

Full Length Research Paper

A geographical analysis of intra-urban traffic congestion in some selected local Government Areas of Lagos metropolis

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Lagos metropolis and its transport system are intricately interdependent. The effect of transport on the city either at the intra urban level or at the level of the spatial evolution of the city is significant. It is in this vein that research work strives to geographically analysis intra urban traffic problems in Lagos metropolis with particular attention to which local government areas traffic congestion occurs, what routes and at what particular point on these routes congestion occurs. This gap has however witnessed a backstop in previous literatures as little contribution has been made to the aspect of the research. Data were collected from primary and secondary. Two sets of questionnaire were used for motorists and commuters in each local government areas under study. The questionnaires were divided into two sections. Section A contained information on social economic characteristics of respondents and section B contained general information on purpose of trip generated areas of congestion, points of congestion, causes of congestions as well as ways of and how thing traffic congestion in the study areas. The data collected were analyzed using various statistical techniques such as analysis of variance (ANOVA) and simple percentage. The study shows that urban transportation is a two-edge sword that is, transport contribute to the growth of urban environment and also brings some negative effectiveness to it. Be that as it may, transport is necessary evil that cannot be avoided in our environment. What we need do is to find means of mitigating the negative impact of transport which has been highlighted in the recommendation but may not be exhaustive.

Key words: Transport, traffic congestion, intra-urban, environment.

INTRODUCTION

The efficient movement of people and goods is essential to the economic development of any urban area, particularly a growing one like Lagos. The fact that transport is a derived demand from which every other sectors of the economy relied upon for effective functioning demands that urban planning should allows interaction of land development and transportation facilities that encourages the most desirable pattern and character of urban growth. Adenle(1981)observed that the urban transportation problems are as a result of the fast growth of the urban areas both in terms of population and area size. Urban based activities such as commerce, construction, manufacturing and general government presence are catalysts which had made urban centers grow more rapidly, which in turn encourages an accelerate the tempo of rural-urban migration (Nkamewe,

1972).

Gbadamosi (2004) observed that transportation affects every human being in the course of his daily activities and it is difficult to conceive a situation where transportation does not play significant role in the life of any individual. Transportation helps to achieve the basic objectives of living in the city which is the functional efficiency of land uses, infrastructure, services and improvement in the quality of life. The structure, size vertical and horizontal spreads of any city are dependent on the nature and function of transport system. As a result of these, the ease, the spread, the cost and quality of movement between land uses and places in the cities are inextricably bound with the transport system, and directly linked with planning system.

As cities expand in size, trip length increases and as a

consequence, person-kilometer for which transport operation is a more relevant expression of transport demands, will increase at a faster rate than person trips (Fouracre, 1984). In other words, the way the city is organized, the manner and pattern of its layout as well as the cost of living in the cities can never be isolated from the cities transport system (Oyesiku, 2002).

Lagos metropolitan area is the largest and most complex urban area in Nigeria and in economic terms, it is sinequanon. It contains the largest manufacturing sector and provides employment for over 45% of the skilled manpower of the country (World Ban, 2002). It is the nodal point of all transport modes (air, water, road and rail) in which road transportation is the most predominant and most utilized within the metropolis (Oni, 1992). This is why the Lagos State Ministry of Transport in 1995 stated that road transportation provides over 50% of the community services through the use of private cars, public and private buses, taxis and motorcycles popularly known as Okada in Lagos State.

Odutola (1977) asserted that government solution to traffic congestion in Lagos was in providing additional road space. While such policy was appropriate at the time, because of the comparative shortage of art vial roads, he put it that road building in Lagos must be nearing an end. Even if the nation can afford the money, it is not likely that with about 20% of the land area already devoted to road transport alone continued road development is not feasible even if this is physically possible may not be justifiable. It is in the view of this, that this study investigates the geographical intra-urban traffic problems in Lagos metropolis and provides response solution to the problem identified.

In recent years, road traffic problems have perhaps attracted more public attention than any other urban problems in Nigeria. The reason for this is quite clear. It is the most visible problem that seems to affect everybody in many Nigerian urban centers. Adefolalu(1997)affirmed that a lot of human activities take place daily in Lagos as a result of the city's high population.

