

Commuters' Perception on Development of Transportation to the Campus of West Bengal State University in North 24 Parganas District of West Bengal

Anwesha Haldar¹ and Srabanti Bera²

Abstract : *An effective transport system not only aids wider exposure to opportunities from distant locations and regional development but also a sense of security. Satisfaction of commuters to a certain mode of transport greatly varies with traditional beliefs, socio-economic independence, cleanliness, allegiance to the service providers or co-passengers, knowledge about other convenient modes, etc. which create numerous patterns. The idea of easing the accessibility heralds larger enrolment rates in more accessible educational institutions, especially in the suburban tracts of North 24 Parganas District in West Bengal. The West Bengal State University (WBSU) is one such institution located in Barasat-I C.D. Block and responses mainly from students were recorded regarding their accessibility experiences and perceptions for assessing the scopes for improvement of transportation. GIS-based maps were prepared to show surface transport networks and isochrones were plotted. The questionnaire surveys through web-based methodologies and Google forms crowd sourcing techniques were applied and simple statistical analyses were carried out to interpret the responses. The study revealed the dynamics of cost, comfortability, and travel time or distance affecting the commuters' preferences towards the available modes of transportation.*

Key words: *Crowd sourcing, accessibility mapping, commuters' preferences, transport development of Berunanpukuria*

Introduction

Accessibility may be referred to the ease of access or closeness to destination or service from the residence of people, and its efficiency lies with the quality of transport infrastructure and public transportation facilities. Accessibility depends on many things like distance, time, and cost of travel (Martinez et al., 2012, Woldeamanuel and Cyganski, 2011); and can be categorized into: (a) physical, when based on physical distance from roads; (b) relative, when based on the travel time or cost; (c) nodal, when based on connectivity matrix; along with (d) public service

1 Assistant Professor, Department of Geography, East Calcutta Girls' College, Kolkata
anweshahaldar@ecgcollege.org

2 Ex Student, Department of Geography, Vivekananda College, Madhyamgram

accessibility, and (e) social service accessibility, which are determined on the basis of the ease of access (distance) to public offices and social service locations (Tarafder and Jana, 2020). The development to become inclusive in a geographical area, public transport systems, needs to grow optimally. Accessibility directly impacts the overall development of any area by enhancing mobility with ease, access to emergency, essential and other services, while also increasing employment diversity and exposure through connecting the other nodal centres. Public transport services not only increases accessibility and exposure to goods and services, but also talks about the economic conditions of a region. It is majorly observed that with economic solvency, and dissatisfaction with the mass transit systems, dependence on private vehicles increases manifold. Whereas, with further economic and welfare progress, public infrastructural conditions greatly improve along with the comfort and time-saving facilities which, when coupled with environmental consciousness directs people to use the advanced modes of public transportation, wherever possible (Aidoo, 2013). With few exceptions, modern day efficiency of a public transport's performance has shifted its focus from the traditionally centred on the priorities of the transport administrators and operator to user satisfaction-centric bargains (Cordera et al. 2019).

Satisfaction is the fundamental point of emphasis in understanding public transport from the customer's perspective (Friman and Felleson 2009). Users' satisfaction and perception greatly depend on the frequencies of the vehicles plying, duration these take from origin to destination, their cleanliness and comfort facilities, behaviour of the drivers, condition of the roads, etc. Often these parameters fall short of expectation in the city fringes as well as suburban areas; but it is also observed that, people tend to overlook some, at the cost of the others. Several are willing to tolerate the poor conditions without any impact upon their level of satisfaction as tolerance to mediocrity is the norm (Donovan et al., 2001; Woldeamanuel and Cyganski, 2011). In many cases it has been observed that public transport systems are offered by private or semi-public service providers operating in almost monopolistic conditions, which are at times, exploitative in nature (Mouwen, 2015). User satisfaction assessment is also an indicator of how public transport services are operating not only for those who commute by public or mass transit vehicles, but also those opting for private vehicles. Where a number of options are available, daily commuters habitually make decisions or sacrifices concerning the mode of transport vehicles and routes taken, based on cost-benefit analysis, satisfaction levels and preferences. Not disregarding the fact that occasionally loyalty to a certain mode or a service provider takes precedence (Lai and Chen, 2011, Lierop et al. 2017).

Human psychology is highly dynamic and depends on larger parameters than a single study can identify, when it comes to selecting preferences. Family

background and traditions, socio-economic independence, health conditions, sense of security, cleanliness, and knowledge about other convenient modes, reliability and dependability on a service provider, all govern the choice of travel preferences. While some feel ease in multimodal shorter time journeys the other people prefer single mode of longer travel times. This also has impacts on the choice of locations for widely available, almost equal quality service providers, like markets, schools, dispensaries, etc. Education in the suburban or rural sectors have a positive correlation with accessibility, i.e. physical, social and economic, where access to education institutions is directly proportional to the enrolment rate, especially in the emerging region of Berunanpukuria (Mondal and Gupta, 2019).

Objectives

Travel behavioural research is an emerging field of study throughout the world. It is not just the physical proximity and connectivity that matters, but the attitudes and preferences of the public transport service users are equally also important. Observations and modelling the satisfaction levels were carried out by Hine and Scott, (2000), Hensher and Rose (2007), Dell'Olio et al. (2010, 2011), Kuhnimhof et al.(2012), Idris et al. (2014), Mouwen (2015), Vedagiri and Arasan (2009), Srinivasan and Bhargavi (2007), Deb and Filippini (2013), Gadepalliet. al. (2018), and many others. While most have deduced statistical analysis and models to assess the behavioural patterns, the present study tries to understand the reasons behind such preferences. Information about the public transport system include travel schedule, stoppage details, transport quality or customer services, all of which can be construed into a simple customer expectation of transport services model (Parasuraman et al., 1993, Grotenhuis et al., 2007). Choice of the routes within the present study area, and the gap between expectations and availability in transport conditions, have been assessed to understand the preferences of the students, faculty and administrative staff commuting to the West Bengal State University (WBSU) campus in the pre-pandemic scenario.

