AN ASSESSMENT OF TRAFFIC CONGESTION WITHIN THE CENTRAL BUSINESS DISTRICT OF ONITSHA, NIGERIA

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Abstract

This study examines the causes of traffic congestion in the central business district of Onitsha, Anambra State. It evaluates the opinion of commuters, transport operators and private car owners on the factors responsible for their experience of traffic congestion in the study area. A total of 158 responses through questionnaire survey of the respondents were collected for analysis. The population was sampled using simple random sampling. The study employed multiple linear regressions to determine the extent of the contribution of the factors responsible for traffic congestion in the Onitsha central business district (CBD).The result of the study showed that traffic congestion within the CBD of Onitsha is significant and will increase by 36.4% for every additional score on poor road network and planning. This indicates that the nature of the road network in Onitsha contributes a major cause to traffic congestion. The study recommends the need to extend, reconstruct and expand existing roads within the CBD to link adjacent and opposite districts as the means to reduce traffic congestion in the area.

Key Words: *Traffic Congestion, Central Business District, Commercial activities, Poor road network*

Introduction

Traffic congestion occurs when a city's road network is unable to accommodate the volume of traffic that uses it. The impact of congestion is often felt more during the peak hours of the mornings and evenings movements of people. The cases of incessant traffic congestion in major commercial cities across the world are becoming a great concern that needed urgent attention. Traffic congestion is becoming worse on a yearly basis due to the increase in population, vehicle ownership, and rapid physical development in the CBDs, and increase in social and economic activities in the City. The view of Ogunbodede (2003) noted that traffic congestion is a situation caused by rapid growth in motorization with less than corresponding improvement in the road network, traffic management techniques and related transport facilities. In the same vein, the study of OECD (2007) viewed traffic congestion as a physical phenomenon relating to the manner in which vehicles impede each other's progression as demand for limited road

space approaches full capacity. It further stated that traffic congestion prevents people from moving freely as it slows and otherwise disrupts the conduct of business within urban areas. However, it is important to note that unfettered movement is not the primary benefit we derive from living in urban areas.

A CBD is the commercial and business centre of a city that often coincides with the "city centre" or "downtown. It functions as a centre to combine the business and commercial activities of cities. According to Olayiwola et al. (2014) a CBD is indisputable areas of traffic attraction occasioned by the growing population concentration, rapid urbanization, and increasing commercial and economic activities. High population generates heavy vehicular traffic, leading to vehicular conflict and congestion as well as other mobility related challenges, which adversely affect the ultimate goal of movement. The CBD is expected to offer high accessibility and mobility advantages, coupled with the provision of transportation infrastructure which paradoxically, are being threatened by mobility challenges resulting in low productivity and loss of man-hours. The mobility related challenges occasioned by cumbersome activities within any CBD reflects in daily traffic congestion and gridlock on its road networks of cities, which Onitsha is not an exception. Onitsha being a major commercial and market centre in Nigeria is a point of consolidation of goods and persons that necessitate vehicular traffic volume above the road capacity. Onitsha can be said to be the largest market city in Nigeria, which attract traders from other neighbouring countries such as Cameroun. As a result, traffic congestion is one of the key problems in Central Business District (CBD) of Onitsha Anambra State. To this end, this study aimed at examining the causes of traffic congestion in Onitsha CBD with a focus to measure the extent of the contributions of identified causative factors to traffic congestion within the CBD from the view of stakeholders.

The paper is structured such that section 1 handles the introduction, section 2 is a review of literature, section 3 covers the study area while section 4 presents the methodology for the study, section 5 has the results and discussion, and section 6 has the policy recommendations and conclusion of the study.

