Office Trip Comfort Perception Based on Passenger Travel Behavior: A Case Study in Uttara Satellite Town

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ABSTRACT

This research is an attempt to study daily office trip of office going people and to find the trip comfort perception based on the travel behavior. Everyday different types of modes are used by the office going people for home to office or office to home travel. There are some factors that influence to choose mode for office trip. Therefore, the exploration of existing travel pattern of office going people is necessary to understand the existing condition and factors influencing modal choice of office trip and the comfort level to use their office trip by different modes. The study was conducted in 14 sectors of Uttara Satellite town. Office going people are the target population for this research. Sample size of this research was 380 i.e. 380 office going people were quarried one by one as per data collection tool. Office trip related primary data has been collected from the respondents through questionnaire survey. This study discovers the existing travel pattern scenario of the office going people. Walking, bicycle, motorbike, private car, public bus, office bus, CNG, rickshaw etc. are being used as transport mode for office going people's trips from home to office or office to home. 15.53% office going people feel extremely uncomfortable. 22.63% feel very uncomfortable, 20.53% feel slightly uncomfortable or medium, 22.89% feel comfortable and 18.42% feel very comfortable in using their present mode for office trips. The findings of the study can be helpful for office authority, urban planners, and other policy makers to understand the structural and behavioral conditions necessary for office going people to choose different modes of transportation according to their comfort perception.

Keywords:-*Office trip, comfort perception, travel behavior, transport mode, modal choice*

INTRODUCTION

Population growth and unplanned urbanization in developing countries increases mobility demand and [1] creates different problems in road system and in transportation [2]. Dhaka, the capital city of Bangladesh with estimated population in 2020 of roughly 2.1 million with density of 23,234 people per square kilometer [3]. High population density with limited road networks is one of the major causes [4] of traffic related problems and various transportation problem including traffic congestion and conflicts are seen [5] in major cities in Bangladesh.

In Dhaka city the normal scenario is that, there are 2230 km of usable access roads where as many as 900,000 vehicles use a day including 420,000 motorized vehicles [6]. For smooth travelling and movement system there are need 25% of the roads and paths of the city's surface area in the city range, but for the city of Dhaka it has been covered only 8% [7, 8] and everyday it is developed itself in an unplanned urbanization. With the shortage of road

network and other facilities the city's traffic problems increasing day by day [9] and creating different road management system [10] and different health related problems in Dhaka city [11]. About 3.2 million working hours wastes by congestion every day and costs the economy billions of dollars every year [12].

For the city, like Dhaka rapid economic growth and business activities are creating more working opportunities and so number of office-going people has been increased at high rate over the past decades in Dhaka [13]. A large number of offices, business centers as well as schools are located in the center of Dhaka city which attracts huge traffic during peak period. However, office trip shares a significant amount of generated trip. Besides the office provided transport, peoples are using walking for their trip [14]. Walking is considered as the most comfortable and equitable means of transportation [15] in Dhaka city and the footpath user has less than moderate satisfaction level [16].

Passenger comfort is an important index that can be used to measure the quality of public transport services [17] and a crucial factor in passenger's choice of traffic mode [18,19]. Comfort is an independent sensitivity, and there is no combined and perfect meaning for it in academic world [20]. The debate adjacent comfort is intensive on the thoughtful of the difference between comfort and discomfort [20]. Comfort is an important aspect that touches passengers' choice on mode preference [20]. Passengers' decisions about certain service qualities can be measured a subjective quantity of service quality [17]. Dhaka with the unplanned expansion and with the minimum care to the living setting, the comfort ability is decreasing day by day in transport [21]. The road management in neighborhood also becoming difficult with the growing

travel pattern [22]. So, evaluating passenger's perception on comfort ability on mood preference is very important in transport service provider to attract passengers. This study therefore conducts surveys on office trip behavior and comfort evaluation on office trip using questionnaire survey. The findings of these surveys can help bus operators, office authority and transport authorities strategy more attractive actions to improve office trip in comfort level. This paper studies the modal choice of office going people in the Uttara area, Dhaka, Bangladesh. There is also make an evaluation of office going people's perception regarding the travel pattern and influencing factors for modal choice of office going people in Uttara residential area.

