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EFFECT OF URBAN TRAFFIC CONGESTION ON THE PRODUCTIVITY OF THE RESIDENTS IN APO, ABUJA, NIGERIA.

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Abstract
The study focused on the effect of urban traffic congestion on man's productivity in Apo, Abuja, Nigeria. The study examines the residents' perceived causes of traffic congestion, Investigate the socio-economic effects of traffic congestion and assess the ways of mitigating the effects of urban traffic congestion in Apo, Abuja, Nigeria. The study used simple random sampling techniques to administer 400 questionnaires to respondents. Frequency distribution table, percentages and 4-point Likert scale on acceptance benchmark of 2.5 was used to analyse the data. The study reveals that the major causes of traffic congestion are pot holes and narrow roads (98.7%) followed by Inadequate road signs (97.6%), Bad weather (96.7%), Lack of alternative means of transport (95.1%), unplanned road network (90%) and Abandoned containers/broken down vehicles (87.9%) respectively. On the other hand, the effects of traffic congestion on commuters' productivity in the study area includes accidents which could cause death, destruction of properties, permanent disability and injuries and loss of productive hours by workers /entrepreneurs (98.2 %). increase the consumption of fuel (93.8%), causes wear and tear (91.8%), frequent repairs and replacements (88.9%) and Transporters incur loss when the transported goods are not delivered on time respectively. The study further revealed that the major ways of mitigating the effects of urban traffic congestion in the study area is traffic lights (97.7%). The study concludes that urban population growth in developing countries fuels the challenges of traffic. The study recommends that land use location and allocation within Apo and environs should be integrated and planned, to enhance the quality and functionality of the environment.

Keyword: Environment, Productivity, Residents, Traffic congestion, Urban traffic

Introduction

Globally, road congestion is a major concern for most countries across the globe (Jain, Sharma, and Subramanian, 2012). According to Rao and Rao (2012), road traffic congestion is a matter of concern for Indian transportation professionals as most cities suffer from moderate to severe congestion. Traffic congestion in India occurs mainly because of the poor road conditions, varying road way features, poor lane discipline, inappropriate bus-stop location and design, diversity of traffic, and unrestrained on-street parking. Furthermore, in a study conducted by Zhang (2011), it was revealed that the problem of traffic congestion is also prevalent in China, because of the inefficient public transport services that are the main means of transport for people, as well as the inverse relationship that exists between the number of vehicles and

the road capacity. Additionally, Reunion Island, where the only means of travel is by road, experienced an increase of 126% in the number of private vehicles from 140,000 in 1990 to 317,000 in 2010. This is because peoples home and workplaces are situated at a distance, and businesses are concentrated in only a few coastal cities (Lamy-Giner, 2011).

African cities particularly Nairobi (Kenya) and Kampala (Uganda), are noted for notorious traffic congestion; heavy traffic jam, while motorists and commuters contend with extreme heat, air and noise pollution as the traffic congestion situation in developing countries is mostly compounded by weak enforcement of traffic rules and regulations, especially in Central Business District and its environs. Fall-outs of the CBD's traffic congestion negative effects are waste of valuable time and resources of motorists and commuters; delays, leading to late arrivals at important scheduled appointments; inability to forecast travel time and plan journeys; increased pollution and gas emission; with grave implications for safety of lives and properties (Olayiwola, Olaseni and Fashina, 2014).

In Nigeria, Adebiyi (2011) observed that the traffic congestion in Lagos is caused partly by road users. Lagos road users are known to be very impatient and very bad at obeying traffic rules. Very often huge traffic jams develop simply because a driver is refusing to give way to another motorist. Additionally, most drivers do not acknowledge road signs because many do not know the meaning of different road signs like "U-Turn", "One Way", "Zebra Crossing", etc. Another major factor responsible for congestion in Lagos is the increase in vehicular ownership. Data from the Lagos Bureau of Statistics (LBS, 2012) shows yearly increases in the total number of vehicles registered in Lagos State from 2009 to 2011. In 2011, about three-quarters of newly registered and those whose registrations were renewed, were private owned.