Literature

Extensive studies on traffic congestion and delays have been carried out in different dimensions on Nigeria roads. These studies are limited to certain cities such as Lagos (Aworemi *et al.*, 2009; Bashiru and Waziri, 2008; Joseph *et al.*, 2012), Ilorin (Aderamo and Atomode, 2011), Akure (Ogunbodede, 2003) and so on. Ogunbodede (2003) studied traffic congestion in Akure Nigeria using GIS approach. It was argued that traffic congestion is as a result of the increasing growth in motor vehicles without a corresponding improvement in transport facilities such as road network, and traffic management techniques. Ogunbodede (2003) also highlighted illegal roadside parking and lack of geospatial information necessary to tackle the spatial problem of traffic congestion. The study suggested the use of a dynamic Traffic Information System (TIS) to monitor congestions in Akure city. It however, cautioned that TIS should not be used in isolation but to complement traditional methods of traffic management such as construction of new

routes, flyovers, one-way, odd and even numbers, etc. which have earlier failed on their own to solve congestion problems in cities such as Lagos, Port Harcourt and Benin-City. Similarly, Aworemi *et al.* (2009) studied traffic congestion in Lagos Metropolis. In agreement with Bashiru and Waziri (2008), the study identified poor road condition, inadequate road infrastructure, accident, inadequate traffic planning, drivers' behaviour and lack of integrated transport system as the major causes of traffic congestion. The problem of traffic congestion at road intersections in Ilorin was examined by Aderamo and Atomode (2011) and found that traffic wardens and parking problems are the greatest causes of traffic congestion/delays at road intersections in Ilorin. In the same vein, the study of Joseph *et al.* (2012) showed that poor driving habits, poor road network, inadequate road capacity, and lack of parking facilities constitute the greatest causes of traffic congestion in Nigeria where Lagos, Port Harcourt and Abuja were identified as cities most affected by traffic congestion.

Gabriel (2013) studied the traffic congestion in Akure area, the results also showed poor driving habits, weather condition, absence of traffic light and/warden, work zones, road side parking, special events, lack of public mass transit, reluctant to use parking facilities and bus stop as factors constituting the greatest causes of traffic congestion in the study area. The study recommended that both Federal and State governments should initiate plans for the introduction of other forms of urban transportation such as Metros and Trains which support the mass movement of people as done in major urban cities globally. Olayiwola *et al.* (2014) revealed

that the causes of traffic congestion is due to haphazard land use pattern, resulting into traffic and transportation bottleneck, vehicular conflict and avoidable traffic congestion, longer travel time and low productivity among others. Popoola *et al.* (2013) showed the causes of traffic congestion as inadequate road capacity, poor road pavement, poor traffic management, poor drainage system poor driving habit, poor parking habit, poor design junctions/round-about, presence of heavy trucks, lack of pedestrian facilities, lack of road furniture, lack of parking facilities and others. Effects of road congestion from the study are waste of time, delay movement, stress, accident, and inability to forecast travel of time, fuel consumption, relocation, night driving, and environmental pollution.

Further studies in the southeastern part of Nigeria by Benjamin (2013) noted that traffic problems on roads in Nigerian cities cannot be adequately addressed without proper identification of the factors responsible for the problem. The study was on traffic congestion along Agbani road in Enugu city, he identified physical factors, technical, land-use and human factors as the major causes of traffic congestion in the area. Some management measures were recommended which include improvement in terminal facilities, land-use relocation, traffic education and traffic personnel improvement. Also, Onyelowe (2011) revealed that the major causes of traffic congestion in south-eastern part of Nigeria is as a result from natural occurrence and climatic change reflecting in excessive rainfall, erosion, poor visibility due to bad weather, and potholes.

It is noted from the literature that traffic congestion studies had focussed on

various segments of roads in Nigeria. Attention has also been on some major urban roads within the country. Notwithstanding, there is a still a major need to highlight the causes of traffic congestion within the CBD of a city with large market size since most studies conducted were focussed on traditional urban centres with market concentration and size less than that of Onitsha. This is expected to contribute to existing literature on traffic congestion.

Study Area

Onitsha being the study area for the study is located in Anambra State, which is one of 36 states in Nigeria and one of 5 states in the southeast geo-political zone of Nigeria. It occupies the eastern bank of the Niger River, covering some 50 square kilometres. Onitsha is strategically located and accessed through the east–west national main road from Lagos through Benin, which links the eastern north–south route via the Niger Bridge at Onitsha. For administrative purpose, the city is divided into two local government areas, Onitsha South and Onitsha North. The city of Onitsha has a good waterways and roads network to provide intermodal transport system for the movement of goods and services unlike other major cities in Nigeria. The Onitsha main market and other markets are located within the central business district. The other markets are namely Ose Okwodu, Ochanja Relief and Niger bridge head. These markets specifically contribute substantially to the economic development of Anambra state and Nigeria in general. The volume of trade and other commercial activities within the markets transcend the limited geographical space of Onitsha to spread to other parts of the country and beyond. Indeed, majority of goods that sold in other cities of Nigeria were bought from Onitsha. This emphasizes the economic importance of Onitsha to Nigeria. The influx of traders from all parts of the country and Cameroon invariably contributed to the towns physical and population growth.

