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Traffic Signal Light and Traffic Control in Ikeja, Lagos State

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Abstract
The paper examined the traffic signal light and traffic control in Lagos metropolis using traffic control officers (LASTMA, i.e. Lagos State Traffic Management Authority) (53) working in Ikeja Local Government as a case study and Commuters (drivers, pedestrians, public transport users) (207). Objectives and hypotheses guided the study. The descriptive survey research design was adopted for the study. The simple percentage, Chi-square (X^2) and Pearson Product-Moment Correlation statistical tools were used to analyse the data. All hypotheses were tested at 95% confidence level and 0.05 level of significance. The hypotheses tested result shows that the introduction of traffic signal lights will not significantly affect traffic control in Lagos metropolis; there is a significant relationship between dysfunctional traffic signals and traffic control, and there is a significant relationship between accident rate and traffic signals in traffic control. It was therefore recommended among others that for effective traffic management and control, both manual and electronic devices must be combined in view of the epileptic nature of power supply in Lagos city, as elsewhere, particularly at major traffic conflict points. To prevent frequent power outages and their adverse effects on traffic management, it is recommended that each traffic control light stand be accompanied by a technician who will repair the light immediately if it is faulty. Traffic education should emphasise knowledge of road traffic laws and highway codes, comprehension of road signs and traffic signals, knowledge of one's responsibilities when driving, respect for other road users, respect for traffic control officers and their directives, concern for the safety of all road users, proficiency in driving and the do's and don'ts of driving and highway use must be adhered to.

Keywords: Accidents, Lagos State, Traffic Control, Traffic Signal Light.

1. Introduction

The increasing number of vehicles on the road around the world has intensified congestion, driving up fuel consumption, increasing carbon dioxide (CO_2) emissions, and increasing accident risks (Alam *et al*., 2025; Retallack, 2019). This increase in the number of vehicles, which has intensified congestion, can also be experienced in Lagos, Nigeria. To contain this intensified congestion, traffic control strategies are needed to respond to this condition.

Traffic control strategies in Lagos State have been continuously redefined to respond to changing highway conditions and rapid societal growth. These strategies are increasingly supported by the Intelligent Transportation System (ITS), which integrates technology into transportation management to improve efficiency, safety, and overall system

performance. In a rapidly urbanising environment such as Lagos Metropolis, effective traffic control has become essential to managing the growing complexity of vehicular and pedestrian movement. The essence of doing this is to manage urban traffic. Urban traffic management, while undoubtedly complex (El Khaili *et al.*, 2021), presents a crucial opportunity to optimise traffic congestion in Lagos.

The pattern of urbanisation in Lagos has significantly influenced traffic origin and destination points, thereby intensifying pressure on the road network. Before 1999, traffic management in the state was largely characterised by neglect and disorder, resulting in chaotic vehicular movement and severe congestion. Studies revealed high vehicle density, which contributed to persistent traffic gridlocks across the metropolis. In contrast, the benefits are improved road safety by reducing congestion (Pasquale *et al*., 2018), facilitating efficient logistics networks (Chakir *et al*., 2020; Terrada *et al*., 2020), and ensuring rapid emergency vehicle response (Imane *et al*., 2022), which potentially saves lives. As Lagos continued to expand economically and demographically, the demand for smoother traffic flow, reduced travel time, and enhanced productivity became more urgent. Consequently, traffic system management emerged as a critical component of sustainable urban development, which comprises road network capacity but is not a major solution for traffic control.