Despite being built from scratch as the country's Federal Capital Territory (FCT), with the city's masterplan, religiously followed, motorists making it in and out of Abuja are increasingly feeling uneasy at the entry and exit points (Anthony, 2021). Aside from the daily struggles and restlessness that come with residing in, and within a burgeoning city like Abuja, the unabating traffic situation that is a permanent feature on the three major entry/exit routes in the FCT, that is, Kaduna-Kubwa-Abuja, Keffi-Karu-Nyanya Abuja and the Gwagwalada-Airport Road- Abuja constitute a pain in the neck for the average motorist (Anthony, 2021).

The foregoing background prompted this study which sets out to assess the effects of urban traffic congestion on commuter's productivity in Apo, Abuja, Nigeria. The specific objectives of this study is to examine the residents' perceived causes of traffic congestion in Apo, Abuja, to investigate the effects of traffic congestion on commuters' productivity in the study area and to assess the ways of mitigating the effects of urban traffic congestion in Apo, Abuja, Nigeria.

Study Area

Apo in Abuja is located in the Abuja Municipal Area Council of Federal Capital Territory (FCT). It is located in the middle of the country and has a land area of about 8,000 km2 of which the actual city (i.e. Federal Capital City) occupies 250sq km and bounded on the north by Kaduna state, on the west by Niger state on the east and south-east by plateau state, and on the south-west by Kogi state. It lies within latitude 9^0 25'N and 9^0 20'N of the equator and longitude 5^0 45'E and 7^0 39'E (Figure 1) (Ade and Afolabi, 2013). Abuja was created on 3rd February 1976 through the promulgated Federal Capital Territory decree no. 6, 1976 mainly due to the growing unsuitability of Lagos as Nigeria's Federal Capital City as result of the problem of peripheral location, dual and conflicting role as both Federal and

State Capital, acute shortage of land space for expansion, and inadequacies for infrastructural development among other reasons since the late 1960's (Dare 2004, Obateru, 2004, Ade and Afolabi, 2013).

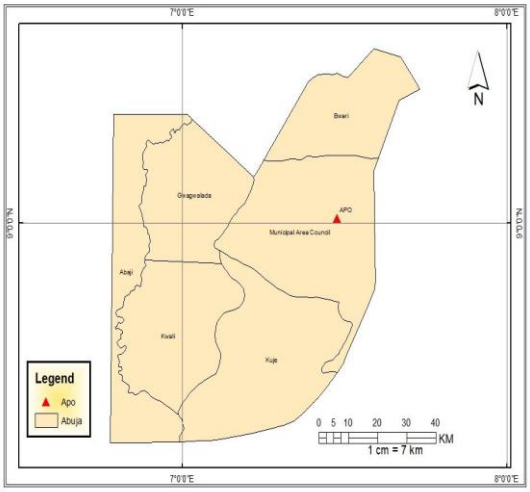


Figure 1: Federal Capital Territory showing Apo
Source: GIS Lab, Department of Geography, KSU, Anyigba (2021)

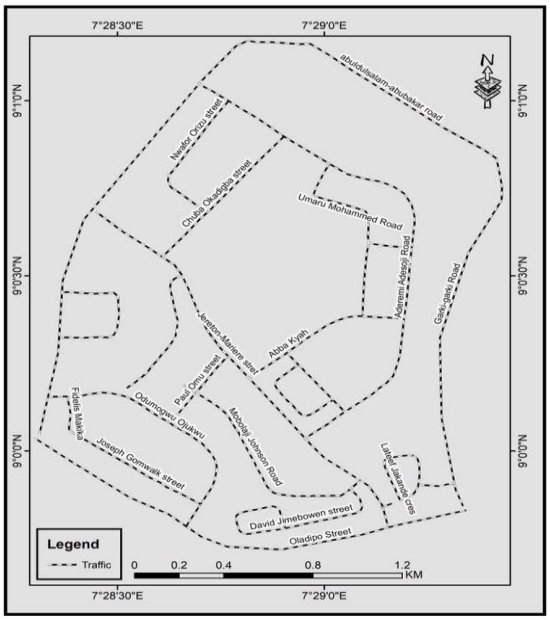


Figure 2: Showing Apo and its Road Network

Source: GIS Lab, Department of Geography and Environmental Studies, PAAU, Anyigba (2021)