Materials and Methods

The study relied on primary source of data collection involving the survey of various road users within the CBD of Onitsha through questionnaire administration. The road users surveyed include commercial motorcycle operators, bus drivers, passengers, pedestrians, traffic control officers, resident and traders. The CBD were divided into four (4) districts A - D for easy administration of the questionnaires. A total of 50 questionnaires were distributed for administration in each of the districts. Therefore, the study took a census of 200 respondents by questionnaire administration. The distribution of the questionnaire survey per the divided districts is presented in Table 1.

Table 1: Districts/Sector Sub-division and Sampled Population

District	District Name	No of Questionnaire
A	Main market	50
B	Ose Okwodu market,	50
C	Ochanja Relief market	50
D	Niger bridge head market	50

The survey successfully gathered information from a total of 158 respondents representing 79% success rate, to form the sample size for the study. The sample size of the study is said to be adequate according to the suggestion of Hair *et al.* (1995) referred to in Williams *et al.* (2010) that sample sizes should be 100 or greater. The study employed accidental sampling technique to collect data with the support of two trained research assistants. Information in the questionnaire was presented such that respondents will have to indicate the weight they attached to a multiple of factors that is capable of causing traffic congestion within Onitsha CBD.

The instrument was designed on a multiple-item measurement scale fashioned on a 5-point Likert scale to allow for a wide measurement of the degree of the respondents' consideration of each variable presented in the questionnaire. The items considered as independent variables are poor road network, on-street parking, narrow road space, traffic rule violation, inadequate street furniture, and bad state of roads. The variables were tabulated for the respondents to rank in order of significance from 1 – Not Significant to 5 – Highly Significant. The dependent variable is traffic congestion measured nominally by yes and no response from the respondents.

Descriptive statistics involving frequency and percentages in cross tabulation form as well as multiple linear regression analyses were employed as techniques for data analysis. This is in the light of the need to identify pattern of the respondents' characteristics, and measure the extent of the influence of the variables on traffic congestion in the CBD. The multiple linear regression analysis was chosen with a single purpose of evaluating the extent of the influence of the independent variables on dependent variable.

Laudau and Everitt (2004) stated that regression is a method of analysis for assessing the strength of the relationship between each of a set of explanatory variables (sometimes known as independent variables), and a single response (or dependent) variable, which is traffic congestion. The model specification for the extent of relationship between the dependent variable and the independent variables takes the general form:

$Y = a + B_1X_1 + B_2X_2 + B_3X_3$

Where; Y = Dependent Variable (Traffic Congestion); B_1, B_2, B_3 = Coefficients; and a = Constant, while X_1, X_2, X_3 are the independent variables. The independent variables are poor road network, on-street parking, narrow road space, traffic rule violation, inadequate street furniture and bad state of the road.

Results and Discussion

The demographic data of the respondents, which include commercial motorcycle operators, bus drivers, passengers, pedestrians, traffic control officers, resident and traders, were examined by the study in order to seek the characteristics of the respondents in relation to their activities that contribute traffic demand within the Onitsha CBD. The demographic data of the respondents presented include gender, marital status, educational qualification and occupation. The results presented in Table 2 indicate that the majority of the respondents surveyed are males (83.1%) and married (70.7%). This may be as result of commercial and trading activities that take place in most CBDs of any urban centre.

Table 2: Gender and marital status of the respondents

Gender			Marital Status		
	Frequency	Percentage		Frequency	Percentage
Male	128	83.1	Single	43	28.7
Female	26	16.9	Married	106	70.7
Total	154	100	Widowed	1	.6
			Total	150	100

It should be noted that the majority of the people with activities within the Onitsha CBD are traders and other workers who are married with family members to take care of. It is indicative that males with more strength than females will be able survive the cumbersome activities of CBDs as a result of its congested nature and characteristic commercial activities.

