. Integration of ride-hailing services with existing transportation infrastructure can be critical in tackling urban mobility difficulties and building a more efficient and accessible transportation system for Dhaka.

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