The FCT climate is the hot, humid tropical type (Balogun, 2001). Annual weather condition of the Apo is characterized by warm rainy season with high humidity and dry season. There is a brief interlude of cold weather between the two seasons. The cold seasons is caused by the North-East Trade Wind referred to as Harmattan. The main feature of the Harmattan is dust haze, intensified coldness and dryness. The rainy season usually begins in April and ends in November. Day time temperature in the rainy season can rise to 30˚C and drop at night to about 22˚C (Balogun, 2001). The climate of the area is transition between the hot and humid climate of the south and the hot and dry climate of the north. Its average annual rainfall is 50-60 inches. The rainy season begins in April and ends in October, while the Harmattan blow for about 4-5 months in the area from November to March (Obateru, 2004).

The area is drained southward into the Niger by rivers Gbako and Gurara and into the Benue by Rivers Nasarawa and Mada (Obateru, 2004). The major streams are the Jabi, Bwari and Usuma streams. Most of these are strongly characterized by high seasonality of flow. The smaller streams are the seasonal and intermittent like Jabi and Usuma, while larger one is perennial like the Bwari stream. They have considerably reduced flow during the long dry season. The study area has an artificial lake called Jabi Lake located in the North-Western part of the study Area. The land use of Apo in Abuja is characterized by residential land uses (flats, bungalows, storey buildings, single rooms compounds), commercial land use (shopping complexes, bank ATM galleries, glossary shops, kiosks), Educational land uses (G.S.S Apo, J.S.S Apo and other private primary and secondary schools). Apo is a home for many economic activities such as transportation activities, civil services, military

and paramilitary occupations with fair network of roads (see Figure 2). Apo has two major markets: Apo fish market and Apo urban market which a federal government market. The essential products sold in these markets are grains, vegetables and general household items. The majority of the residents are working with the government and other institution, some are involving in petty trading and other businesses.

Methodology

In order to minimize been bias and also to enhance objectivity, the non-probability (quota sampling) technique being specifically the purposive sampling technique was used in identifying the key population used in this study. Using this approach allowed the researcher to select the specific cases or data sources or areas that are especially informative i.e. residents, passer-by, motorists, business men and women in the study area. The data required for this study were data on the residents' perceived causes of traffic congestion in Apo, Abuja; data on the socio-economic effects of traffic congestion in the study area and data on the ways of mitigating the effects of urban traffic congestion in Apo, Abuja, Nigeria. The sample size for this research was derived using the Taro Yamane's formula based on the population of Apo. The formula is stated in Equation 1:

$$n = \frac{N}{1 + N(e)^2} \quad \text{Equ. 1}$$

Where; n = Sample size
N = Total population
e= Level of significance

$$n = \frac{776,298}{1 + 776,298\ (0.05)^2}$$

$$\frac{776,298}{1 + 776,298\ (0.0025)}$$

$$\frac{776,298}{1 + 1,940.8}$$

$$\frac{776,298}{1,941.8}$$

n = 399.8
n = 400

Note: 776, 298 is total population of people in the study area

Therefore, a total of four hundred (400) questionnaires was administered by the researcher, for the purpose of this study. People responses to the questions in the present study was transferred to the SPSS statistical package, 20.0 version, which enabled both frequencies and percentages to be computed, which was later presented in a tabular form for easy understanding. However, before the SPSS analysis of the present study, all the returned questionnaire booklets were checked for incomplete responses by the researcher alone and those that did not qualify to be included for the analysis were removed. The data that was collected were analysed using descriptive statistics.

Results and Discussion

Demographic Characteristics of Respondents

From the table 1, 240 of the respondents representing 61.5% are male, while 150 of the respondents representing 38.5% are females. This shows that the number of men sampled for this study were more than the women. The table further shows age distribution of respondents where; 22 respondents representing 5.6% were within the age bracket of 18-25, 191 respondents representing 49% were within the age bracket of 26-30, 79 respondents representing 20.3% were within the age bracket of 31-40, 58 respondents representing 14.9% were of age bracket 41-50, while 40 respondents representing 10.3% were 51 years and above. This shows that all adult age groups were sampled in the survey and experience the ménage of traffic congestion. 251 of the respondents representing 64.4% are married, while 139 respondents representing 35.6% are singles. It can be deduced that majority of the respondents were married as most married people have cars which contributes to traffic

congestion compared to their single counterparts who usually use public transport.