Keeping the quality parameters constant, awareness about the ease of accessibility is often observed to encourage higher enrolment rates in educational institutions, and the WBSU is no exception. Thus, this study was carried out to understand the behavioural aspects, preferences and problems of commuters to WBSU in Berunanpukuria village about 6 km away from Barasat town.

Methodology

The study is based on respondents commuting to the WBSU from the surrounding areas, especially from their places of residence, as the need for hostel or paying guest accommodations also depends on ease of accessibility. Therefore, the location in which the WBSU campus is situated needs a brief introduction. Within the district of North 24 Parganas, Barasat-I Community Development Block

of the Barasat Sadar Subdivision consists of nine Gram Panchayats and one census town. Nilganj-Icchapur Gram Panchayat forms the western limit of the Block and consists of 18 mouzas. Berunanpukuria mouza located around 22.74° north of latitudes and 88.43° east of longitudes, is the largest census village of Nilganj-Icchapur Gram Panchayat and is situated in between Barrackpore and Barasat municipalities. The village has an area of 1.52 sq.km of which the University stands over 0.12 sq. km. The university was established on the 26th day of May in 2008, and presently having the student and scholar strength of 1757, in addition of about 100 academic staff members (https://wbsu.ac.in/wp-content/uploads/2021/02/West-Bengal-State-University_NIRF_2021.pdf).

This research employs both quantitative and qualitative techniques where even though the responses are graphically represented to show the trends of the majority, also confirms to the individual views and issues that were brought up during the survey. Crowd-sourcing methodologies from Google applications were employed to collect the commuter's responses and understand traffic conditions on the roads around the locations at various time frames. Geographic information system (GIS) techniques to mapping and Open Street Map (OSM) Plugins with QGIS software version 3.16.11 are employed to understand road networks, nodes, isochrones (polygons created by joining points of an equal accessibility in terms of travel time and also distance when vehicular speed and movability or reachability is deduced), and to analyse traffic congestions at different time-frames throughout the day in the week. Primary data pertaining to the perceptions of the regular commuters to WBSU was acquired through Google Forms and analysed on Spreadsheets. The data were extracted online through structured questionnaires to collect the opinions of respondents during the period March-August, 2021. The questionnaire includes queries on the transport systems, their modes, breaks, availability, cost, comfort, and preferences. Due to limitations of online survey during the covid-19 pandemic lockdown only 114 respondents were surveyed, 97% of whom were out-going or recently pass-out students and scholars. The purpose of their visit to the WBSU was mostly educational, for either attending a post graduate class or for a Ph.D. degree, 2 responses where from staff members and one from a guest faculty. As all the respondents are well educated, the opinions should be considered as an outcome of their informed decisions.

The respondents are mostly in the age group of 21-26 years, and are coming from 'middle' and 'lower-middle-class' economic backgrounds. The others belong to the age group of 40-50 years. Among the respondents 53% are female and 47% are male. 90% of them live in their own residences. Of the total respondents 21% used to commute about 6 days a week, 24.7% at least 5 days a week and 42% mostly 2 to 4 days a week (fig. 2 A and B). The following map (fig. 1) shows the locations of the respondents who commute daily to the WBSU from various

and colleges, Kingston Educational Institute, AMS Polytechnic College, Eminent College of management and technology, SBIHM school of management, NIMAS hotel management institute among many others but details of which is not in the purview of the present study. It is worthy to state that with the steady growth in the number of educational institutions, there will be a burgeoning need for hostels, medical shops, restaurants, and other students' activity centres. For this, the basic prerequisite is a safe and secured surroundings with reasonably high quality connectivity and accessibility.

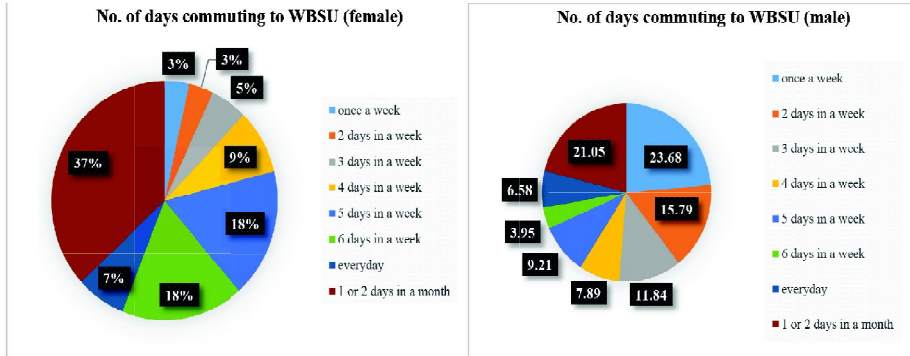


Fig. 2. A (Left) and B (Right)

Results and Analysis

The OSM based computation of road networks (fig. 3) shows that higher density of the transport is clustered around urban centres of the Kolkata Metropolitan Area (KMA) and vehicular roads markedly reduces as one goes out towards east and north into the rural areas. The WBSU campus is situated in a rural location, but it is surrounded by the transport hubs such as, Barrackpore, Barasat and Dum Dum. Although the accuracy of auto-generated isochrones have not been tested, both maps showing areas of equal distances (fig. 4) and equal time taken (fig. 5) when travelled by motor vehicles on roads seems to be realistic and confirm to statements that have been interpreted during the survey. The concentric zones conform to the geometric distances. The isochrones reveal that large parts of the country-side is covered by agricultural lands, and very few habitations are observed all along the transport routes, and thus reachability are greatly dependent on junctions (break-points) or bus stops, train stations or road crossings from where suitable transport facilities can be availed. It is also observed that just north of Barrackpore-Barasat road connecting the National Highway (NH)-12 via Krishnanagar road in the east, and Barrackpore Trunk Road and Kalyani expressway in the west, is occupied by large wetland areas, namely the Kheblir Bil, Borti Bil and others along with vast stretches of agricultural plots. Hence, people have to take a detour via Barrackpore or Barasat to reach the campus causing longer travel time and distance travelled.