In spite of its area size in Nigeria, it has the highest population. Its current population is variously estimated at 15, 543,204 and it is expected that its growth will continue at the current rate of nearly 6% per annum (World Bank 2006).

It also interesting to note that Nigeria after 47years of independence as a nation is under its greatest crises in transportation that is threatening to grind the nation to a halt. The immobility observed is not in the context of complete absence of traffic on urban roads but immobility in the form of delay and wasteful man-hour, and car users suffering from stress. This however does not suggest that the government is not doing anything to improve the situation. In fact the establishment of various agencies by all tiers of government shows their concerns about the problem (Adedimila (1981). Despite various approaches and measures at improving the traffic

congestion of Lagos over the years the problem has continued to grow worse.

Ogunsanya (1984) explained that congestion cost implication on vehicle is also very high as it increases wear and tear resulting in higher cost of maintenance. The environment effects of this problem are equally disturbing. Its effect on human health is grave. The noise disturbs local residents while the exhaust fumes can have an adverse effect on health. Globally, traffic fumes assist with acid rain and the resulting 'green house effect' (Jones, 1993).

STUDY AREA AND METHODOLOGY

Study area

Nigeria is located in the Western part of Africa, bordering the Gulf of Guinea, lying between latitudes 4° 20' and 14° 30' east of Greenwich (Adeleke, 2003). Lagos State lies approximately between longitudes 2° 42' E and 3° 42' E and latitudes 6°22' N and 6° 52' N. The 180 km long Atlantic coastline forms the Southern boundary of the state while its Northern and Eastern boundaries are shared with Ogun State. On the western side, the Republic of Benin borders the boundary (Balogun et al., 1999).

Lagos metropolis occupies 2,910 sq. km out of the 3,577 sq. km land area of Lagos State. Fifteen of the 20 local governments in Lagos State are located within the Lagos metropolitan area. The local governments are – Agege, Alimosho, Apapa, Amuwo-Odofin, Eti-Osa, Ikeja, Ifako-Ijaiye, Kosofe, Lagos Island, Lagos Mainland, Surulere, Mushin, Oshodi-Isolo, Ojo and Somolu (Lagos State, 2003 Digest).

5.7 million people or 6.4% of the population of Nigeria (88.5 million people in 1991) live in Lagos State (Nigeria National Population Census, 1991). In 1997, Lagos State population was estimated at 6.9 million out of which Lagos metropolitan area has 5.2 million (Nigeria National Population Commission, 1997). By projection the population of Lagos metropolitan area was estimated to be 12.9 million by 2000 and 24.5 million by 2015 (UN, 1996).

Transportation and communication facilities are poorly developed in Lagos metropolis. According to the metropolitan Lagos Master Plan, year 2000, the transportation land areas occupy 3202 hectares (18.6%). The figure alone can be traced to the beginning of transportation problem in the metropolis. An ideal transportation land use areas should be 25% of the total land use area (Lagos Master Plan, 2000).

Despite the fact that Lagos metropolis is the largest commercial, economic and industrial centre in the country, its transportation and communication do not commensurate with its status, as it has the worst in terms of mobility and communication problems in Nigeria. There is no adequate, effective, efficient and inexpensive communications and means of mobility. And where available they are often too expensive, inefficient and considered as elitist affair. Less than 10% of its population has access to efficient tele-communication facilities.

In most cases and places where available it is grossly inefficient. Nigeria with GDP of US\$527 has a total teledensity penetration of 0.43% (fixed line generation is 0.4% for mobile line). Thirty percent of this alone is in the metropolis, yet inefficient and unreliable (source: Policy News magazine, vol. 6, No.16, April 16 to 22, 2001).