METHODOLOGY

Two types of data from both primary and secondary sources were collected for this study. Primary data was collected through questionnaire survey and collected from 14 different sectors of Uttara. Non-probability sampling techniques is used here where the units that are investigated are based on the judgment of the researcher [13]. The sampling unit for this research is the office going people. Sample size of this research was 380 i.e. 380 office going people were quarried one by one as per data collection tool from 19 January to 12 February. However, about 239 of them were male and 141 were female. A structured questionnaire with closed as well as some open-ended questions is developed and used to collect data.

Secondary data includes the information of population which was collected from Bangladesh Bureau of Statistics (BBS). Different kinds of maps of the study area were collected from various sources such as DNCC, RAJUK and Uttara Sector Kollayan Somiti.

STUDY AREA: UTTARA SATELLITE TOWN

The satellite town Uttara is originally planned to be a square grid residential suburb, geographically protected from floods in the southern Dhaka [23]. Now a days Uttara converted its town character with its busyness and different activities of the people as like as commercial, educational and others [24].

Uttara is planned by RAJUK and divided into 14 sectors, starting from sector 1 to sector 14 and Its total area is 6.095km² [23].
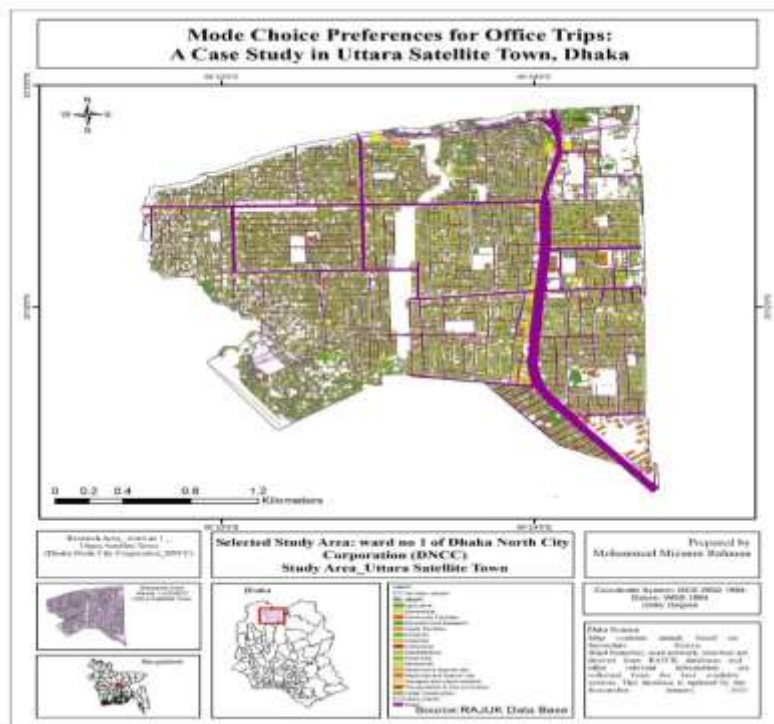

Fig.1:-Location of the Study Area (Uttara, Ward No 1 of DNCC)
Source: Urban Planning Section-DNCC, 2018 and [23]

Fig.2:-Uttara Residential Area and Land Use (Uttara, Ward No 1 of DNCC)
Source: Urban Planning Section-DNCC, 2018 and [23]

TRANSPORT FACILITIES

Transport system of Uttara city is mainly road based. The role and contribution of railway or water transport is very minimal in terms of passenger transport. Public transport system is not well developed here. Available public transport modes can be divided into two which are motorized and non-motorized. Motorized transport modes include buses, minibuses, taxi, auto-rickshaws etc. and non-motorized transport modes include by cycle and rickshaw (Sector Kollan Somiti, 2018).

Fig.3:-*Road Distribution in Study Area (Uttara, Ward No 1 of DNCC)*
Source: Urban Planning Section-DNCC, 2018 and [23]

Streets in sector 1 get submerged under water during light rainfall. Streets in sectors 7, 10 and 14 are mostly in bad shape owing to renovation work-in-progress. All streets in Uttara are wide enough for two cars to pass. Walkways exist on broader roads; alleyways do not have any walkways.

RESULT AND DISCUSSION
Overall Office Travel Pattern

People's major purpose of trip generation is office trip. Number of office trips depend on the office day number in a week. Normally an office has two off days in a week except some offices such as industries, garment factories, service giving farms etc. So, weekly office trips are normally 10 to 12 per week. Average number of weekly trips is 13. Their office trip shares 84.67% of the total trips of a week. The rest 15.33% share contains other trips including mainly excursion, skill development activities etc.

