

Traffic Analysis on a Suburban Road in Yewa South Local Government of Ogun State, Nigeria

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Abstract

In the past years there have been little vehicular movement in Yewa South Local Government. Since inception of Dangote Cement factory, commercial activities have increased with surge in the attendant vehicular traffic along the Ilaro-Ibese axis. There is however the need to assess the traffic condition on the road to make an informed suggestion to improve the road operating capacity. Reconnaissance was conducted on the stretch of the road to ascertain factors that contribute to congestion on the road and possible spot/location to conduct traffic count to address the issue of congestion. Manual traffic count was carried out between the hours of 7am and 7pm daily for a week to obtain information about the vehicular traffic on the chosen road using handheld electronic device. Traffic characteristic was also taken into consideration, Motorcycle / Tricycle; Car; Bus; Truck /Trailer; and Good Vehicles / Van were the major vehicle types The British standard of Passenger Car Unit (PCU) was used in the computation and analysis of the road capacity. The traffic analysis on a suburban road, Ilaro-Ibese road, in Yewa South Local Government of Ogun State, Nigeria has been studied and it can be concluded that the road is a very important conduit in this axis as major means of moving some agricultural produces and cement produced in this area to final consumers. It can be concluded that traffic on this road is dominated by motorcycles, cars and heavy goods trucks. Also, it can be concluded that congestion at the Ilaro-Ibese junction is influenced by market-going traffic and lack of adequate traffic control mechanisms in place, driver behaviours, pedestrians crossing the road and largely the poor road condition.

Keywords: *Traffic, PCU, congestion, road and vehicles*

Citation

Olarewaju, A. J. & Olaoye, J. O. (2024). Traffic Analysis on a Suburban Road in Yewa South Local Government of Ogun State, Nigeria. *International Journal of Women in Technical Education and Employment*, 5(2), 26 – 31.

Introduction

Transportation is the movement of goods, services and people from one place to another. It is essential for a national development and growth. Different modes of transportation exist in Nigeria however the commonest and most affordable is road transportation. Road transportation, like every other mode of transportation, has its challenges which make road transportation sometimes uncomfortable and costly. Some of the problems encountered are delays, congestion, bad roadways, inadequate control devices/measures, lack of

adequate infrastructures such as drainages, median, interchange/intersections and so on. Proper transportation planning, adequate designs (geometric and pavement designs) and timely maintenance are however required for any proposed roadway or upgrading of an existing one. This can be achieved through the understanding of the prevailing traffic component of the transportation system in an area. Engineering characteristics of traffic such as volume, speed, parking, delays, are studied in order to understand the nature of traffic and its composition.

ARTICLE HISTORY

Received: July 5, 2024

Revised: July 8, 2024

Accepted: July 9, 2024

The analysis of the traffic characteristics gives insight into causes of observed traffic challenges in an area.

Abdurrahman & Nasiru (2022), attributed traffic congestion partly to traders selling by the roadside and indiscriminate parking of vehicles on the road by motorists thereby denying road users to maximize the road capacity.

Joseph et al., 2012 maintained that congestion can be caused due to road system, pattern of land development, composition of traffic, and policies of public transportation. Congestion was further divided into institutional, human, and physical matrices by Ogunsanya (2006). The regulatory bodies tasked with overseeing both the infrastructure and the road users are the physical transport infrastructures, and the human element refers to the attitudes of the road users. Bad road conditions and inadequate road infrastructure were found by Aworemi et al., (2009) and Bashiru & Waziri (2008) in independent study conducted in Lagos. Other factors included poor traffic planning, driving behaviour, and the absence of an integrated transport system. Road intersections are a key element of metropolitan roadways that are typically prone to produce traffic congestion, according to Joseph et al. (2012), while Momoh (2011) avers that an inadequate integrated transportation system and an excessive reliance on motor vehicles are the culprits causing congestion.

According to Kadiyali (2013), there are three ways to define road capacity: basic capacity, possible/operating capacity, and practical/design capacity. While the possible/operating capacity is the maximum number of vehicles that can pass a given point on a lane or roadway under the current conditions of the roadway and traffic, the basic capacity is the ideal number of vehicles that can pass a point on a road where there are no obstructions to traffic movement. Hayri et al (2024) reported that the maximum number of vehicles that can be projected to travel on a roadway or through a point while taking into account the maximum traffic density that won't unreasonably cause a delay, hazard, or restrict the freedom of movement of road users under

the current traffic and roadway conditions is known as the practical or design capacity.