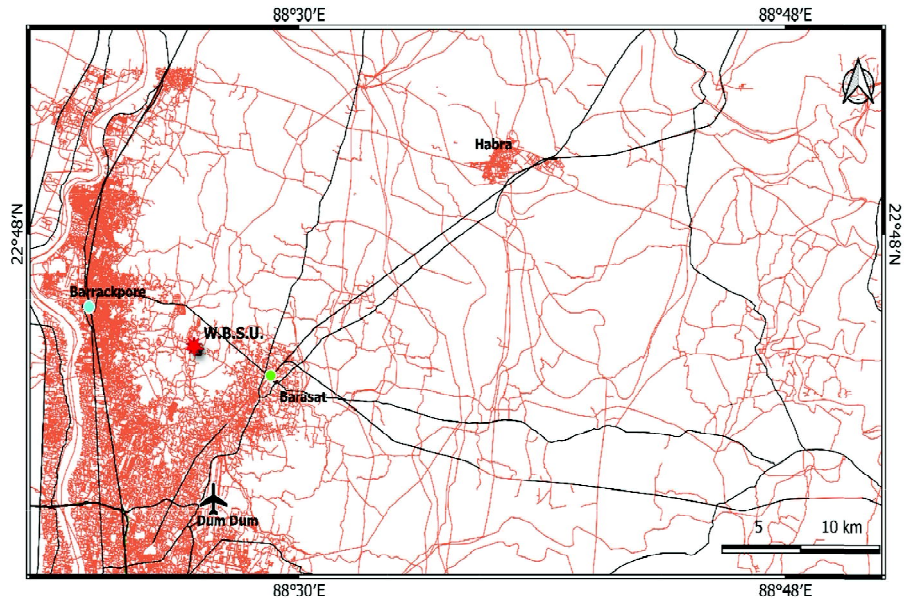


Fig. 3: Surface Transport Network around the WBSU

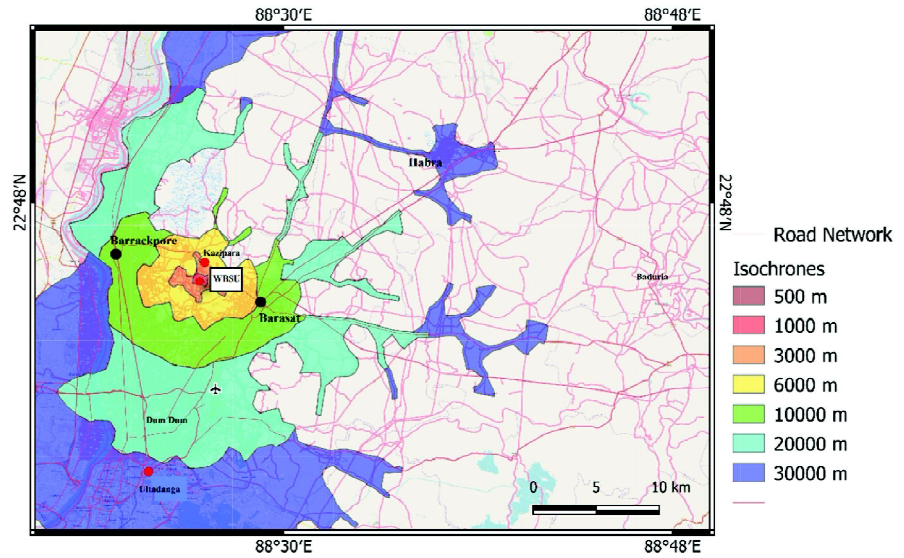


Fig. 4: Areas having equal perceived distance from the WBSU by public transports

Analysing the responses received, it was inferred that students' residences ranged from 2 to 96km, and majorly from a distance of 2-40 km, on an average for both males and females (Table 1). The respondents cover the distance by various modes of transports among which 98% use public transport. Thus, emphasis is given