METHODOLOGY

Due to the nature of this study, two types of data were used. They

are primary and secondary data. These sources included field survey carried out by the researcher. Data were collected with questionnaire went direct observations and interviews. Two sets of questionnaires were used for motorists and commuters in each local government area under study. The questionnaire was divided into two sections, section A Contained information on socio-economic characteristics of respondents and section B contained general information on purpose of trip generated areas of congestion, points of congestion, causes of congestion as well as ways of and how thing traffic congestion in the study area. Personal observation and interviews were made to supplement the data on the questionnaires.

The secondary data was collected from the Lagos State Ministry of Transport, Federal Road Safety Corp, local government secretariats of each local government, existing publications textbooks, journals etc. Data gathered from these sources include vehicle registrations form the FRSC, publication on Lagos State and on selected local government areas. The data collected were analyzed using various statistical techniques such as simple percentage and analysis of variance (ANOVA).

CONCEPTUAL FRAMEWORK AND THEORETICAL UNDERPINNING

Traffic theory

Traffic flow theory is a tool that helps transportation engineers understand and express the properties of traffic flow. At any given time, there are millions of vehicle on our roadway. These vehicles interact with each other and have impact on the overall movement of traffic. Alber (1997) explained that traffic flow can be divided into two primary types which are:

- (i) Uninterrupted flow
- (ii) Interrupted flow

Uninterrupted flow

This is a type of flow regulated by vehicle-vehicle interaction and interaction between vehicle and the roadway. Vehicle traveling on inter-state highway participate in uninterrupted flow. Contrary to this, there exists interruptions in traffic flow on our inter-state highways, Taking the Lagos-Ibadan expressway as an example, there exists and interaction in the flow of traffic, which is usually caused by obstructions (potholes, broken down vehicles etc) or by the police/federal road safety corps officials. However, relevant to this study is the interrupted flow, which is discussed subsequently.

Interrupted flow

This is a type of flow, which is regulated by an external means such as traffic signals etc. Under interrupted flow conditions, vehicle-vehicle interactions play a secondary role in defining the traffic flow. Vehicles traveling on intra-urban roads participate in interrupted flow. An example of this flow is the movement of vehicles to and from Lagos Island, Alimosho, Eti-osa, Kosofe and Oshodi/Isolo local government in Lagos metropolis. Traffic lights, traffic wardens, speed breakers and other traffic control devices depending on the local government interrupt movements of vehicles. It is the interruption in the movement of these vehicles that leads to congestion.

Taking Eti-osa and Lagos Island local government for example, movement of vehicles from C.M.S. to the Law school Via Ozumba Mbadiwe road is usually interrupted by traffic lights at major intersections. Movement however continued after an interval and

this process continue.

However, during the peak hours and owing to the density of vehicles playing this road at this time, there is usually traffic congestion, which sometimes results into jam density and an all day of traffic jam as the case may be. The extent of the congestion is however dependent or measured by some parameters.

The traffic flow theory helps to explain the characteristics of traffic stream and hence, predict the consequences of alternative designs. The parameters (questionnaire) in the other hand helps to explain the characteristics of traffic congestion as experience in the five local governments under study.

RESULTS AND DISCUSSION

From Table 1, 26% of the respondents agreed that there exist traffic congestion between 7 to 9 am, 0.5% agreed to between 9 to 11 am, another 0.5% agreed to 11 to 10am. In the same vein, 3.5% agreed to between 1 to 3 pm, 19% agreed to between 3 to 5 pm and the remaining 51% agreed to between 5 to 7 pm. It can be deduced from the table that traffic congestion is at its peak between 7 to 9 am and 5 to 7 pm. This however, is in line with the reality of the two peak periods of congestion, which exist between 7 to 9 am (morning peak) and 5 to 7 pm (evening peak) in the study area.

From Table 2, 10% of the respondents agreed to the fact that traffic congestion occurs most on Sunday, 57% of the respondents, agreed to Monday, 3% to Tuesday, 2% to Wednesday, 15% to Thursday, 6% of Friday and the rest 7% of the respondents said traffic congestion occurs mainly on Saturdays.

It can be deduced from the table that traffic congestion occurs most on Monday. This is justified by the fact that Monday is the first day of the week. This however leads to the clogging of the roads, which in turn leads to terrible traffic congestion on Mondays.

