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Travel Time Dynamics of the University of Port Harcourt Inter-campus Commercial Transit Services

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ABSTRACT
There has been worrisome perennial traffic gridlock on the various gateways to the three campuses of the University of Port Harcourt, Choba, Rivers State, Nigeria, owing to rapid urbanization of the host communities, expansion of the University and the consequent increase in population of students, staff, visitors and business owners. There is the growing concern that the University would soon become inaccessible if something is not done urgently to reverse the simmering condition. This debilitating development has continued to increase and assume new shapes as the years rolled by. This paper seeks to evaluate the situation with a view to recommending necessary steps to contain it. It evaluates the traffic characteristics of the area of study using Travel Time (temporal) parameters obtained over a 5 work-day of the week period on the two major routes. The study revealed a grossly inefficient system with very high travel time of 9.32 minutes for a 1.5 kilometers distance on the first analyzed route as against the maximum time of 1.8 minutes, using as benchmark, the Nigerian Highway Code maximum speed limit for buses in built up areas. On the second route, the study also revealed that an average of 20.8 minutes was spent on a distance of 3.5 kilometers; as against the expected time of 4.2 minutes, using the stated benchmark. It is observed that the high travel time is blamable on the attitude of the road users, mechanical states of vehicles and the geometric features of the road network.

Keywords: Travel-time, Geometric features, Gridlock, Fleet size.

I. INTRODUCTION

Mobility crises often results from poor land-use planning in rapidly urbanizing environments. It is common knowledge that development favors the pull factors of migration, thus leading to sharp increase in population, increase in vehicular traffic and consequently, on travel time.

The University of Port Harcourt, Choba, Rivers State, Nigeria is a handy example of a rapidly urbanizing area with the attendant spike in population, leading to perennial traffic bottleneck. This condition greatly hampers access by staff and students whose activities are bound by time as stipulated in various departmental and faculty timetables for lectures and examinations. On the other hand, the productivity level of the non-teaching staff is also greatly hampered by poor traffic system, because productivity is often a function of the level of comfort both in easement of access to offices and in moving materials and people from one campus, classroom or field to another.

It has been observed that there are too many bus stop/pick and drop points in the area and this greatly reduces the travel speed. With the change in the geometric features of the road, such as the extension of the U-turn points on the East-West road which is the major feeder road to the University, the commuting distance increased. However, the long travel time cannot be explained by only the alteration.

This paper seeks to evaluate the traffic characteristics of the three major campuses of the University with a view to understanding the underlying issues that hamper the free flow of traffic and make consequential recommendations towards arresting and reversing the situation. In other to achieve the aim of this study as stated above, Gordon Line Traffic Survey was carried out to obtain the average travel time, peak/off peak hours, traffic volume and the traffic flow rate of the routes. However, this paper dwelt only on the travel time analysis.

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II. STUDY AREA

Founded in 1975 in the then sleepy Choba community in Obior/Akpor Local Government Area of Rivers State, the University of Port Harcourt and the Choba Community have both grown into a densely populated area with ever spiraling traffic. The current population of the University is conservatively put at 45,000 students at various levels of studies and about 7000 members of staff of various cadres. This excludes the multitude of the business owners/operators, contractors and visitors.

Bound in the east by Rumuekini community, in the West by the New Calabar River, in the south by the Choba and Alakahia communities and in the north by Omuoko and Omuokiri communities, the University lies between latitudes 4*54'15"N and longitude 6*55'26" E. The development of the University has been trickling down and having multiplier effects on the host communities and their neighbors. The University comprises of 3 campuses: Choba, Delta and Abuja. The Delta Park – Unipark road is an internal single lane road network starting from the Delta entrance gate to the UPTH inner gate.

The Unipark – Igbogo road route runs from the Ofrima end of the Dan Etete double lane, passing through the East-West road (Expressway). It joins the Igbogo road, a trunk C network in the Rumuchakara clan of Choba town and connects the Choba-Mgbuoba road at the Rumuchakara junction and then, terminates at the Choba Park.

III. METHODOLOGY

The researcher engaged eight traffic controllers for the survey. Each vehicle has a fleet number embossed on it. Two researchers manned each of the parks, with a list containing all the fleet numbers. While in each park, one of the assistants recorded the arrival time against each fleet number, the other recorded the take-off time. For this study, research assistants were commissioned from among members of the University Taskforce on enforcement of minimum operational standards on the mass transit services and students. The researcher shuttled between the parks to supervise the assistants. The exercises took place between Monday and Friday, 8am to 6pm each day. Park Management provided a comprehensive list of operators who obtained the daily operation permit. It was through the list that the daily fleet size was computed. The data obtained were vehicle occupancy rate, traffic volume, traffic flow rate and travel time. The travel time analysis formula was used and results compared to the Standard Speed Limit Benchmark of Nigerian Highway Code. This paper however, is only concerned with the travel time variable.

Travel Time

Travel time is the average duration through in which a trip is concluded from origin to destination (i.e. from Delta park gate to Unipark) and from Uniport to Choba and vice versa.