Usual Travel Mode for Office Trip

Most of the respondents like to private car as their office going mode. Bus is used less than private car. However, office bus or car, walking, CNG and rickshaw are used equally but less than public bus. The lowest used mode for going to office is by-cycle.
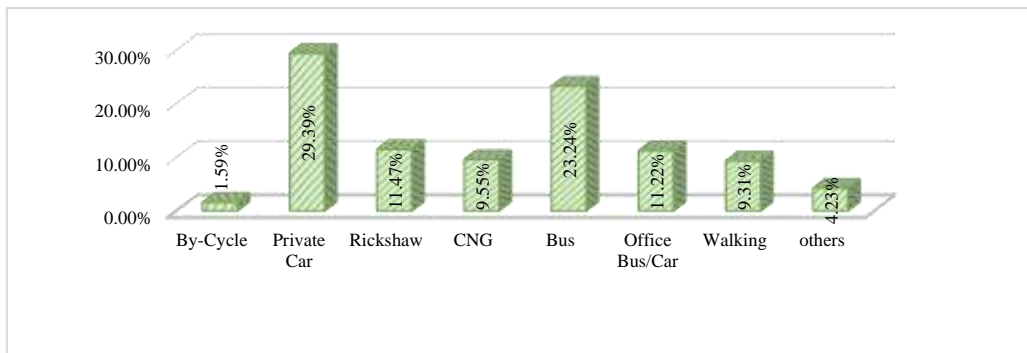
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Fig.4:-*Share of modes for office trips*
Source: Field Survey, 2018

Travel Distance for Office Trip

The highest no of respondents' offices is located within 1-2 km distance. The 2nd highest no of offices are located within more than 5 km distance from home. The 3rd highest no of offices are located within less than 1 km distance from residence of the office going people. The lowest no of offices is located within 2-5 km distances.
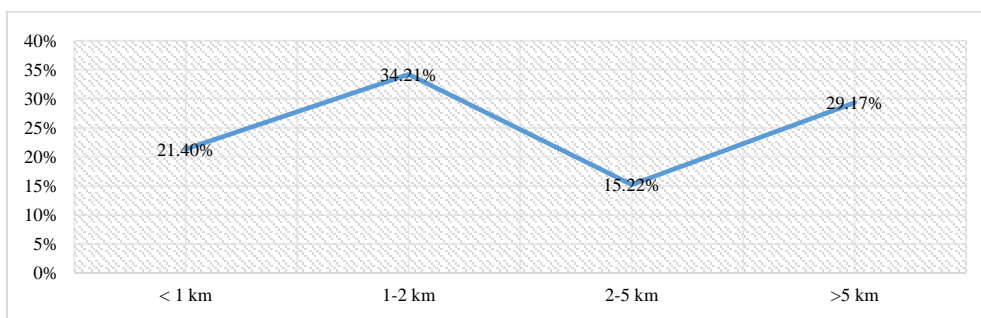

Fig.5:-*Office Going People's Travel Distance*
Source: Field Survey, 2018

Usual Mode for Office Trip According to Gender

No female respondent like to use by-cycle. They like public bus and private car than any other modes for going to office. They like to go to office by walking more than male. However, most of the male respondents like to use private car as office going mode and bus then. They like by-cycle as office going mode the lowest.
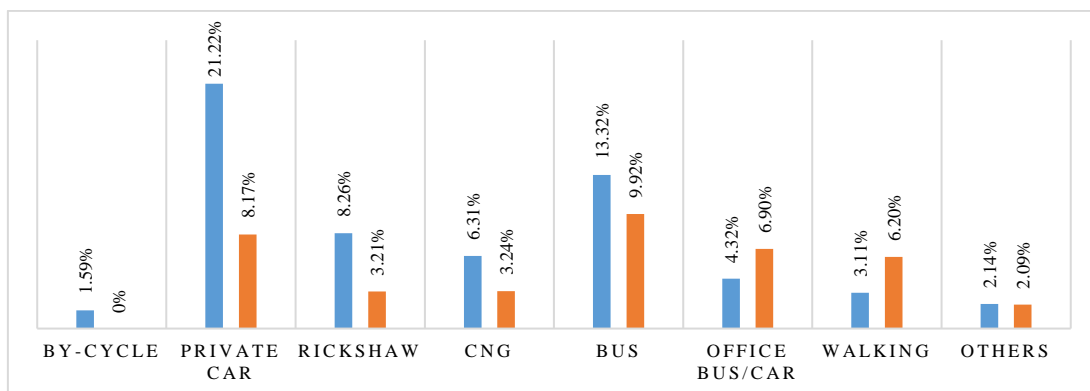