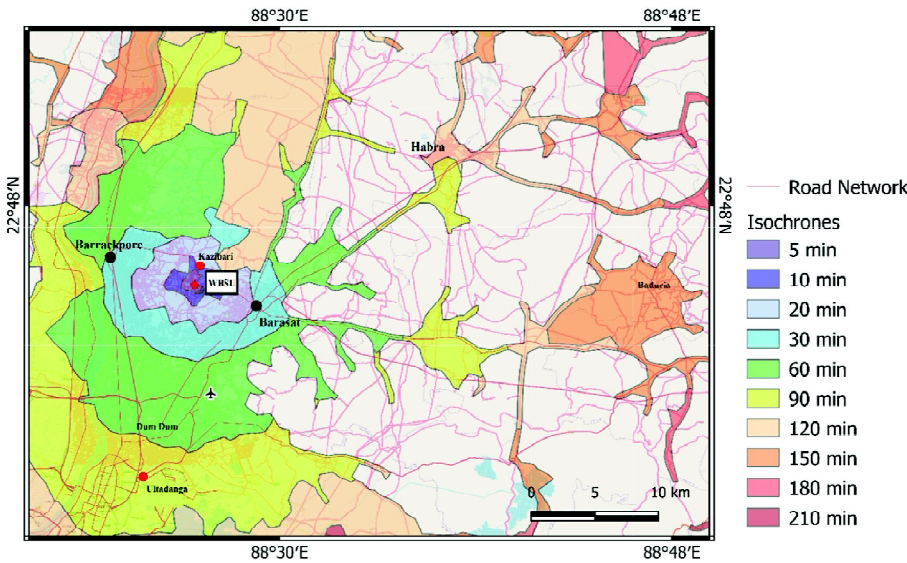


Fig. 5: Areas having equal perceived time from the WBSU by public transports

on the preferences and improvement in public transport services not only around the University campus in Berunanpukuria, but also the routes that students take to reach the University from the nearest train and bus stops. Here mainly auto and 'toto' (electric auto-rickshaws) are common for the distance from the nearest bus stop to the WBSU, but the maximum stretch is commuted by local trains (66%) to Barasat Railway Station (about 6 km) or by bus to Kazibari Bus Stop a bit more than 1.5 km away (57%). Of the responding males, two of them live around Serampore and Sheoraphuli across the Bhagirathi-Hugli river, where they have to cross to Barrackpore using the ferry service; while one of the female members take a private car from Madhyamgram to reach the University (fig. 6. A and B). The total time taken to reach the University varies from 20 min to a little more than 4 and half hours (fig. 7. A and B) depending on timely transport connectivity, the reasons for this includes, delayed bus service due to traffic congestion, crowding in peak hours increases waiting time to avail the services, delay in availing the previous transport mode in multiple break journeys, missed scheduled trains, strikes in any single mode of transport service, rains or late evenings leads to reduced frequency in the services. The major congestion points identified by the respondents include Barasat Champadali, Colony, Helabottola, Dakbunglow, and Barasat rail-station crossings, Nilganj crossing, Hasnabad town and New Barrackpore town, and other major road crossings where 10 to 20 min is the minimum stoppage time. It is also to be noted that the perception of distance becomes more for people using the bus service rather than train, which is regular, much faster and without traffic delays. Respondents commented that having low awareness regarding routes or availing just a single

transport mode can be disadvantageous due to these reasons, and thus they often have to take breaks during their travel and at times have to shift to other routes to be assured of reaching the University on time. Therefore, 76% of the respondents have to take at least 2 nodal breaks to reach the University where females tend to take lesser number of breaks than males (Fig. 8). Breaks in journey is said to reduce the journey times which requires *a priori* knowledge of routes, alertness and accurate calculation of timings to match transportation schedules; besides preferred corners or seating facilities may be unavailable when boarding from crowded points, which makes travel quite cumbersome for the women. The graph (fig. 9) shows that majority of the respondents use bus for their first mode of transport to commute from their residences, followed by train and then auto or toto.

Table 1: Gender-wise Distance Travelled

Distance Covered (in km)	% of Female	% of Male
< 10	20.69	39.79
10-20	27.59	53.06
20-30	17.24	33.15
30-40	15.52	29.85
40-50	3.45	13.27
50-60	6.9	6.63
60-70	5.17	9.94
> 70	3.45	6.63

Source: Primary survey, March-August, 2021

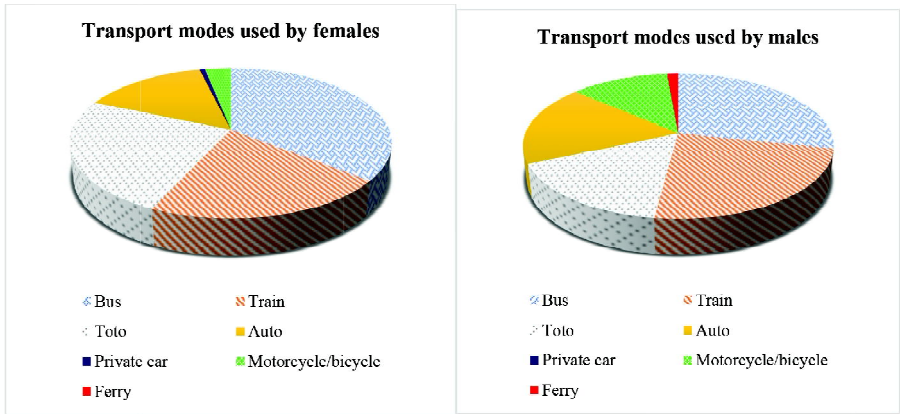


Fig. 6. A (Left) and B (Right)

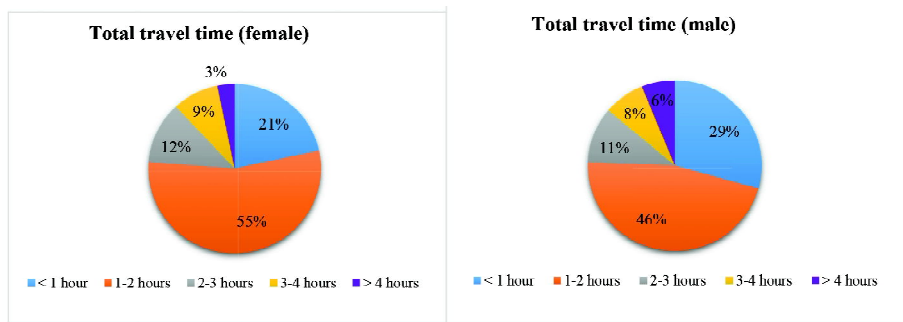


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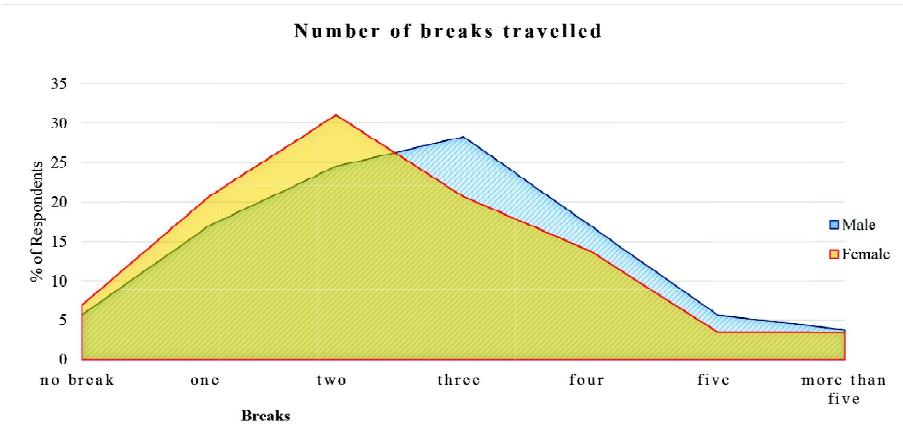