From Table 3, it is observed that indiscriminate parking and road side trading are the major causes of traffic congestion in Kosofe Local Government Area. Others are being absence of traffic light and flooding. In Oshodi/Isolo LGA, the main causes of traffic congestion are existence of potholes and in discriminate parking. In addition to these are roadside trading, bad vehicles and flooding. In Eti-Osa LGA, traffic congestion is majorly attributed to indiscriminate parking and flooding, while others are too many bus stops, bad vehicles and existence of potholes. In Alimosho LGA traffic congestion is attributed majorly to existence of potholes and indiscriminate parking. This is followed by roadside trading flooding and a bad vehicle in Lagos Island LGA, traffic congestion is attributed majorly to indiscriminate parking and roadside trading. Other being flooding, too many bus stops and cultural activities.

From Table 4, 57 respondents (38%) of the respondents spend less than 30 minutes in traffic congestion. 86 respondents representing 57% spent between 30 to 60 min in traffic congestion while the rest 7 respondents representing 5% spend more than 60 min in traffic congestion. It can be concluded from the table that

Table 1. Shows time of congestion.

Vehicle	Kosofe		Oshodi/isolo		Eti Osa		Alimosho		Lagos island		Total	Percent
	Mot.	Com.	Mot.Com.	Mot.	Com.	Mot.	Com.	Mot.Com.	Mot.Com.			
7am-9am	4	3	5	3	5	4	4	5	5	3	39	26
9am-111am	0	1	0	0	0	0	0	0	0	1	1	0.5
11am-1pm	0	0	0	0		0	0	0	1	1	1	0.5
1pm-3pm	1	1	1	0	0	1	0	1	0	0	5	3.5
3pm-5pm	4	1	3	2	2	4	4	2	3	3	28	19.0
5pm-7pm	9	6	9	7	13	2	10	5	9	6	76	51.0
Other	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	18	12	18	12	18	12	18	12	18	12	150	100

Source: Author's field survey. KEY: MOT- MOTORISTS. COM-COMMUTERS.

Table 2. Shows days of traffic congestion.

Vehicle	Kosofe		Oshodi/isolo		Eti Osa		Alimosho		Lagos island		Total	Percent
	Mot.	Com.	Mot.Com.	Mot.	Com.	Mot.	Com.	Mot.Com.	Mot.Com.			
Sunday	1	0	2	0	1	0	2	1	8	1	16	10
Monday	8	8	13	8	9	8	13	8	2	8	85	57
Tuesday	0	2	0	1	1	0	0	1	0	0	5	3
Wednesday	0	0	0	1	0	1	0	1	1	0	3	2
Thursday	0	0	2	1	7	1	0	1	7	0	22	15
Friday	0	2	1	0	0	2	1	0	0	3	9	6
Saturday	9	0	0	1	0	0	2	0	0	0	10	7
Total	18	12	18	12	18	12	18	12	18	12	150	100

Source: Author's field survey. Key: MOT- Motorists, COM-Commuters.

Table 3. Shows causes of traffic congestion.

Causes	Kosofe	Oshodi Isolo	Eti-Osa	Alimosho	Lagos Island	Total	Percent
Existence of pot hole	0	10	2	8	0	20	13.2
Indiscriminate	12	8	6	7	10	43	28.7
Parking	8	6	0	4	10	28	18.7
Road Side Trading	0	0	0	0	0	0	0.0
Absence of Traffic Light	10	0	0	0	0	10	6.7
Flooding	2	2	12	4	6	26	17.3
Too many bus stop	0	0	4	0	2	6	4.0
Bad Vehicles	3	4	4	2	0	13	8.7
Cultural Activities	0	0	0	0	2	2	1.3
Total	30	30	30	30	30	150	100.0

Source: Author's field survey.

majority of the respondents spend between 30 to 60 min in traffic congestion.