Fig.6:-*Usual Mode for Office Trip According to Gender*
Source: Field Survey, 2018

Office Transport Service
About 13% officials told that their office provides transport services. Some private offices have own transport services for their officials and it is very costly. The average monthly cost of this service is 1150 taka. Some gov't offices also provide transport though the quantity is so low. They provide office bus or car for their officials. This service is relatively cheap and more accessible. The cost of this service is recovered from their monthly office payment. About one-third officials (whose office provides office transport) use office transport but the other do not. The main reasons of this are having

personal car and office located close to home. Cost is another reason for the situation. At the same time, availability of public transport at any time at cheap cost is a dominant reason for not using office transport service.

Comfort Level Office Going People
About 15.53% office going people feel extremely uncomfortable. 22.63% feel very uncomfortable, 20.53% feel slightly uncomfortable or medium, 22.89% feel comfortable and 18.42% feel very comfortable in using their present mode for office trips.
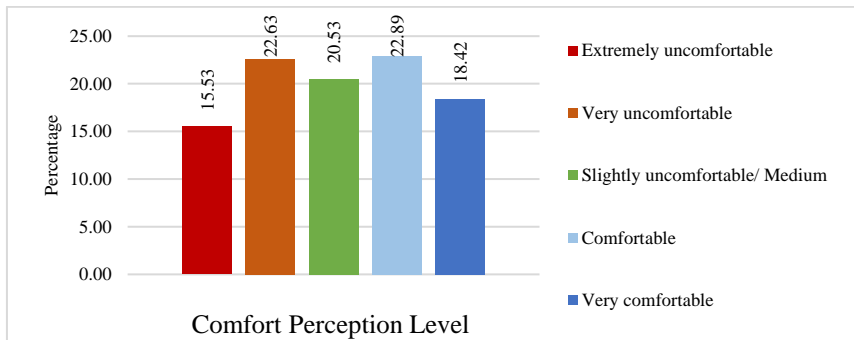

Fig.7:-*Comfortable Level of office Trips*
Source: Field Survey, 2018

Comfort Level According to Gender
Among the extremely uncomfortable (15.53%) level about 5.76% female feels extremely uncomfortable level of perception and 9.77% Male feels extremely uncomfortable level of

perception. On the contrary, 6.83% female respondents feel very comfort, 11.59% male respondents feel very comfortable in their office going trip. The other gender wise comfortable lelvel of office trips are showed by the following figure.
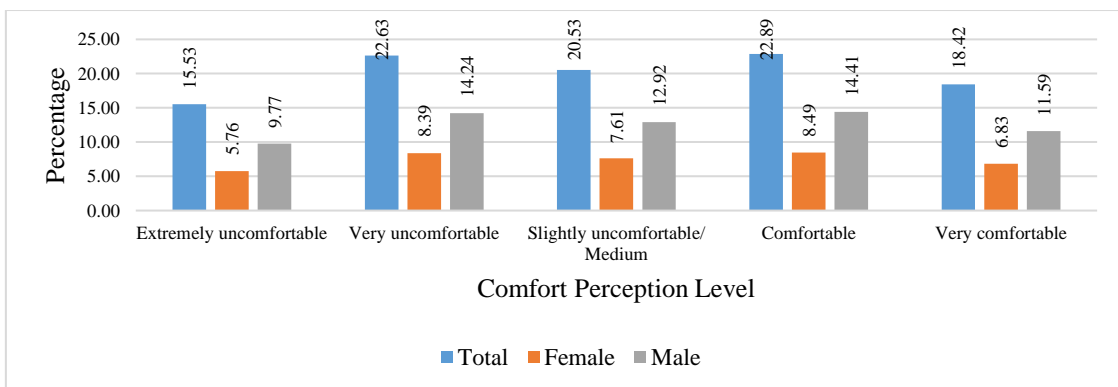

Fig.8:-*Comfort Level According to Gender*
Source: Field Survey, 2018

In the Likert scale ranging from 1 to 5 the satisfaction level about the Comfort perception level. The overall score on the Comfort perception level is 3.06 and it expressed Slightly uncomfortable/ Medium for the office trip.