Fig. 8. Nodal breaks in transport route

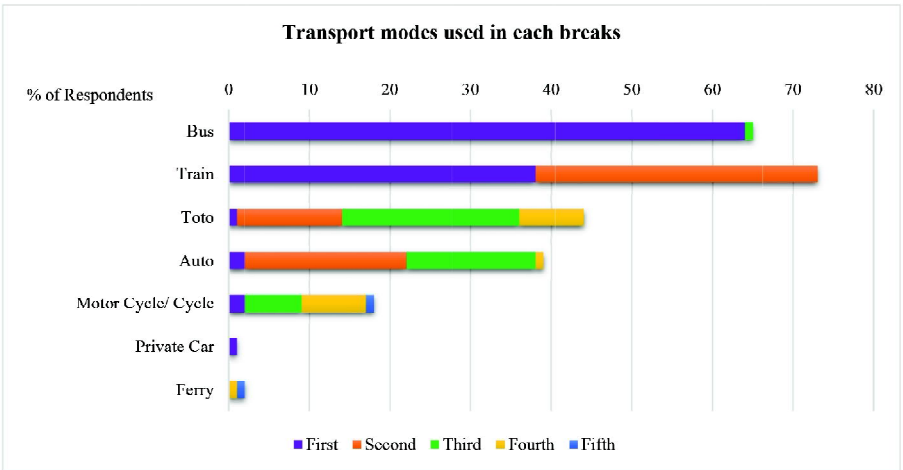


Fig. 9. Modes of transport availed

In connection with the breaks in journey taken by the commuters to the WBSU, graphs (fig. 10. A and B) were composed where the bars show the total time required to cover each break, and lines represent the waiting time to travel by each mode. It was observed that substantial proportion of females opted for modes of transport that took the minimum waiting time, unlike the males who choose varying transport according to less waiting time. On the other hand, females did not mind taking longer journeys if it was more comfortable, unlike males who preferred journeys of shorter duration and faster transportation even if it had more breaks. This was also noticed in the preceding cartograms (fig. 11. A and B) where the total time taken by females is longer compared to males in a similar travel zone (up to about 35 km distances that normally takes less than 2 hours in public transport modes) because of less preference towards multiple breaks. The frequency of transport services diagrams show that there is little variation in opinion among the male and female genders where the tolos and autos scored the highest, succeeded by public and private bus services (fig. 10. A and B).