To obtain the travel time for the two major routes, (Delta park gate to Unipark and from Unipark to Choba park), twenty (20) vehicles were randomly selected for survey on each route. The number of surveys made for each vehicle was four. The formula for travel time analysis is as given below:

$$\text{Average Travel Time} = \frac{\Sigma \text{ travel time}}{\Sigma \text{No of trips made}}$$

IV. RESULTS AND DISCUSSIONS

Below are the tables of values for the survey.

Table 1: Travel time on Delta Park to Unipark route (1.5km)

Vehicles	**(S1) Survey 1**	**(S2) Survey 2**	**(S3) Survey 3**	**(S4) Survey 4**	$\bar{x}$ **Mean**
Vehicle 1	9.33	2.46	10.20	8.51	9.37
Vehicle 2	8.42	10.20	9.25	9.23	9.3
Vehicle 3	8.46	9.32	10.18	8.46	9.10
Vehicle 4	10.20	10.17	10.26	9.31	9.9
Vehicle 5	8.45	9.28	9.45	8.54	8.9
Vehicle 6	10.18	9.30	9.42	9.29	9.54
Vehicle 7	8.50	10.01	10.22	9.34	9.51
Vehicle 8	8.40	9.36	8.40	9.26	8.8
Vehicle 9	8.56	9.44	9.31	10.16	9.36
Vehicle 10	10.15	9.25	9.20	8.52	9.28

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Vehicle 11	9.38	9.36	8.53	9.28	9.13
Vehicle 12	10.02	10.19	8.59	9.24	9.51
Vehicle 13	9.47	9.41	9.30	9.34	9.38
Vehicle 14	9.35	9.26	9.25	8.50	9.09
Vehicle 15	8.50	8.45	9.28	9.42	8.9
Vehicle 16	9.22	9.30	9.46	9.33	9.32
Vehicle 17	9.29	8.40	10.17	9.26	9.28
Vehicle 18	9.43	10.05	9.26	9.30	9.51
Vehicle 19	9.58	8.41	10.00	9.24	9.30
Vehicle 20	10.26	9.43	9.41	10.08	9.7
Total	185.15	188.05	189.24	183.61	186.18

$$\Sigma \bar{x} = \frac{185.15 + 188.05 + 189.24 + 183.61}{N(S1 + S2 + S3 + S4)}$$

$$= \frac{185.15 + 188.05 + 189.24 + 183.61}{20 + 20 + 20 + 20}$$

$$= \frac{746.05}{80}$$

$$\frac{\Sigma \bar{x}\ (186.51)}{N(20)}, = 9.32$$

: $\Sigma \bar{x}$ = 9.32 minutes (i.e. 9 minutes, 32 seconds).

The above analysis indicates that the average travel time for vehicles on the route (Delta park – Unipark) is 9 minutes, 32 seconds.

Table 2: Standard Speed Limit (Recommended) For Vehicle in Nigeria.

Types of vehicle	Built up areas	High ways	Expressways
Motorcycle	50	50	Not applicable
Cars on private use	50	80	100
Taxes & Buses	50	80	90
Tankers & Trailers	45	50	60
Towing vehicle on towing	45	45	45
Towing vehicles not on tow	50	60	70

Source: Nigeria Highway Code (2015).

Applying the speed limit benchmark in Nigeria:

The federal Highway Code stipulates 50km/hr in built up areas such as the study area/route, for buses. Applying this benchmark; the route (Delta Park Gate to Unipark) is 1.5 kilometer distance . This implies that the distance should take 1 minute, 8 seconds (1.8 minutes).

i. e. $\frac{1.5\ (\text{km})}{50\ (\text{km.hour})} = \frac{1.5}{50} = 0.03\text{hour}$

∴ 0.03 x 60 minutes

= 1.8 minutes (1 minute, 8 seconds)

Given that ideally, the distance of 1.5 kilometer may be covered within 1.8 minutes on 50km/hr speed. The average travel time is 9.32 minutes. This clearly indicates that so much time is wasted in transit. In other words, a whooping 9.32 minutes is spent against the ideal 1.8 minutes. This leaves us with an extra 7.52 minutes of wasted man hour.

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Table 3: Travel Time on Unipark- Igbogo Road- Choba Park Route (3.5km)