Problems of Office Trip
Almost 27% respondents don't face any problems while travelling but about 73% respondents face and they are willing to mark some problems. These problems are-

Table 1:-Different problems of office trip in the study area

Problems	% of Respondents Opinion	Ranking
Dust, noise and polluted air	24.47	2nd
Poor walking facilities	3.16	6th
Traffic jam	37.37	1st
Road construction work	19.74	3rd
Unsafe road crossing	10.00	4th
Insecurity, etc	5.26	5th

Source: Field Survey, 2018

Problems During Office Trips
One of the major problems for office trip is traffic jam. Traffic jam makes their journey time lengthier. Sometimes they are late for office because of it. Office going people who use various modes except walking often face this problem. Their office starts 7.30 am to 10.00 am and closes 4.00 pm to 8.00 pm. This is peak hours of travelling for all classes of working people. For this reason, traffic jam occurs and it hampers the office trip.

Road construction or different development projects run almost throughout the year in Dhaka city. These activities hamper traffic as well as pedestrian flow and causes traffic jam at length. Sometimes it becomes the cause of dust pollution that destroy comfort.

Pollution is another problem facing by the office going people. The most affective pollution forms are sound and odour pollution. Random use of horns and bells of vehicles create sound pollution and hamper their mind and body badly that take off their freshness and reduce concentration in official works. Fumes of vehicles as well as odour of rotten waste beside the road also affect them.

The existing facility for walking is not well developed and continuous. Footpath is accompanied with street hawkers and various construction materials. Waste is gathered here and there that makes the footpath unusable for pedestrian. Again, scarce of foot over bridge makes road crossing very hard and unsafe for the office going people especially for the female officials. Walking spaces of existing overbridges are illegally occupied by hawkers, street people and so on. This also hampers the usage of overbridges.

Male and female office going people feel unsafe because of the sudden occurrences happens in Dhaka due to political or other sort of movement and collision with police force and other forces. Besides, sexual harassment, hijacking, kidnapping have become major incidental issues for office trip.

Office Going People's Gender
The male office going people choice private car and public bus more and female office going people choice private car, public bus, office bus and walking more as mode for office going trips.
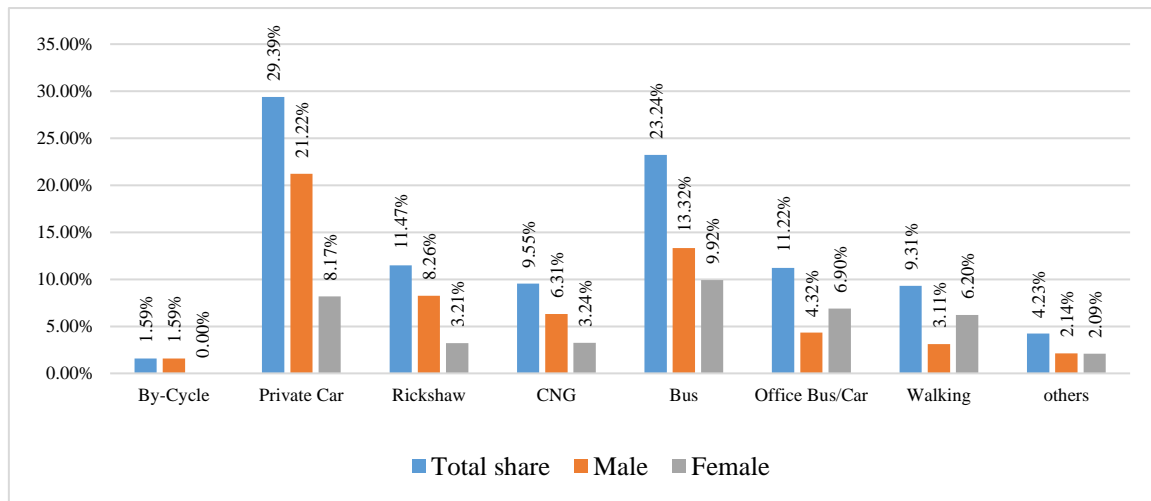
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Fig.9:-*Usual Mode for Office Trip According to Gender*
Source: Field Survey, 2018