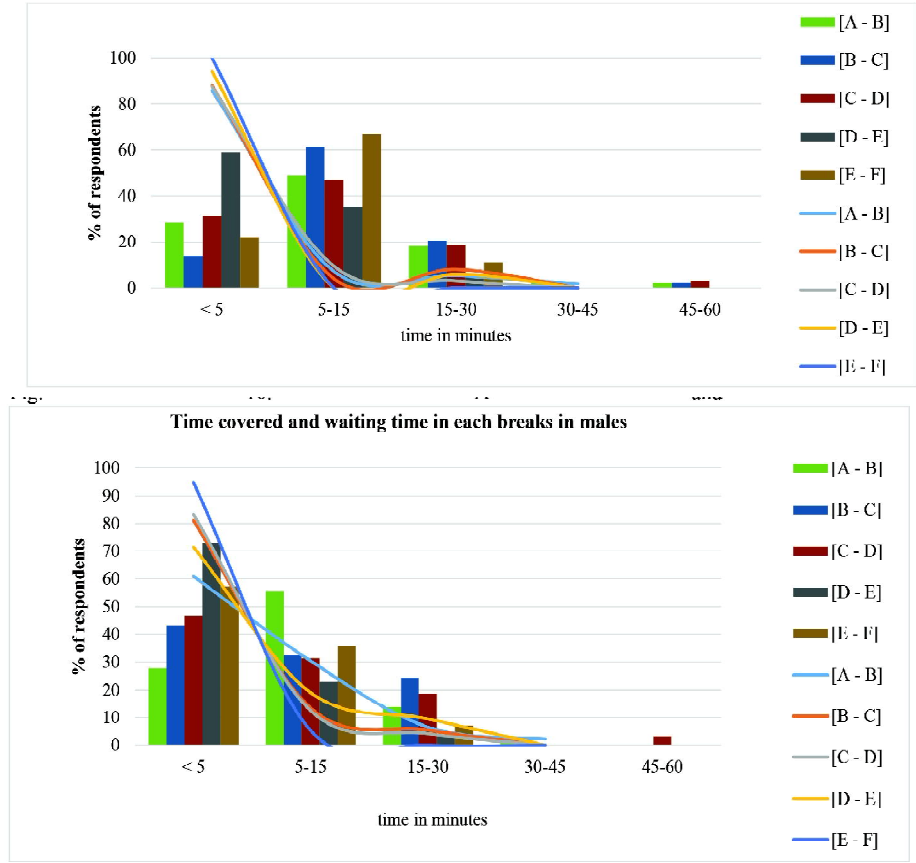


Fig. 10. A and B

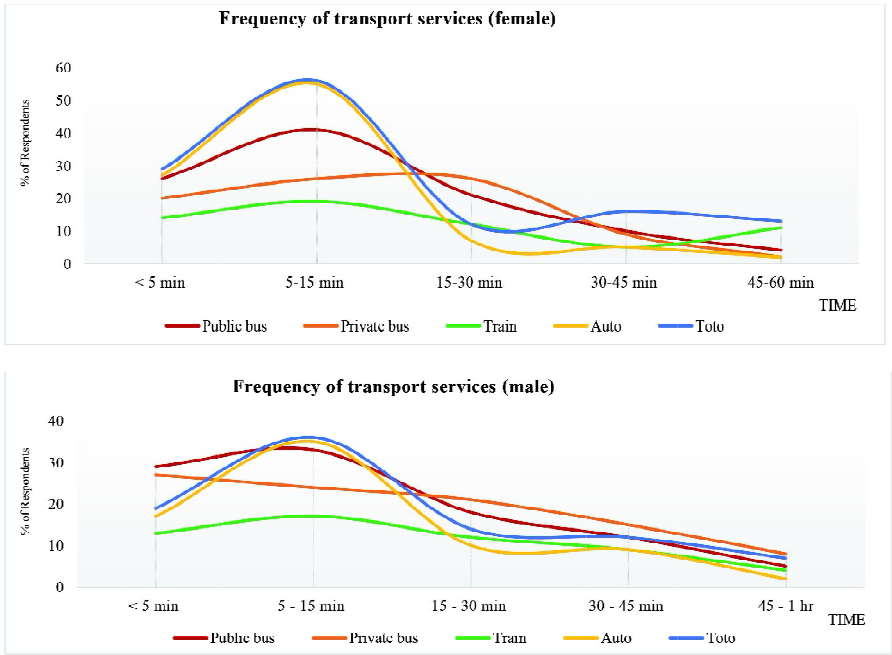


Fig. 11. A and B

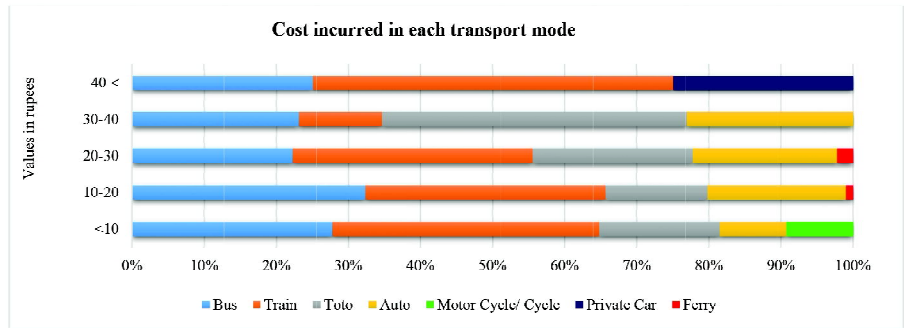


Fig. 12

The cost of transport in different modes varies with distance travelled, and here responses are based on commuters' experiences (fig. 11). Hence, it is observed that train and bus fares fluctuate, but a daily expenditure of over 50 INR is normal for commuters beyond a distance of 6 km, which may exceed up to 150 INR daily for students living afar even in public transport modes. Therefore, a willingness to pay response was kept in the questionnaire and interpreting the majority of observations, it can be inferred that 21% of the males were willing to spend 25-50 INR, while 21% females were ready to expend 75-100 INR. However, in other fare categories men have been identified to spend more compared to females which

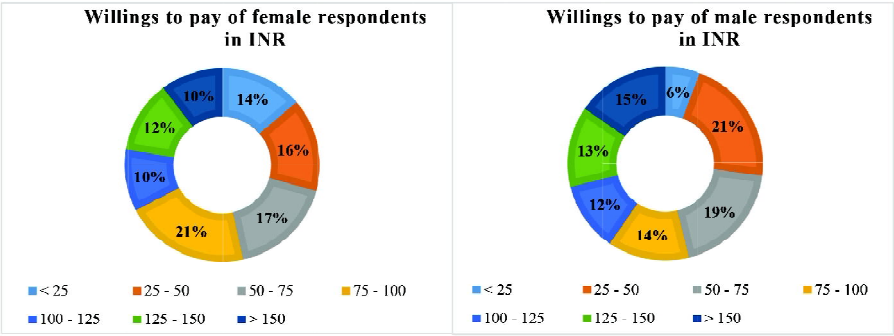


Fig. 13. A and B

depended on the varying income categories that were taken in this survey. The affordability factor must be brought up in front of road planners as the commuters in this region have low purchasing power and economic independence. In terms of distance, no significant gender difference can be observed (fig. 14 A and B), although a rational trend of spending more over longer journeys can be observed in case of the male respondents. There is no significant difference in terms of gender bias in regard to distance travelled and willingness to pay since the value of significance is less than the critical value of chi square test. (Table 2). The correlation between distance and willingness to pay is not significant for both male (p value of 0.029 at 95% confidence level) and female (p value of 0.077 at 95% confidence level).

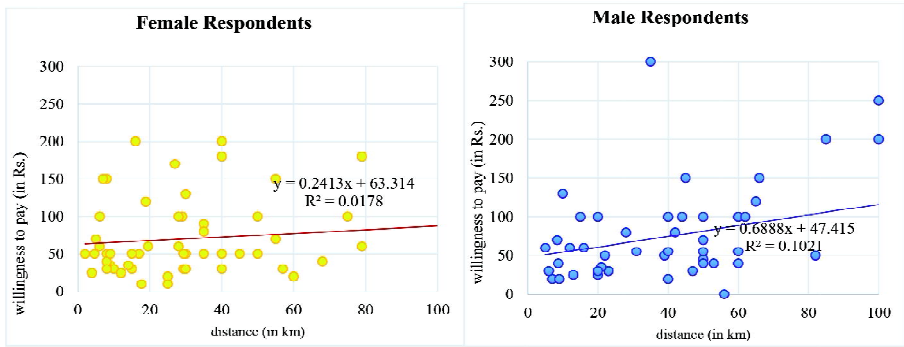


Fig. 14. A and B

Fig. 14. A and B

Table. 2

	Distance travelled	Willingness to pay
p value=	0.78	0.33
Chi. Sq. Test statistics =	6.43	6.92
Critical value at 0.005 significance level =	18.31	12.59