Vehicles	**(S1) Survey 1**	**(S2) Survey 2**	**(S3) Survey 3**	**(S4) Survey 4**	$\bar{x}$ **Mean**
Vehicle 1	20.08	21.04	20.48	20.22	20.45
Vehicle 2	21.12	20.21	21.29	20.16	20.6
Vehicle 3	20.59	20.35	21.36	19.53	20.45
Vehicle 4	20.21	19.57	20.45	20.28	20.12
Vehicle 5	19.58	22.20	23.21	20.44	21.35
Vehicle 6	20.43	21.34	24.00	21.19	21.7
Vehicle 7	19.53	18.51	21.15	20.23	19.09
Vehicle 8	21.41	24.03	21.27	18.57	21.32
Vehicle 9	22.03	20.56	23.52	20.33	21.6
Vehicle 10	21.20	22.23	24.09	20.36	21.47
Vehicle 11	19.37	21.35	19.56	20.50	20.19
Vehicle 12	22.28	19.55	22.53	21.51	21.54
Vehicle 13	18.52	21.33	21.20	18.55	19.09
Vehicle 14	20.39	22.17	23.50	22.12	22.04
Vehicle 15	22.51	21.28	18.33	20.09	20.55
Vehicle 16	20.22	23.22	20.28	21.45	21.29
Vehicle 17	21.31	20.41	20.36	19.35	20.35
Vehicle 18	19.58	23.06	19.50	20.26	20.6
Vehicle 19	20.42	21.24	21.41	21.31	21.09
Vehicle 20	20.15	19.50	20.13	20.45	20.05
Total	410.93	421.15	427.52	406.9	

$$\Sigma \bar{x} = \frac{410.93 + 421.15 + 427.52 + 406.9}{N(S1 + S2 + S3 + S4)}$$

$$= \frac{410.93 + 421.15 + 427.52 + 406.9}{20 + 20 + 20 + 20}$$

$$= \frac{1666.5}{80}$$

$$= 20.8$$

$\therefore \Sigma \bar{x}$ = 20.8 minutes (20 minutes, 8 seconds).

The analysis given above shows that the Average Travel Time for vehicles on the Unipark- Igbogo Road- Choba Park route is 20 minutes, 8 seconds (20.8 minutes).

Using the Nigeria Highway Code benchmark which stipulates 50km/hr in such areas built up areas), for buses, the ideal travel time ought to ne 4minutes, 8 seconds.

Note: Distance = 3.5km

Benchmark = 50km/hr

$$\text{i.e } \frac{3.5 \text{ x } 60}{50}$$

= 0.07 x 60 = 4.2 minutes.

However, the actual travel time is 20.8 minutes. This is excessive waste of man hour, at the tune of extra 16.6 minutes per trip. (i.e. 20.8 - 4.2 = 16.6).

V. CONCLUSION

It has been established from the study that there is huge waste of man-hours in transit between the University campuses. It may be emphasized that the 1.5km Delta Park to Unipark route takes an average of 9 minutes, 32seconds, as against the ideal time (using the Nigerian Highway Code benchmark) of 1minute, 8 seconds. This shows that an average of 7 minutes, 52 seconds is wasted in transit.

The Unipark-Igbogo Road- Choba 3.5 kilometers route takes an average of 20 minutes, 8 seconds travel time; as against the ideal time of 4 minutes, 2 seconds, using the said Nigeria Highway Code benchmark. It is clear from the facts established above that with an average man-hour of 16 minutes, 6 seconds is wasted on each trip.

Many factors contribute to this delay. The peak-hours traffic volume is one factor that causes perennial gridlock and increased travel time. Others are the mechanical state of vehicles, uncontrolled pick-and-drop points, erection of unnecessary speed breakers, touting activities, street trading, geometric features of the road and attitude of road users, which include pedestrians. It is noteworthy that pedestrianism is becoming a huge challenge at the Choba junction and the A.P/IPS axis due to the lack of zebra crossing and the tendency of pedestrians to cross the road at whatever point he/she wishes to.

VI. RECOMMENDATIONS

From the facts and issues of the forgoing analysis, this study makes the following recommendations:

1. The park management must set a minimum standard for admission of vehicles into the fleet on franchising basis. Vehicles must be fully certified to be in top mechanical shape before registering them in the fleet.
2. Periodic assessment/inspection of vehicles must be carried out with utmost seriousness. The National Road Traffic Regulation of Nigeria recommends that commercial vehicles should be inspected for road worthiness every six months. It is obvious that this hardly applies to the Campus mass transit service, thereby making it a dumping ground for disused vehicles.
3. There should be properly designated pick-and-drop points/bus stops on the routes. The attitude of picking and dropping passengers at will must be discouraged by the task force by the impoundment of defaulting vehicles and imposition of fines for violation or non use of designated places for that purpose.
4. The speed breakers on Igbogo-Choba park axis are too many and unnecessary. They should be dismantled by the state authorities.
5. Touting and Street trading on the Choba Junction and Igbogo Road routes must be stopped. Street traders take up the road shoulders for the sampling of their wares, thereby forcing the pedestrians on the road and also reducing the available space for overtaking.
6. Surface markings are very needful on the routes. Of paramount importance are zebra-crossing features on the Choba Junction and IPS axis of the East-West Road. This would guide the pedestrians on crossing points, thereby reducing the razzmatazz experienced in those areas as pedestrians cross from as many points as the pedestrians are.
7. Rehabilitation of failed positions of the Unipark Igbogo Road- Chona route and reconstruction of the Dan- Etete road with coaltar instead of the interlocking stones currently in use, which makes the pavement uneven and slows movement.

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