Anupriya *et al*. (2023) confirmed that increasing road network capacity is not an efficient solution to manage congestion, because the average travel speed in the network does not increase substantially due to induced growth in travel volumes. Traffic congestion is easily identifiable by overcrowded roads filled with vehicles and pedestrians. It occurs when the number of vehicles on a roadway exceeds its capacity, leading to reduced speeds, delays, and stop-and-go conditions. The causes of congestion are often complex, including high traffic volumes, road accidents, poor weather conditions, and physical bottlenecks. In Lagos Metropolis, congestion has extended to more hours of the day, more roads, and more commuters than in previous decades. Rapid population growth, economic expansion, and rising employment levels—without a corresponding expansion of public transportation infrastructure—have significantly contributed to this situation, with traffic signals as a regulatory infrastructure. One of the most critical road infrastructures for regulating vehicular and pedestrian movement at intersections is the traffic signal light. Traffic signals play a vital role in coordinating movement, enhancing safety, and minimising conflicts at road junctions. Without properly functioning traffic signals and complementary traffic control by traffic officials, accident rates are likely to increase, congestion may worsen, and traffic flow may be impeded. This brings to the fore the traffic flow theory that underpins this study.

The traffic flow theory focuses on flow optimisation and congestion reduction; it also considers vehicular and pedestrian movement. It concentrates on the properties, mechanisms, and dynamics of traffic flow from various perspectives, addressing transportation challenges such as deciphering traffic phenomena and promoting safe, efficient, and intelligent transportation (Ni, 2015). This theory is relevant to this study because it provides effective solutions to traffic problems for managers and a tool for road traffic development systems. Also, the increasing disparity of vehicles and pedestrians has intensified the challenges of road traffic congestion and efficiency. Hence, making the traffic flow theory a valuable resource

for developing a mitigation strategy for road transportation issues, especially as it relates to the traffic signal light and traffic control. Traffic control, which encompasses a range of activities undertaken by relevant agencies to improve roadway safety, efficiency, and effectiveness, is also a demanding and high-risk occupation often performed under challenging weather conditions and requiring constant vigilance. Studies conducted in this context didn't take into account the complementary role played by traffic officials. Hence, this study seeks to examine the role and effectiveness of traffic signal lights vis-à-vis traffic control by traffic officials in controlling traffic within Lagos Metropolis. Specifically, the study investigates the impact of traffic signal lights on vehicular and pedestrian movement, their contribution to traffic management, and the consequences of dysfunctional traffic signals on overall traffic control.

Statement of Hypotheses

The following hypotheses were tested

1. Introduction of traffic signal lights will not significantly affect traffic control in the Lagos metropolis.
2. There is no significant relationship between a dysfunctional traffic signal and traffic control
3. There will be no significant relationship between accident rate and traffic signal in traffic control.

2. Methodology

Study Context

Lagos State is located in the southwestern part of Nigeria on the narrow coastal floodplain of the Bight of Benin, occupying approximately between longitudes $2^0$42 to $3^0$42 E and latitudes 6^0 22 ′to
6 ^{0}52 N. The population of Lagos State has grown significantly over the years, from around 305,000 in 1950 to 5.3 million in 1991, and 9.1 million in 2006 (Federal Republic of Nigeria Population Census Commission, 2006). The projected population of Lagos is expected to reach 25 million people by 2025 (Lagos Bureau of Government, 2022). Lagos Metropolis boasts a complex drainage system comprising rivers, lagoons, creeks, and the ocean, covering approximately 22% (787 km²) of the state's total landmass. Population densities in Lagos Metropolis vary, ranging from about 4,907 persons/km² in sparsely populated areas to 20,000 persons/km² in densely populated areas (Adeaga *et al*., 2020). Specifically, Ikeja Local Government, it is the capital city of Lagos State in south-west Nigeria. It is located on the mainland part of Lagos and serves as the administrative headquarters of Lagos State, with its boundaries being shared with Agege, Alimosho, Kosofe, and Oshodi-Isolo Local Government Area. It lies approximately between latitude 6^0 35'N and 6^0 37'N and Longitude 3^0 20'E
and 3^0 22'E. And it's positioned strategically with importance as a result of its closeness to Muritala Muhammed International Airport, Lagos State Government Secretariat, Alausa, and notable industrial and commercial hubs, thereby showcasing a high volume of pedestrian and vehicular traffic.