Modal Choice According to Age

Following figure shoes that office going people of below 18 years age group like by-cycle as mode for going to office more. The office people of 18 to 30 age group choose private car and public bus more but rickshaw, walking, CNG, office bus, etc less. Private car is highly liked by people of 30 to 50 age group. They also like rickshaw and public bus more but CNG the lowest. CNG is liked more by the people of above 50 age group. They also like private car, public bus, office bus and walking almost equally.
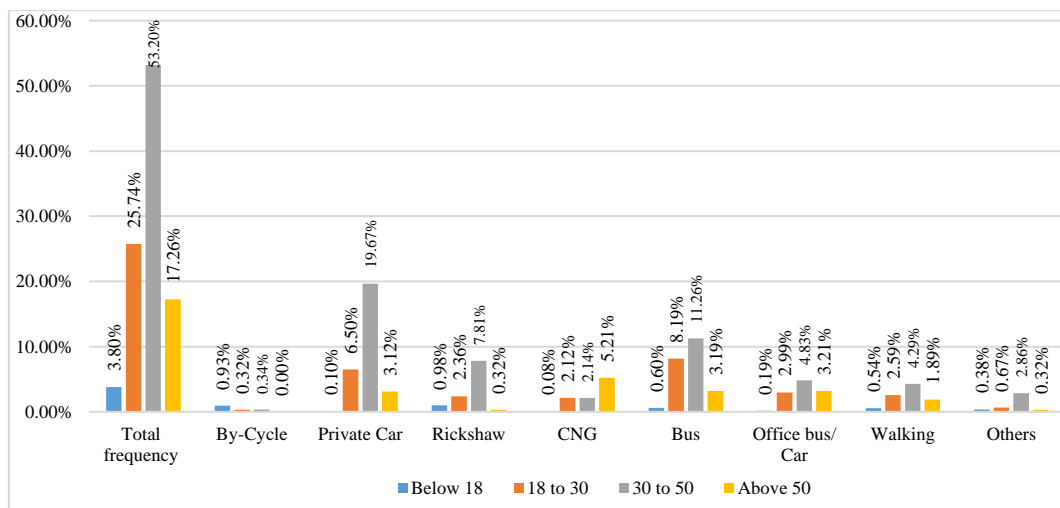

Fig.10:-*Modal choice according to age*
Source: Field Survey, 2018

Modal Choice According to Income

By-cycle is chosen more by <20000 income group people. Private car is chosen mostly by the people whose income is 30000 to 50000. Rickshaw and CNG are also chosen more by more by <20000 income group people. Public bus is liked more by <20000 and 20000 to 30000 income group. Office bus is chosen more by 20000 to 30000 income group. Walking is chosen more by <20000 income group people. People whose income is 50000 to 100000 and more than 100000 chose private car most than any other modes.
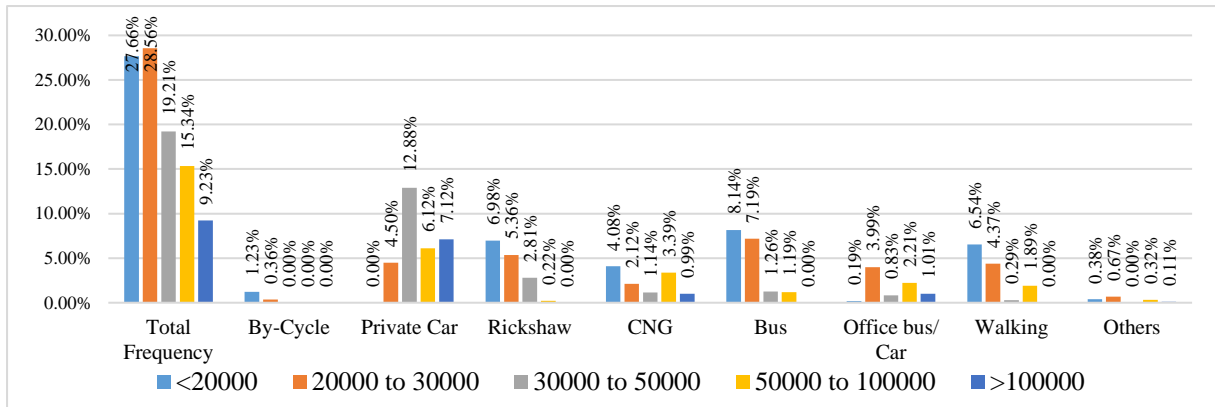
Fig.11:- *Choice of mode according to income*
Source: Field Survey, 2018