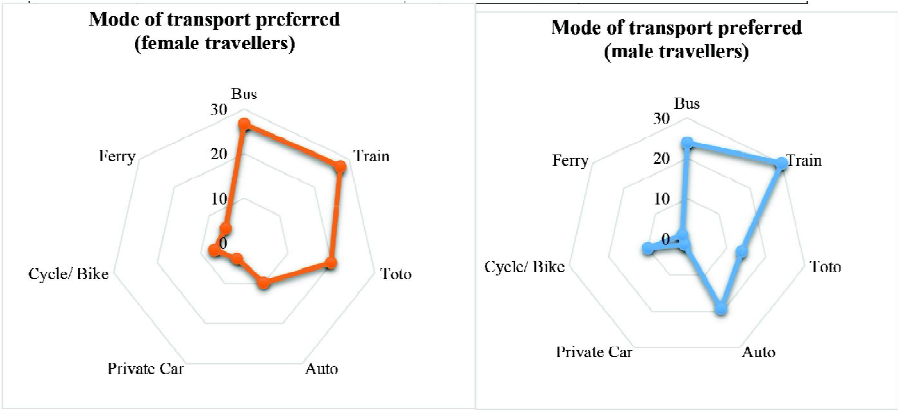


Fig. 15. A and B

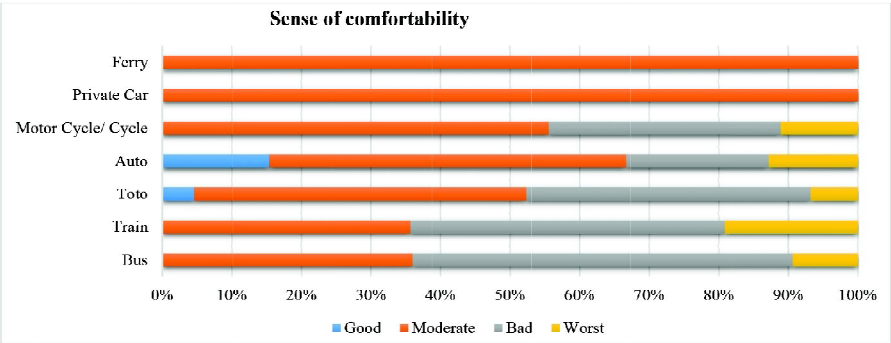


Fig. 16

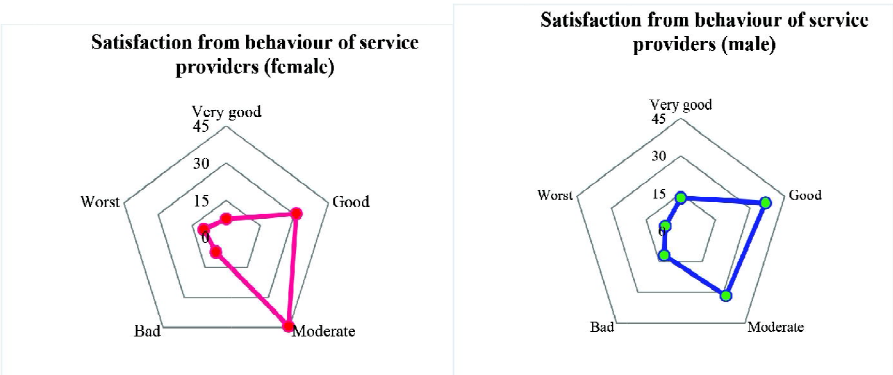


Fig. 17. A and B

Train services are more preferable among the female commuters (66%) compared to bus services (56%) because the journey by train is not only faster but also more

comfortable and the services are regular, mostly on time than bus services to reach the University (fig. 15 A and B). Government or private bus services are not consistent in maintaining the routes nor the timings. Most private bus services are relatively expensive, at times charging more than the stipulated fares; hence commuters prefer the train services. On the other hand, the totos are most preferable (39%) than auto (33%) as they are readily available from anywhere and do not stick to only the main road routes. This is a hybrid conveyance having the advantages of both the cycle-rickshaws and autos but lack in proper suspension capacities leading to jerky rides. They are also much cheaper and environment-friendly as stated by 27% of the respondents who preferred totos to auto. These electric auto-rickshaws are slower and rides create more shudders than autos; however, there is no rash driving or misbehavior on the part of the toto drivers making it more acceptable among the students. However, the female commuters preferred bus more than train and totos to auto services for comfort issues; unlike males who prefer train and auto for faster mobility. In this pandemic situation even though toto drivers maintain proper distance among the passengers, the male respondents preferred their own cycles and motorcycles to reach the University.

When asked about the condition of roads, 67% responded that there were no major waterlogging or road closures *en route* but the quality of surfacing and maintenance is extremely poor. The roads around the University campus are not in a very good condition especially during the monsoon season. Although the Barasat-Barrackpore highway route is relatively wide, during monsoons it is best be avoided. Kazibari to the University road is in bad condition because of the absence of any maintenance work in spite of heavy vehicular movements. All routes encircling the Barasat town, have the paramount problem of traffic congestion during peak hours (10am to 12pm), over speeding on highways, unlawful driving and high density of people habitually jaywalking on roads like in most cities and towns in West Bengal. Of the respondents only 24% could identify the accident-prone zones on their access routes that includes Barrackpore-Barasat highway, Barrackpore rail-gate, Helabottola crossing, Kazibari crossing, Dakbanglow crossing in Barasat, Taki Road, Dum Dum Airport approach roads and other crowded areas while most have responded to the presence of traffic signals (55.9%), civic volunteers (40.5%) and traffic police (47.7%) at major crossings in these areas. For the pedestrians' safety, few over-bridges or underpass (18% agreed) and footpath or footbridges (20% positively respondent) are present, which needs to be increased with proper planning. Speed breakers (28.8%), police stations (22%), speed limit zones (13.5%), no honking zones (5.4%), one way routes (11.7%) and traffic outposts (10%) were very few in numbers. These problems have reflected in their opinion, which to some extent affects the comfortability factor in various modes of transport (fig. 15). Commuters have varied opinions on travel by auto and toto, but unanimously they have consented to the fact that travelling by bus is not a very comfortable

experience in these routes, even though sometimes it is the only available option.

On asking to rank the behaviour of the service providers (fig. 16), 6.3% responded as very good, 35.4% were satisfied, 50.5% had moderate opinions, 6% felt the situation was bad and finally 1.8% said they faced worst situations. Most of them said that the frequency of bus service was poor and over-crowding reduced comfort. Sometimes it was not worth the money and waiting time spent, but since no other alternative of break journeys were available they were left with no choices. Reckless driving, quarrels, dust, smoke and noise pollutions sometimes infuriate the commuters. Female respondents stated that they felt safe more now than before if they returned back home by around 8 pm although fear of unlawful activities around Barasat were high previously. Most of the respondents said that from 9 am to 8 pm, all types of transport services were available to and from the WBSU and their places of residence. Cases were few but about 19% said that in case of emergencies the University authorities or faculties make provisions for transport to reach their nearest bus stop or railway station.