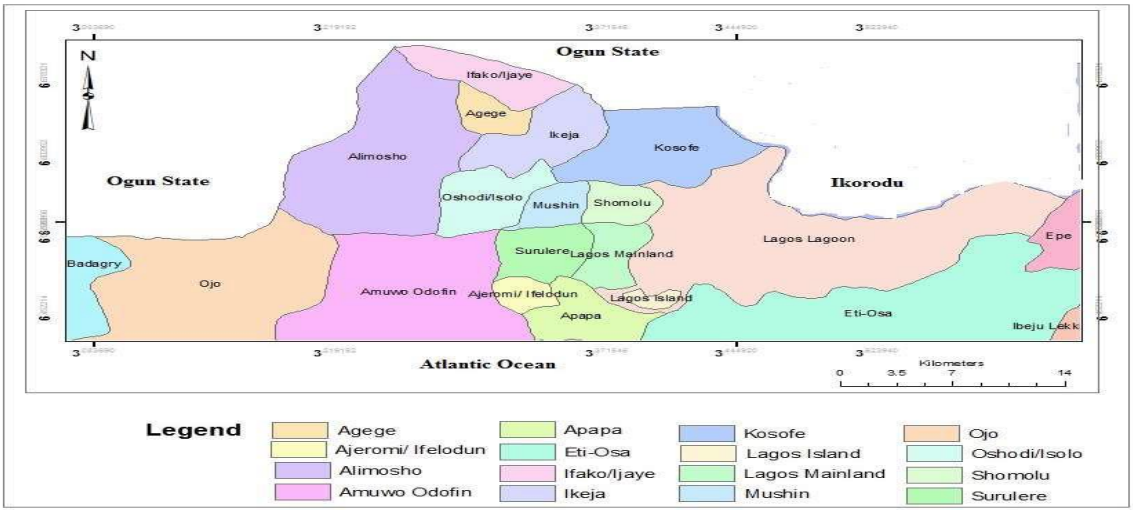

Figure 2**.** The sixteen metropolitan local government areas in Lagos state

Source: (Lagos state ministry of physical planning and urban development, 2014).

A quantitative survey was adopted for the study. The rationale behind this is that traffic control involves both measurable outcomes (e.g., waiting time, compliance rates). The targeted respondents are the Lagos State Traffic Management Authority (LASTMA) officers (53), Commuters (drivers, pedestrians, public transport users) (207). Purposive sampling was used to select officers stationed at major intersections. Stratified random sampling across different transport modes (private car owners, bus drivers, pedestrians) in the study area. The sample size was determined using Cochran's formula for surveys, ensuring statistical validity. The data was obtained as a result of structured questionnaires with closed-ended questions with variables embedded in the questionnaire that relate to the study under review. The variables are frequency of signal compliance, perceived effectiveness of signals, average waiting time, and accident incidence.

4. Results and Discussion

Traffic enforcement and commuter experience

Table 1: Socio-demographic characteristics of LASTMA officials

Characteristics	Frequency	Percentage (%)
Age		
21-29	17	32.1
30 - 39	21	39.6
40 - 49	11	20.8
50 and above	4	7.5
Gender		
Male	43	81.1
Female	10	18.9
Marital Status		
Married	31	58.5
Single	17	32.1
Divorce/ Separated	5	9.4
Education Level		
Secondary		
Diploma / NCE	11	20.8
Degree / HND	21	39.6
Postgraduate	17	32.1
	4	7.5
Years of Experience		
1 – 5	23	43.4
6 – 10	13	24.5
11 – 15	11	20.8
Above 15	6	11.3
Total	53	100

Source: Authors Compilation, 2025.

Table 1 provides a snapshot of the socio-demographic characteristics of LASTMA officials in the study area. The average age of the most officials is 30-39 years (39.6%), indicating a relatively youthful workforce, which might mean that they are tech savvy, adaptable to modern traffic systems and energetic for enforcement. Males are the dominant (81.1%), suggesting a need for more female representation, and this could influence the approach to traffic control, potentially more assertive. The majority are married (58.5%), and most have a Diploma/NCE (39.6%), indicating a moderate level of Education which impacts understanding of

complex traffic systems, but could be sufficient for basic enforcement. Many have 1 – 5 years' experience (43.4%), suggesting a relatively new workforce which may lead to familiarity with nuanced traffic patterns and potential for training gaps.