Table 1: Socio economic variables of respondents

Gender	**No. of Respondents**	**Percentage**
Male	240	61.5%
Female	150	38.5%
Total	**390**	**100.0%**
Age Bracket		
18-25	22	5.6%
26-30	191	49.0%
31-40	79	20.3%
41-50	58	14.9%
51- Above	40	10.3%
	390	**100.0%**
Marital status		
Married	251	64.4%
Single	139	35.6%
Total	**390**	**100.0%**
Religion		
Christianity	251	64.4%
Islam	134	34.4%
Others	5	1.3%
Total	**390**	**100.0%**
Level of Education		
Primary	39	10.0%
Secondary	78	20.0%
Tertiary	273	70.0%
Total	**390**	**100.0%**
Occupation		
Traders	177	45.4%
Driver/Conductors	59	15.1%
Civil Servants	78	20.0%
Students	57	14.6%
Others	19	4.9%
Total	**390**	**100.0%**
What time of the day does traffic congestion occur		
Morning	199	51.0%
Afternoon	47	12.1%
Evening/night	144	36.9%
Total	390	100.0%
Hours or minutes it last		
less than an hour	119	30.5%
1-5 hours	232	59.5%
above 5 hours	39	10.0%
Total	390	100.0%

Source: Field Survey, 2022.

242 of the respondents representing 63.7% are Christians, 134 of the respondents representing 35.3% are Muslims, while 4 of the respondents representing 1.1% belong to other religions. Therefore, most of the respondents were Christians. 39 respondents, representing 10% had primary education, 78 of the respondents representing 20% are secondary school graduates, while 273 of the respondents representing 70% are graduates of various tertiary institutions. Therefore, majority of the respondents have more than basic education. 177 respondents representing 45.4% were traders, 59 respondents representing 15.1% were Drivers/Conductors, 78 respondents representing 20% were Civil servants, 57 respondents representing 14.6% were students, while 19 respondents representing 4.9% were engaged with other occupations. Therefore, majority of the respondents were gainfully employed.

Similarly, respondents representing 51% said its morning time, 47 respondents representing 12.1% said its afternoon time, while 144 respondents representing 36.9% said that traffic congestion occur at evening/night hours. This indicates that morning hours are characterized with traffic congestion in Apo. The table also revealed that 119 (30.5%) said traffic congestion last for less than an hour, 232(59.5%) respondents said its 1-5 hours while 39(10%) said its above 5 hours. This shows that traffic congestion in the study area lasts between 1-5 hours as most road users are delayed by this range of hours per day when carrying out their day-to-day activities.

Causes of Traffic Congestion in the Study Area

The results from table 2 revealed that the perceived causes of traffic congestion in Apo, Abuja includes: lack of alternative means of transport, unplanned road network, abandoned containers/broken down vehicles, bad weather, inadequate road signs, pot holes and narrow roads. It shows further that the major causes of

traffic congestion are pot holes and narrow roads (98.7%).

Table 2: Perceived causes of traffic congestion in Apo, Abuja

S/No	Item	SA 4	A 3	D 2	SD 1	Mean	Decision
1.	Lack of alternative means of transport	232 (59.5%)	139 (35.6%)	18 (4.6%)	1 (0.3%)	3.4	Accepted
2.	Unplanned road network	226 (57.9%)	125 (32.1%)	27 (6.9%)	12 (3.1%)	3.2	Accepted
3.	Abandoned containers/broken down vehicles	199 (51%)	144 (36.9%)	25 (6.4%)	22 (5.6%)	3.3	Accepted
4.	Bad weather	212 (54.4%)	165 (42.3%)	5 (1.3%)	8 (2.1%)	3.2	Accepted
5.	Inadequate road signs	233 (59.7%)	148 (37.9%)	5 (1.3%)	4 (1%)	3.1	Accepted
6.	Pot holes	230 (59%)	155 (39.7%)	5 (1.3%)	0 (0%)	3.2	Accepted
7.	Narrow roads	202 (51.8%)	183 (46.9%)	2 (0.5%)	3 (0.8%)	3.3	Accepted