The design capacity for a single-lane road with a 6.75-meter lane width for two-directional flows is 900 PCU/hour, according to Transport for London (2011). Understanding capacity is crucial to this study because it makes it possible to compare the current operational capacity (Traffic Volume) with the facilities' practical or designed capacities to assess if they are adequate or insufficient.

This study aims at studying the Ilaro - Ibese roadway traffic and in order to determine the composition of traffic, the daily traffic, the peak and off-peak periods and the prevailing operating road capacity. This research will also determine the type of elements that can be added to the roadway for operating and maintaining the transportation system safely and economically on this road stretch.

Materials and Methods

Study Area

The road studied for its traffic is located on the boundary of Ilaro -Ibese township in Yewa South Local Government Area of Ogun State, Southwestern Nigeria. It lies on coordinates 6°53'4" N, 2° 58' 51" E and 5° 25' 36" E, 8° 41' 56" E Figures 1 and 2). The road forms part of Nigeria - Benin Republic international route network bearing both light passenger and heavy goods vehicular traffic.

Ilaro township is the headquarters of the Yewa people. It has a number of commercial centre such as banks, petrol stations, supermarket, sawmill and other businesses. The Federal Polytechnic Ilaro, many primary and secondary schools are also located therein. It shares boundary with Owode-Yewa a town with an international route leading to Benin Republic, Ajegunle/Papalanto, Ifo, Oja-Odan a market town on an international route leading to the Republic of Benin as well as Ibese a town hosting the Dangote cement factory. Ilaro is a main link town to several other towns in the axis with big agricultural produce market hence on such market days it is very common to witness congestion at Ilaro Motor Park junction that

distributes traffic to the major roads which either leads into the community or outside Ilaro to other neighbouring towns. All the exit routes through Ilaro township bear a mix of inter and intra traffic of both heavy goods and low-capacity vehicles. The Ilaro - Ibese road doubles as a market route and roadway for heavy trucks laden with cement (about 45 tonnage) moving from the Dangote cement Industry.

Method

Reconnaissance was conducted on the stretch of the road to ascertain factors that contribute to congestion on the road and possible spot/location to conduct traffic count to address the issue of congestion.

Manual traffic count was carried out between the hours of 7am and 7pm daily at the junction of the IBEDC office for a week to obtain information about the vehicular traffic on the chosen road using handheld electronic device. Traffic count was taken on both ways, towards Ibese and towards Ilaro. Traffic characteristic was also taken into consideration, Motorcycle / Tricycle; Car; Bus; Truck /Trailer; and Good Vehicles / Van were the major vehicle types on the road. The British standard of Passenger Car Unit (PCU) was used in the computation and analysis of the road capacity. The statistical analysis required is the average of the PCU.