Table 2. Commuters by mode of transport

Mode of Transport	Frequency (n)	Percentage (%)
Private Vehicles	83	40.1
Buses	61	29.5
Okadas	31	15
Other (Taxis, etc)	32	15.5
Total Drivers	207	100

Source: Authors Compilation, 2025

Test of Hypotheses

Hypothesis 1: Introduction of traffic signal lights will not significantly affect traffic control in Lagos metropolis.

Table 3: Traffic signal light effect on traffic control

Variables	Observed Frequency	Expected Frequency	Total Frequency	XCal.	X_Tab.	df	Remark
Introduction of traffic light	476	423					
			2809	6.640	9.49	X	Accept $H_0$1
Traffic control	53	423					

N=160, P>0.05

From table 3, the calculated Chi-Square (X^2) value of 6.640 is less than the critical Chi-Square (X^2) value of 9.49 at a 0.05 level of significance and 4 degrees of freedom. In view of this, the null hypothesis, which states that "Introduction of traffic signal light will not significantly affect traffic control in Lagos metropolis ", is accepted.

Hypothesis 2: There is no significant relationship between a dysfunctional traffic signal and traffic control

Table 4: Relationship between dysfunctional traffic signals and traffic control

Variables	Mean	SD	Df	r-cal value	Critical value	Remark
Dysfunctional traffic signal	1.00	0.49				
Traffic control	1.59	0.78	198	0.776	0.195	Reject H_o2

P<0.05, N=160

Table 4 reveals that the r-calculated value of 0.776 is greater than the r-table value of 0.195; therefore, the null hypothesis, which states that "There is no significant relationship between dysfunctional traffic signals and traffic control," is rejected. It is concluded that there is a significant relationship between dysfunctional traffic signals and traffic control in Lagos State.

Hypothesis 3: There will be no significant relationship between accident rate and traffic signal in traffic control

Table 5: Relationship between accident rate and traffic signal in traffic control

Variables	Mean	SD	df	r-cal value	Critical	Remark
Accidents rate	1.03	0.56				
Traffic signal in traffic control	1.59	0.78	198	0.761	0.195	Reject H_o3

P<0.05, N=160

The results in Table 5 reveal that the mean rating of accident rate is 1.03 with a standard deviation of 0.56, and the traffic signal in traffic control had a mean rating of 1.59 with a standard deviation of 0.78. The results revealed that the r-calculated value of 0.761 is greater than the r-table value of 0.195; therefore, the null hypothesis that states that "There will be no significant relationship between accident rate and traffic signal in traffic control in Lagos State" is rejected. It is concluded that there is a significant relationship between accident rate and traffic signals in traffic controlling Lagos State.

Discussion of Findings.

The paper examined the traffic signal lights in traffic control in Lagos Metropolis. The association of these two reflect the dynamics of traffic in urban areas like the metropolitan Lagos. A plausible explanation for these traffic issues in metropolitan Lagos is the increase in vehicular and pedestrian activities in the metropolis. According to (Rassaq & Hassan, 2010; Li *et al*, 2021; Bani & Boukourscheٍ, 2016), it is believed that transport signal lights and traffic control should be attached with a great degree of seriousness and importance in order to allow for seamless flow of traffic. This is because they are used to convey safety messages. This is in tandem with the belief in (EOM & Kim, 2020). Adopting a quantitative approach, it was discovered that there was no significant effect of traffic signal lights on traffic control and that there is no significant relationship between accident rates and traffic signals in traffic control in the study area. The study found empirical evidence that signal light introduction and installation will not significantly affect traffic control in the Lagos metropolis. This is not surprising as a result of the growth in the population of Lagos metropolis, which also concurs with Zirra *et. al.* (2021) & Tadama *et. al.* (2022) that population growth affects socioeconomic life and livelihood among people. This growth is impactful on the vehicular and pedestrian movement in the metropolis, due to the connection of transportation to all parts of urban life; business, education and industry (Olawole, 2012). The movement of vehicles and pedestrians in Lagos Metropolis has become huge as a result of several reasons, which include business, industry, education and administrative activities that make individuals ply several locations across the metropolis, including the study area.