Source: Field Work, 2022.
Keys: SA= Strongly Agree; A= Agree; D= Disagree; SD= Strongly Disagree

From table 3, based on the calculated mean, it was revealed that Socio-Economic Effects of Traffic Congestion in the Study Area includes that: Road traffic congestions increase the consumption of fuel, Transporters incur loss when the transported goods are not delivered on time, Wear and tear on vehicles as a result of idling in traffic and frequent acceleration and braking, lead to more frequent repairs and replacements, Road traffic congestion drags the productivity and growth of the regional economy, Road traffic congestion has led to an increase in accidents, which cause death, destruction of properties, permanent disability and injuries, The accidents are accompanied with blocking other road users' passage thereby causing gridlock caused by the vehicles involved in the accident and Workers /Entrepreneurs are performing below standards due to late arrivals. This was indicated by majority of the respondents as their mean response was above the acceptance benchmark of 4-point likert scale of 2.5, therefore, it was accepted.

Likewise, majority of the respondents 98.2 % agree that accidents are accompanied with blocking other road users' passage thereby causing gridlock caused by the vehicles involved in the accident, while Workers /Entrepreneurs are performing below standards due to late arrivals. It is followed by 97.2% Road traffic congestion has led to an increase in accidents, which cause death, destruction of properties, permanent disability and injuries, 96.2% Road traffic congestion drags the productivity and growth of the regional economy, 93.8% Road traffic congestions increase the consumption of fuel, 91.8% Wear and tear on vehicles as a result of idling in traffic and frequent acceleration and braking, lead to more frequent repairs and replacements and 88.9% Transporters incur loss when the transported goods are not delivered on time. This is expected as most of the outcomes of traffic congestion include any of the above depending on the people involved.

This agrees with Elisonguo (2013) who stipulate that fuel consumption and depreciation of vehicles also tend to increase because of traffic congestion, thus leading commuters to spend more money on fuel. Businesses that have adopted the just-in-time system are more prone to be affected by traffic congestion as it is difficult to make just-in-time deliveries efficiently, thus reducing productivity and competitiveness (May and Marsden, 2010; Raheem et al., 2015). Choi et al. (2013) and Raheem et al. (2015) add that businesses dealing with perishable products rely a lot on travel reliability. However, travel conditions are unreliable when roads are congested, as traffic flow is impeded, thus causing travel time to increase.

Objective three revealed that the ways of mitigating the effects of urban traffic congestion in Apo, Abuja, Nigeria includes: setting up traffic lights (97.7%). This is followed by training of federal road safety corps (97.2%), training of Road traffic warders (94.9%), building of flyovers (92.9%) and Expansion of the roads as double lane roads (92.6%). This disagrees with Hudson (2000) who in his study on bicycle planning pointed out that integrating bicycle into transportation system will make greater contribution to the solution of the problem of traffic in towns. He explained further that apart from its efficiency, low operating cost, little or none environmental problem will be produced.

Table 3: Effects of Traffic Congestion on Commuters' Productivity in the Study Area

S/No	Item	SA 4	A 3	D 2	SD 1	Mean	Decision
1.	Road traffic congestions increase the consumption of fuel	245 (62.8%)	121 (31%)	21 (5.4%)	3 (0.8%)	3.3	Accepted
2.	Transporters incur loss when the transported goods are not delivered on time	245 (57.9%)	121 (31%)	10 (2.6%)	14 (3.6%)	3.4	Accepted
3.	Wear and tear on vehicles as a result of idling in traffic and frequent acceleration and braking, lead to more frequent repairs and replacements	227 (58.2%)	131 (33.6 %)	18 (4.6%)	14 (3.6%)	3.2	Accepted
4.	Road traffic congestion drags the productivity and growth of the regional economy.	244 (62.6%)	131 (33.6 %)	5 (1.3%)	10 (2.6%)	3.3	Accepted
5.	Road traffic congestion has led to an increase in accidents, which cause death, destruction of properties, permanent disability and injuries	244 (62.6%)	135 (34.6 %)	5 (1.3%)	6 (1.5%)	3.1	Accepted
6.	The accidents are accompanied with blocking other road users' passage thereby causing gridlock caused by the vehicles involved in the accident.	240 (61.5%)	143 (36.7 %)	5 (1.3%)	2 (0.5%)	3.3	Accepted
7.	Workers /Entrepreneurs are performing below standards due to late arrivals	231 (59.2%)	152 (39%)	2 (0.5%)	5 (1.3%)	3.9	Accepted