In proffering solution to the problems of traffic congestion, the following as revealed by Table 5 were suggested by respondents in the study area. In Kosofe LGA, emphases were laid on the provision of parking

space and removal of markets along roadside. This was followed by; provision of traffic warden, expansion of road, some roads should be made Highways, provision of drainage channels and provision of more parking spaces. In Oshodi/Isolo LGA, emphases were laid on the filling of pot holes and expansion of roads followed by these are,

Table 4. Shows average time spend in traffic congestion.

Time/lga	Kosofe		Oshodi/Isolo		Eti Osa		Alimosho		Lagos island		Total	Percent
	Mot.	Com.	Mot.Com.	Mot.	Com.	Mot.	Com.	Mot.Com.	Mot.Com.			
Less than 30min	6	8	4	6	9	8	6	4	4	2	57	38
Between 30-60 min	10	4	12	6	9	4	12	8	13	8	86	57
above 60 minutes	2	0	2	0	0	0	0	0	1	2	07	5
Total	18	12	18	12	18	12	18	12	18	12	150	100

Sources: Author's field survey. Key: MOT - Motorists. COM - Commuters.

Table 5. Shows solution to traffic congestion.

Causes	Kosofe	Oshodi Isolo	Eti-Osa	Alimosho	Lagos Island	Total	Percent
Fill the pot hole	0	10	8	10	5	37	24
Remove market along road side	6	4	0	2	6	6	4
Provision of traffic light	4	0	0	2	0	2	2
Provision of traffic warden	3	0	5	4	2	11	7
Expansion of road	3	10	3	8	3	37	25
Some roads should be made H-way	3	0	2	0	3	9	6
Provision of more parking space	2	2	8	0	6	15	10
Provision of drainage channel	3	4	10	4	5	33	22
Others	0	0	0	0	0	0	0
Total	30	30	30	30	30	150	100.0

Source: Author's field survey.

Table 6. Shows time of congestion as indicated by respondents.

Time/lga	Kosofe		Oshodi/Isolo		Eti Osa		Alimosho		Lagos island		Total	Percent
	Mot.	Com.	Mot.Com.	Mot.	Com.	Mot.	Com.	Mot.Com.	Mot.Com.			
7am-9am	4	3	5	3	5	4	4	5	5	3	39	26
9am-111am	0	1	0	0	0	0	0	0	0	1	1	0.5
11am-1pm	0	0	0	0	0	0	0	0	1	1	1	0.5
1pm-3pm	1	1	1	0	0	1	0	1	0	0	5	3.5
3pm-5pm	4	1	3	2	2	4	4	2	3	3	28	19.0
5pm-7pm	9	6	9	7	13	2	10	5	9	6	76	51.0
Other	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	18	12	18	12	18	12	18	12	18	12	15	100

Sources: Author's field survey. Key: MOT – Motorists, COM - Commuters.

removal of markets along roadsides provision of drainage channels and provision of more parking spaces.

In Eti-Osa LGA, emphaes were laid more on the provision of drainage channels and provision of more parking spaces. Others being provision of traffic wardens expansion of roads and some roads should be made highways.

In Almosho LGA on the other hand, emphases were laid on head to fill of potholes and expansion of roads. Others were on provision of drainage channels provision of traffic wardens, provision of traffic lights and removal of

markets along roadside. In Lagos Island LGA, emphases were laid on the removal of markets along roadsides and provision of more parking spaces. Following these are provision of drainage channels, filling of potholes, expansion of roads some roads should be made highways and provision of traffic wardens. Respondent's views in Table 6 were used to generate the ANOVA in Table 7.

From Table 7 at 5% level of significance, the calculated value, f_c is 0.003 less than the table value f_t 2.76. Hence, we accept the null hypothesis (H_0) there is no significant

Table 7. Shows ANOVA result on the day traffic is experienced most by motorists and commuters.

LGA	Sum of square	Df	Mean squares	F
Between groups	0.467	4	0.117	0.003
Within groups	875.000	25	35.00	
Total	875.467	29		

Sources: Generated from SPSS Packages.

variation in traffic congestion between the five local governments under study, and reject the alternative hypothesis (H_i). The table however reveals that there is no variation in the time of congestion experienced by respondents in the five local governments. It can be concluded from the foregoing that there is no significance variation in traffic congestion between the five local governments under study.