Street lighting is a major public issue around the University, especially along the road connecting Kazibari and the University, and also Barasat- Barrackpore road. Of the few who have to stay back late for classes and other works, 37% responded that all through street lighting is a necessity, and as high as 89% are unwilling to stay back after 7pm because of the darkness and isolation in the locality. Most of the people come here in the morning and leave by afternoon. But keeping in mind the increasing hostels, students' accommodations and local residents in the surrounding areas, and local government authority should provide necessary measures for staff and students to work till the late evenings whenever necessary. Most students feel that, in the evening, the road between Kazibari to the University is not safe due to the absence of traffic police or street lights or large clusters of inhabited areas. Also the roads being narrow and no separate space for footpaths or bicycling alleys, have either led to lowered speed of larger vehicles or increasing chances of accidents. It is to be also noted that, the area although is under Barasat-I Block but is under the jurisdiction of Duttapukur Police Station which is around 15 km away, hence people have lowered sense of security in this location. Only 29% of the respondents felt that this route has a good, comfortable, fast and low cost transport option from their location; and the other 28% stated that the institution was not appropriately located and could have been placed on a better accessible junction like near Kazibari main road or within Barasat town or its close proximity.

On enquired about the possible suggestions for improvements in public transport facilities, most responded on proper street lighting, maintenance of road surfaces and footpaths, relevant traffic flow alignments to ease out congestions, more shops so that the area does not look desolate, proper bus stops, toto or auto

stands outside the campus gates etc. Some opined that the University should have its own free or subsidized bus services from Barasat and Barrackpore railway stations and surrounding bus stops, while some others said that the routes leading to the University should have concessional fare rates, the frequency of buses at peak times must be increased, auto routes directly from railway station must be allowed at reasonable rates, a fixed rate chart for all vehicles must be made available otherwise drivers charge at their free will. Finally, respondents also felt that the police should regularly go in rounds to ensure safety of the students in vehicles as well as on roads. One of the respondents stated that earlier there was a government bus which would run from Champadali to the University directly, but due to reasons unknown it was closed down. That bus service would cost less and provide easy accessibility, as it was available from Helabottola to the WBSU, but now the students have to walk about 2 km to the University since many cannot afford the extra toto fares. Construction of a bus depot near the University can be beneficial.

Studying the rate and extent of congestion as reflected in the Google traffic applications map and Street View layers at different timeframes each day of a typical week or current traffic scenario, suggestions for alternative routes through either mass transit modes such as train, mono-rail, state or private bus, metro rail or para transit modes such as auto, electric rickshaws, cycle and bikes may be considered as follows (Fig.18):

- a) If travelling from the south, at any point of time, it can be inferred that Kalyani Expressway remains congestion free for most of its stretch, hence dedicated routes from Dopere crossing (A) on the expressway, up the Nilganj Road across on the Noai channel to the University campus may be widened and maintained for a faster travel.
- b) If travelling from the north, a side road from Mirhati crossing (B) along the NH 12 or Duttapukur (C) along the NH 112 (Barasat to Petrapole border) into Duttapukur- Nilganj Road can be widened and developed to avoid the congestion of Barasat central area.
- c) From the east a bye-pass highway up to the junction area Sebarhat (D) around Noaikhal (canal) crossing of the Nilganj road and Barrackpore-Barasat road could ease travel to all directions
- d) As the western side has a comparatively smaller student catchment, and even fewer options, the Metrorail lines that are proposed up to Barrackpore or Barasat may be extended up to Nilganj area or the Barasat line may be joined with the Barrackpore line with a halting station in-between, can add to the transport mode choices for the fastest and most comfortable journeys from this educational hub.

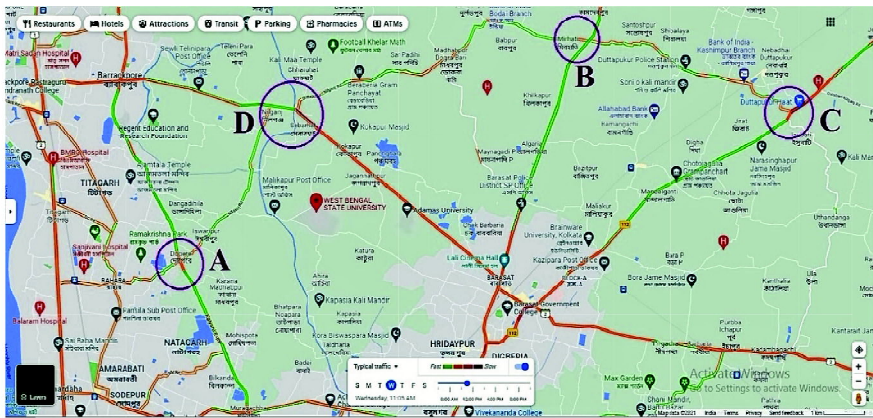


Fig. 18

Apart from transport infrastructural modifications, accessibility perceptions improve with better vehicular cleanliness, seating arrangements, sturdy built, driving skills and their behaviour with the fellow passengers along with ensuring safety and security in all vehicles and along routes,. The public toilet facilities, shops of emergency goods, clean waiting zones at regular intervals along the routes or at stoppages can ease out the discomforts of the long journeys in every route.

Conclusion

Barasat to Barrackpore area around Kazibari in NilganjGram Panchayat accommodates numerous schools, colleges, institutes and universities which require safe, comfortable, fast, frequent and cheap transport facilities apart from transformation of the rural landscape to an urban centre. The University campus under study was planned to have been located in a very strategic point having two nodal centres of Barrackpore and Barasat on its two sides, apparently connected by ample para-transit modes. However, as per commuters' surveys, the accessibility routes are perceived as poor due to low frequency of vehicles, non-regularized fares and lack of adequate transport options, low maintenance of roads, etc. Keeping these issues in mind and analyzing the behavioural preferences in travel modes, the authors conclude that clean and secured vehicles, more direct, dedicated and regular mass and para transit routes from major residential centres, even at a distance of 30km, are to be provisioned by the concerned transport authorities to develop this area in a major educational nucleus.

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