Source: Field Work, 2022.
Keys: SA= Strongly Agree; A= Agree; D= Disagree; SD= Strongly Disagree

From table 4, based on the calculated mean, it was revealed that the Ways of Mitigating the Effects of Urban Traffic Congestion in Apo, Abuja, Nigeria includes: Expansion of the roads as double lane roads to reduce congestion, Road traffic warders should be well trained on how to reduce the congestion in

the core areas, Flyovers should be constructed to reduce the number of commuters on same route, The federal road safety corps should be well equipped with cars and other mobility to enhance control of traffic and The traffic lights should be active both day and night to help the road safety in their work. This was indicated by majority of the respondents as their mean response was above the acceptance benchmark of 4-point likert scale of 2.5, therefore, it was accepted.

Table 4: Ways of Mitigating the Effects of Urban Traffic Congestion in Apo, Abuja, Nigeria

S/No	Item	SA 4	A 3	D 2	SD 1	Mean	Decision
1.	Expansion of the roads as double lane roads to reduce congestion	239 (61.3%)	122 (31.3%)	24 (6.2%)	5 (1.3%)	3.6	Accepted
2.	Road traffic warders should be well trained on how to reduce the congestion in the core areas	237 (60.8%)	133 (34.1%)	10 (2.6%)	10 (2.6%)	3.2	Accepted
3.	Flyovers should be constructed to reduce the number of commuters on same route	219 (56.2%)	143 (36.7%)	18 (4.6%)	10 (2.6%)	3.3	Accepted
4.	The federal road safety corps should be well equipped with cars and other mobility to enhance control of traffic	234 (60%)	145 (37.2%)	5 (1.3%)	6 (1.5%)	3.1	Accepted
5.	The traffic lights should be active both day and night to help the road safety in their work	234 (60%)	147 (37.7%)	5 (1.3%)	4 (1%)	3.2	Accepted

Source: Field Work, 2022.
Keys: SA= Strongly Agree; A= Agree; D= Disagree; SD= Strongly Disagree

Therefore, table 4 indicates that the majority of the respondents 97.7% agree that the traffic lights should be active both day and night to help the road safety in their work. This is followed by 97.2% The federal road safety corps should be well equipped with cars and other mobility to enhance control of traffic, 94.9% Road traffic warders should be well trained on how to reduce the congestion in the core areas, 92.9% Flyovers should be constructed to reduce the number of commuters on same route and 92.6% Expansion of the roads as double lane roads to reduce congestion. This is expected as respondents and road users have different opinions on the ways to mitigate effects of traffic congestion in the study area because they are affected in different ways by the traffic.

Conclusion and Recommendations

Urban population growth in developing countries fuels the challenges of traffic congestion. This affects virtually every facet of human endeavours, including socio-economic activities within the Apo area. It is against this backdrop, that an all-inclusive policy measure, essentially integration of vertical and horizontal growth pattern within the CBDs be encouraged. Thus, the need to adopt such planning strategies as smart growth concept, in ensuring that physical and transportation planning efforts are being integrated. This is to alleviate the challenges of traffic congestion in the CBD of major cities. This stands to reduce waste of valuable man-hour and materials resources in traffic congestion, as to improve the socio-economic wellbeing of the people. The following recommendations were made based on the findings of this study: Since the perceived causes of traffic congestion in Apo, Abuja includes: lack of alternative means of transport and unplanned road network, it is hereby recommended that, land use location and allocation within Apo and environs should be

integrated and planned, as to efficiently and aesthetically enhance the quality and functionality of the environment.

Since the effects of traffic congestion includes, increase the consumption of fuel, causes wear and tear, and frequent repairs and replacements, it is recommended that the road networks should be widened to allow the flow of vehicles and commuters in the study area. Government and private establishment to embark on enlightenment programmes, using radio, television jingles, workshops, seminars, and conferences to educate on the relevancy of projects or programmes, revealing its benefits to the community at large; essentially towards improving the people's socio-economic wellbeing.

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