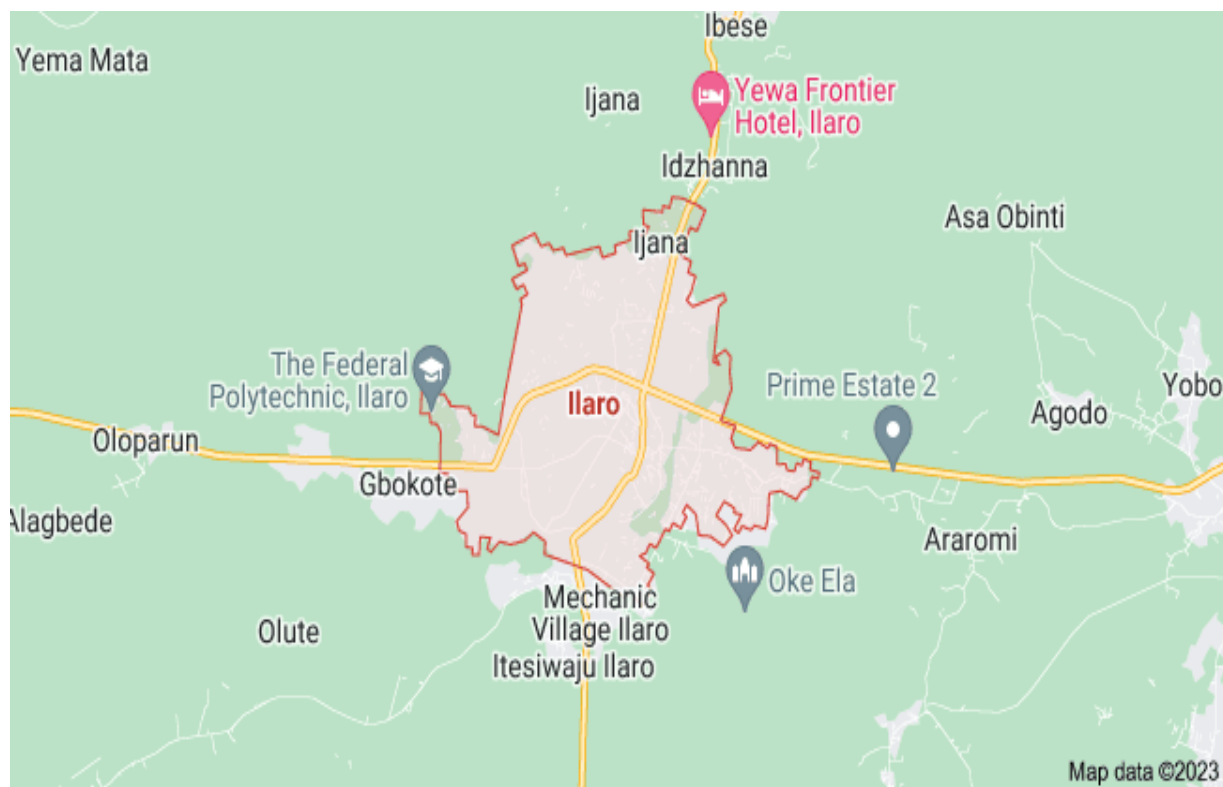


Fig. 1: Map of the Study Area

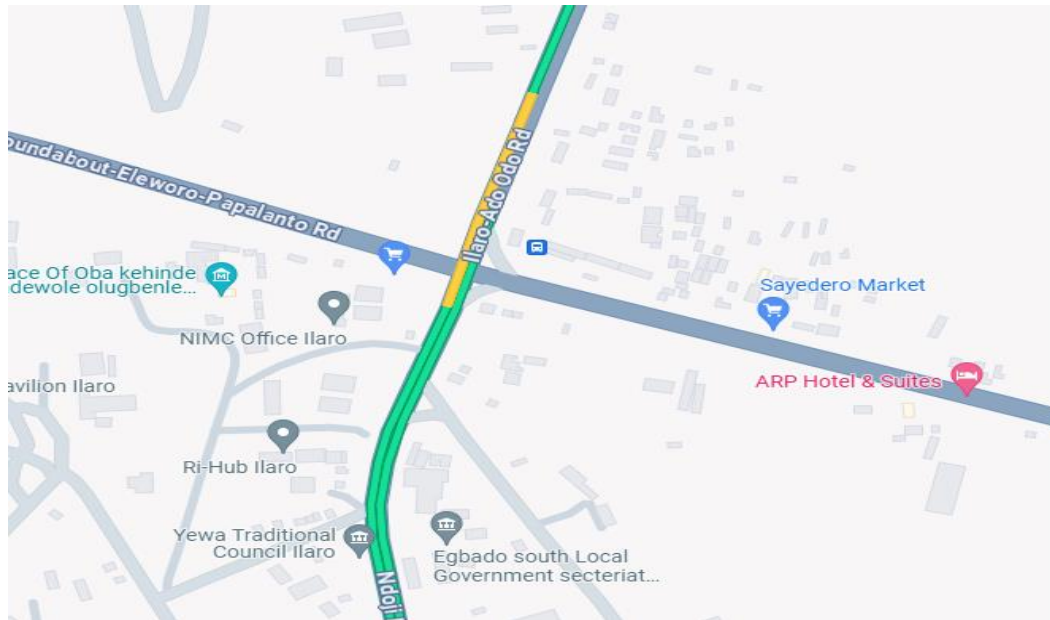


Fig. 2: Ilaro Road Network

Results and Discussion

The results of the traffic count and traffic composition are presented in Tables 1 and 2 below. The estimation of the PCU is based on the British Standard; accordingly, Motorcycle/Tricycle – 0.75, Car -1.00, Mini trucks/Buses/Goods van -2.00 and Trucks – 4.00 (Kadiyali, 2013).