CONCLUSION

In history, urbanization is known to be one of the most significant factors of transformation of human society. With rapid urbanization and economic growth comes motorization accompanied by the negative externalities of traffic congestion, which has engendered several challenges and problems to humanity.

However, it is recognized that a sustainable urban transport development cannot be isolated from the broader social and economic development of any country as they are interdependent and are mutually reinforcing components of sustainable development.

RECOMMENDATION

It is in line with previous conclusion that the following recommendations are made towards reducing the problems of traffic congestion in the study area.

Use of non-motorized transport

The volume of commuter travel by motorized means should be reduced while non-motorized means such as bicycles and walking should be encouraged. These non-motorized means will help in reducing air and noise pollution, promote personal fitness and good health, reduce energy consumption, reduce fatal accidents in addition to provision door to door services and making use of less space of parking.

Telecommunication

With the recent proliferations of the usage of the Global

System for Mobile Communication (GSM) in Lagos, it is hoped that telebanking, teleshopping and telecommuting would be on the increase and subsequently reduce physical contacts hence, volume of commuter travel by motorized means of transportation in the metropolis.

Traffic restraint methods

In Lagos metropolis, most areas are characterized by narrow roads, which create problems for smooth traffic along such narrow corridors. The adoption of the following traffic management techniques will however help in reducing traffic in Lagos metropolis. The techniques are as follows: Road capacity enhancement scheme, one-way streets or system, Traffic sign (that is, pavement marking, road signs etc), Pedestrian safety measures (that is, traffic Islands, guardrails, cross-markings etc) vehicle parking regulations and controls, modernization of junction controls (that is, priority control, signalization, improved signal through coordination and computerization), routing and operational polices for heavy goods vehicle and high occupancy vehicles among others.

The use of mass transit/bus priority

The use of mass transit has an advantage in moving more people than tax-cabs and mini-buses. In addition to this, the space occupied by smaller vehicles will be well reduced, if larger buses, trains and ferries are patronized. The incorporation of bus only lanes on highways will also help in easing congestion.

Intermodal coordination

A single means of travel may not be able to serve adequately intra-urban needs. Since the environment of Lagos State has a terrain that is dominated by both land and water, a means of incorporating both means will help in reducing the burden on only one means of travel. For example, it is possible for a commuter who intends covering Sango to Lagos Island to take a bus to Oshodi, from Oshodi take a train to Apapa and from Apapa take a ferry to C.M.S. Using this modal split and coordination

approach; the negative impact of one mode constituting too much traffic on the road would be eliminated.

Traffic education

Another veritable approach to reducing traffic problem is to embark on mass education of road users. This should involve student's drives, commuters and traffic offenders. There should be a curriculum development that would cut across all segments of the society and should be incorporated in the educational syllabuses at primary, secondary and tertiary institutions. The programmed could also make use of Road Safety campaigns, Posters, Mass media (radio, television etc) bills and slogans.

In addition to the aforementioned, government at federal, state and Local level should put in place policies to the following effects:

1. Creation of more parking spaces in the Local government.
2. Rehabilitation and expansion of roads.
3. Construction of drainage channels.
4. Removal of markets along roadsides.

It is hoped that if the aforementioned are strictly adhered to the problems of traffic congestion will be reduced in the metropolis.

This study shows that urban transportation is a two-edge sword that is, transport contribute to the growth of urban environment and also brings some negative effectiveness to it. Be that as it may, transport is a necessary evil that cannot be avoided in our environment. What we need do is to find means of mitigating the negative impact of transport, which has been highlighted in the recommendation but may not be exhaustive.

As situations demand, solution should be proffered by tapping experiences from both commissioned and researched works to formulate and recommend transportation policies that would be enduring and make the environment of Lagos state livable and capable of sustainable the raising population of vehicle in the near future.

It is on this note this research has attempted a geographical analysis of intra-urban traffic problems in Lagos metropolis with the view or acceleration positive changes.

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