Also, the study revealed that there is a significant relationship between a dysfunctional traffic signal and traffic control, which is because gridlocks, increased accidents, and hampering of emergency response time are outcomes of a dysfunctional traffic signal and traffic control, with Lagos, in one of the developing countries in Africa, having its share of these causative factors which aligns with Oluwaseun (2021) that cities in Nigeria have struggled to cope with the sudden increase in travel demand, as the

development and supply of transportation infrastructure have lagged far behind. The struggle of coping with travel demand still boils down to the primary reason – population, why there is huge vehicular and pedestrian traffic in the metropolis, especially in the study area. The study's finding of a significant relationship between accident rate and traffic signals showcases that poor coordination or dysfunctional traffic signals contribute to crashes. Long waiting times at signals encourage risky behaviours such as running red lights or lane changes in an aggressive manner. Conversely, well-synchronised signals reduce conflict points, minimise stop-and-go driving, and enhance predictability—key factors in lowering accident rates. Due to these traffic flow conditions and a reflection of exposure, the result is consistent with the observations in the literature (Ding *et al*., 2020; An *et al*., 2022; Asadi *et al*., 2022). This is in tandem with traffic flow theory's assertion that stable vehicle movement reduces turbulence and collision likelihood.

5. Conclusion and Recommendation

Conclusion

Traffic problems along roadways in Nigerian cities cannot be adequately addressed without proper identification of the factors responsible for the problem. Identification of such factors will become the bedrock for the search for appropriate planning and management approaches that will eliminate traffic congestion in Nigerian cities. For this to take place, the Urban Transport Planning and Management Committee (UTPMC) should be established in each state, which will be vested with the responsibility of identifying holistically and empirically relevant factors which cause traffic bottlenecks in Nigerian cities. Such a committee will not only serve as a research bureau but should be empowered to implement its recommendations. Law enforcement is about the most important aspect of traffic control. Any defaulting driver must be spotted and punished either by a fine or charged in court.

Recommendation

Major traffic that passes through the axis of the study area is external traffic that plies the road as a shortcut. This volume of traffic can be reduced by the construction of good alternative bypasses. Existing roads can be redeveloped into a collector to bypass Ikeja. Similarly, other roads can be redeveloped into collectors to serve as a bypass. Construction of bypasses has been one of the effective devices for redressing traffic congestion.

There is a great need to integrate transportation and land-use planning. Land-use and transport form a closed-loop system and interact very much. Land-use planning will involve the relocation of major land-users that attract and generate traffic enormously to other places. Alternative sites exist; this site consists of privately owned plots but can be acquired by the state government on the basis of overriding public interests.

Absence of adequate traffic management devices at critical points and a host of other traffic infrastructure create traffic bottlenecks within the urban area, with resultant wastage of travel time (Ibrahim, 2004). For effective traffic management and control, both manual and electronic devices must be combined in view of the epileptic nature of power supply in Lagos city as elsewhere, particularly at major traffic conflict points. To prevent frequent power outages and their adverse effects on traffic management, it is recommended that each traffic control light stand be accompanied by a technician who will repair the light immediately if it is faulty.

Traffic Education: Traffic education is the deliberate training of all road users,

especially vehicle operators, including Keke-Napep operators, in proper and lawful behaviour on public highways. It should emphasise knowledge of road traffic laws and highway codes, comprehension of road signs and traffic signals, knowledge of one's responsibilities when driving, respect for other road users, respect for traffic control officers and their directives, concern for the safety of all road users, proficiency in driving and the do's and don'ts of driving and highway use.

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