Daily Traffic

From Table 1, there is similar traffic volume on Monday, Wednesday, Thursday and Friday except for Tuesday and Saturday that are influenced by the market-going traffic. Sunday traffic suggests that many

commuters rest on this day except those going to worship centres hence the low traffic. Average daily traffic of the road, 2886.3 PCU, compared to other days’ traffic such as Monday, Wednesday, Thursday and Friday show that market days traffic has significant influence on the average daily traffic. From the study the road experience peak periods between 7:00 - 9:00am and 5:00 – 7:00pm daily while other time can be referred to as off-peak periods. It is common that during peak periods motorcycle and cars dominate the traffic as workers hasten to and return from their respective workplace around this time.

Table 1 : Summary of Traffic Volume on Ilaro –Ibese Roadway

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total	AHTF
07:00-09:00	581.00	1125.50	557.75	431.25	671.00	810.75	390.25	4567.5	326.25
09:00-11:00	277.00	471.00	335.75	304.00	430.00	451.75	305.75	2575.25	183.95
11:00-01:00	193.50	527.25	312.25	273.75	231.75	343.50	196.25	2078.25	148.45

01:00-03:00	457.25	774.00	380.75	473.00	480.25	478.75	123.25	3167.25	226.23
03:00-05:00	274.00	441.25	252.25	250.25	303.00	860.75	333.00	2714.50	193.89
05:00-07:00	743.00	1088.00	462.50	550.25	572.50	1085.00	600.00	5101.25	364.38
Total	2,525.75	4427.00	2301.25	2282.50	2688.50	4030.50	1948.50	20204.00	
ADT									2886.3
PCU/hour	210.5	368.9	191.8	190.2	224.0	335.9	162.4		

Operating Road Capacity

Road capacity can be defined as the maximum design capacity of a given roadway at link and junction level for motorised traffic for different lanes and carriageway widths while the operating capacity is capacity at which the prevailing traffic is being conveyed after many random influences such as the driver behaviour of individuals, changing road conditions and weather have interacted to remove an element of available capacity. According to the Task force – Technical Note 10 of the Transport for London, the road capacity for such Urban All-Purpose (UAP4) road is 900 but the

operating capacity, PCU/hour, of the road is far less than this (Table 1).

Traffic Composition

Traffic on this road is composed of Motorcycle/Tricycle, Cars, Buses/ Goods van/ Mini Truck and Trucks/Trailers. However, from Table 2, cars and trucks dominate traffic in this axis. This stems from the fact of cement transportation from the Dangote industry and the use of cars mostly for passenger transportation around this area. Also, motorcycle is also used predominantly for door-to-door commuter movement and short distance transportation.

Table 2 : Composition of Traffic on Ilaro –Ibese Roadway

Days	Vehicles		Motorcycle/Tricycle		Cars		Bus/ Goods van/ Mini Truck		Trucks	
	Actual	PCUE	Actual	PCUE	Actual	PCUE	Actual	PCUE	Actual	PCUE
Monday	401	300.75	1517	1517	124	248	115	460		
Tuesday	384	288	1201	1201	87	174	691	2764		
Wednesday	263	197.25	1004	1004	54	108	248	992		
Thursday	274	205.5	1201	1201	114	228	162	648		
Friday	386	289.5	1141	1141	121	242	254	1016		
Saturday	422	316.5	1542	1542	82	164	502	2008		
Sunday	298	223.5	453	453	46	92	295	1180		
Total	2428	1821	8059	8059	628	1256	2267	9068		

Conclusion

The traffic analysis on a suburban road, Ilaro-Ibese road, in Yewa South Local Government of Ogun State, Nigeria has been studied and it can be concluded that the road is a very important conduit in this axis as a major means of moving some agricultural produces and cement produced in this area to final consumers. It can be concluded that traffic on this road is dominated by motorcycles, cars and heavy goods trucks. Also, it can be concluded that traffic on the road is influenced by market-going traffic and the lack of adequate traffic control mechanisms, driver behaviours, pedestrians crossing the road and largely the poor road condition causes congestion at the Ilaro Motor Park Junction and not excessive operating road capacity. However, an appropriate interchange structure and well-articulated punitive measures to deter untowards human habits to traffic will reduce congestion at the junction.

Finally, another Cement factory, Bua Cement, being proposed in the axis will soon commence operation which will alter the existing traffic load on this road hence further studies on the traffic on this road would be required and a more robust statistical analysis would be employed but in the current study only the mean (average) as a statistic tool is required.

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