Modal Choice According to Travel Distance

If the distance is <1 km, the people choose rickshaw more. If the distance is 1 to 2 km, the people choose public bus more. If the distance is 2 to 5 km or >5 km, the people choose public bus more and then private car respectively.
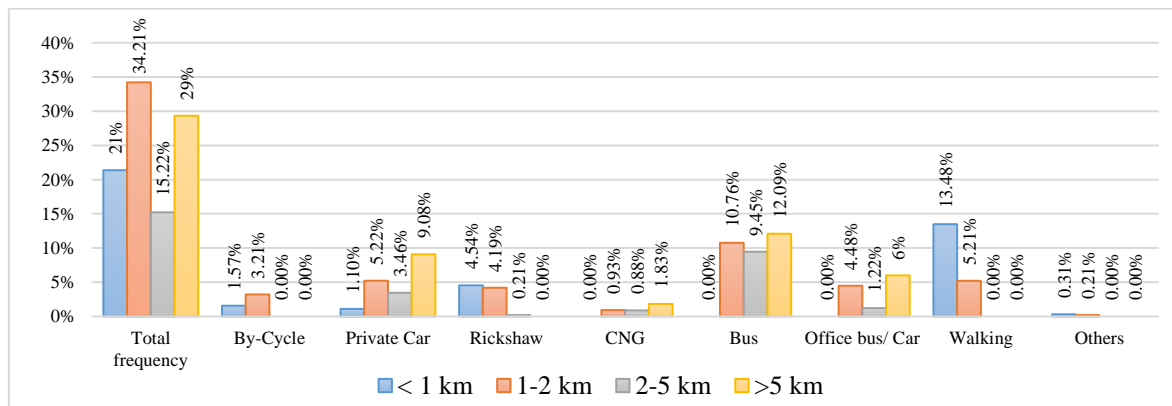

Fig.12:-*Choice of mode according to distance*
Source: Field Survey, 2018

Modal Choice According to Travel Cost

Travel cost significantly influence modal choice. It depends on the ability to spend money of the office going people. Since people are very sensitive to travel costs and it depends on travel length and mode of transport, different levels of travel cost were chosen. One unit increase in travel cost of any vehicle may impose disutility of that particular mode. Cost increases with distance, two sets of fares are provided. The daily travel fare of different types of modes was considered. Here the maximum and minimum costs for each mode are given in Table 1 accordingly. If

anyone uses walking or cycle for school, there is no cost required. Use of private car also doesn't require any trip cost though driver cost (6000 to 10000 taka) and maintenance cost is needed. Public bus requires the least money to travel.

Rickshaw requires more than public bus. Travel cost of CNG is higher than any other modes. Calculating monthly travel cost for different vehicles it is found that public bus requires the lowest amount of taka per month. On the other hand, CNG requires 3250 taka every month. Cost of office bus and rickshaw is nearly same.

Table 2:-Travel cost in different modes

Modes	Travel Cost (Tk. /trip)	Modal choice (%)	Modes	Travel Cost (Tk. /trip)	Modal Choice (%)
Rickshaw	10 to 50	11.47	**By-cycle**	200-300 tk/ month	1.59
Office bus	10 to 35	11.22	**Private car**	6000 to 12000 tk/ month	29.39
Public bus	5 to 40	23.24	**Walking**	0.00	9.31
CNG	50 to 200	9.55	**Others**	5 to 30	4.23

Source: Field Survey, 2018

Modal choice according to travel time

When the travel time is <20 min, the chosen mode is walking mostly and then rickshaw respectively. If the travel time is 20 to 40 min, public bus is chosen mostly and then private car, walking, office bus, rickshaw etc. are used respectively. In case of 40 to 60 min as well as more than 60 min travel time, public bus is chosen mostly and then private car correspondingly.
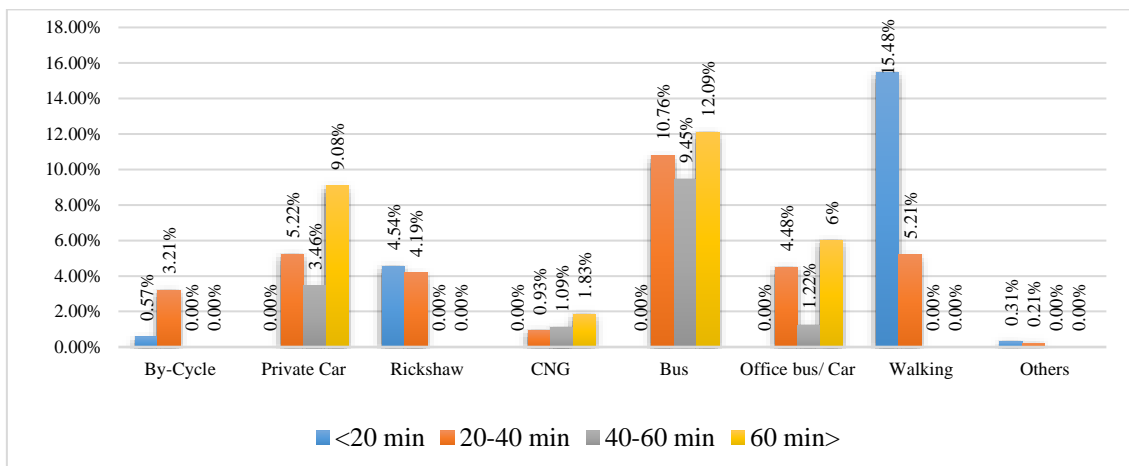

Fig.13:- Choice of mode according to travel time
Source: Field Survey, 2018

Comfort Level

The highest no of respondents feels high level comfort while using private car and public bus service for office trips. At the same time relatively, highest no of respondents feels low comfort using private car and office bus service.
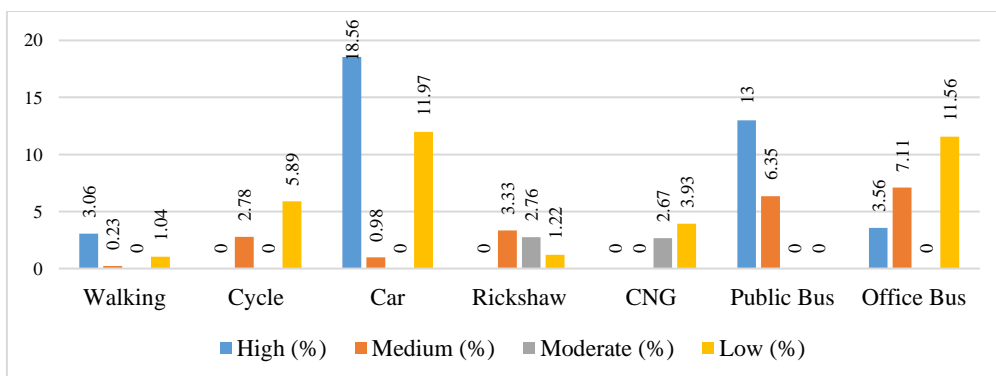

Fig.14:-Comfort level according to modes
Source: Field Survey, 2018

Ranking of Factors

The factors that influence the travel mode for office trips are ranked according to the respondent's perception. Significant level of the correlation between the factors and usual modal share has been calculated for ranking. Statistical bivariate correlation method has been followed for this calculation. The test of significance is two-tailed and Pearson is selected as correlation coefficient. Following the significance of correlation, factors have been ranked.

Table 3:-Ranking of factors

Factors	Significance of correlation	Type of correlation	Ranking
Travel time	0.917	Strong positive	1
Travel distance	0.899	Strong positive	2
Age	0.706	Strong positive	3
Comfort level	0.483	Weak positive	4
Educational status	0.067	Weak positive	5
Car ownership	0.058	Weak positive	6
Travel cost	0.043	Weak positive	7
Monthly income	0.028	Weak positive	8
Occupation	0.010	Weak positive	9
Gender	0.010	Weak positive	9
Companion	0.010	Weak positive	9

Source: Field Survey, 2018

Table 3 shows that there is a strong correlation between travel time and modal choice. This factor influences the modal choice for office trip very much and it is ranked 1st. Travel distance is ranked as the second most influencing factor. The third ranked factor is monthly age of respondents. These three factors have strong positive correlation with modal choice.

Some other factors that have weak positive correlation with modal choice are Comfort level, Educational status, Car ownership, Travel cost, Monthly income, Occupation, Gender and Companion respectively according to significance. These factors have a little influence in choosing modes for office trips.

CONCLUSION

This research attempts to explore existing travel pattern. Different types of socioeconomic and demographic characteristics of the office going people strongly influence the travel pattern of office trip. Though people prefer different types of modes according to their socioeconomic characteristics, but they should be motivated for such modes that will reduce total number of vehicle on roadway significantly during office starting and closing time as well as save time and money. The existing travel pattern is not well comfortable. The office going people don't get proper office bus services and pedestrian facilities. Significant number of office going people use car to travel to and from office. A few number of office going people also choose walking. Private car is the main reason of congestion. Most of the offices do not have office bus system. This study's findings indicate that travel time, travel distance and age affect office going peoples' mode choice.

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