The educational qualifications and occupational status of the respondents as presented in Table 3 shows that the majority of the respondents (55.1%) has secondary school education. This suggests that the nature of activities within the CBD does not require advanced educational qualification. It is indicative that trading and other semi-skilled commercial activities which do not require higher level education dominate the CBD.

Table 3: Educational and Occupational status of the respondents

Education			Occupation		
Status	Frequency	Percentage	Status	Frequency	Percentage
Primary sch.	26	20.5	Pedestrians	21	14.8
Secondary sch.	70	55.1	Motorcycle Operators	50	35.2
First degree	25	19.7	Bus Passengers/Drivers	26	18.3
Master/PhD	4	3.1	Traffic Controllers	9	6.3
Others	2	1.6	Traders/Residents	36	25.4
Total	127	100	Total	142	100

The total number of the respondents who are commercial motorcycle operators (35.2%) relates to the educational qualification of the majority of the respondents operating within the CBD. The larger percent of 18.3% attributed to Bus Passengers/Drivers belongs to passengers with higher education who are civil servants and other corporate workers living around or transiting the CBD for work place.

The nature of traffic congestion within the Onitsha indicates that respondents face severe poor traffic situation in the morning and evening hours. This is as a result of the demand for movement as the CBD serves as both trip generation and distribution centre. In spite the high level of hardship that traffic congestion imposes on people and the environment, it is to be noted that traffic congestion and problems are caused by a combination of factors. This study considered a few factors that are responsible for traffic congestion at the CBD of Onitsha. These are poor road network, on-street parking, narrow road space, traffic rule violation, inadequate street furniture and bad state of road.

The coefficient of the causes of traffic congestion within the CBD of Onitsha presented in Table 4 provides the estimates of the regression coefficient, standard errors of the estimates, t-tests that a coefficient takes the value zero, and confidence intervals. The estimated coefficients are given under the heading 'Unstandardized Coefficients B'; these give, for each of the explanatory variables, the predicted change in the dependent variable when each explanatory variable is increased by one unit conditional upon all the other variables in the model remaining constant. It therefore shows that traffic congestion will tend to be increasing by 36.4% and 6.0% for every additional score on poor road network and on-street parking respectively (Table 4). This indicates that the nature of the road network in Onitsha contributes a major cause to traffic congestion alongside drivers' attitude of on street parking. This implies that the two variables majorly accounted for the perennial hardship commuters are facing in Onitsha.

Table 4: Coefficients[a] of the Variables

Model	Unstandardized coefficients		Standardized coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.878	.149		5.896	.000
Poor road network	.364	.107	.352	3.410	.001
On- street parking	.060	.120	.051	.505	.615
Narrow road space	-.054	.104	-.043	-.523	.602
Traffic rule violation	-.020	.025	-.064	-.805	.422
Inadequate street furniture	-.006	.030	-021	-.195	.846
Bad state of the road	-.047	.029	-.169	-.1.630	.105

a. Dependent Variable: Traffic Congestion

On the other hand, the negative relationship of narrow road space (5.4%), traffic rule violation (2%), inadequate street furniture (0.6%) and bad road (4.7%) implies that every additional score on each of the variables will produce a corresponding value of decrease in traffic congestion. Importantly, it is to be noted from Table 4 that poor road network is the only variable that is significant at 0.05 in the model. This implies that poor road network is the major and statistically significant factor responsible for congestion within the CBD of Onitsha.

The Table 5 is an ANOVA result providing an F-Test equal to 4.825 when the explanatory variables are set at zero. The result shows $F(6,151) = 4$, $p<0.001$, which can bring to a conclusion that the independent variables significantly influence traffic congestion at Onitsha CBD.

Table 5: ANOVA[b] of Traffic Congestion in Onitsha CBD

Model	Sum of squares	Df	Mean square	F	Sig.
Regression	2.957	6	.493	4.825	0.000[a]
Residual	15.423	151	.102		
Total	18.380	157			

a. Predictors: (Constant), bad state of the roads, Narrow road space, traffic rule violation, on-street parking, poor road network planning, inadequate street furniture
b. Dependent Variable: Traffic congestion

Table 6 presents the model summary of the multiple linear regression analysis in order to assess the strength of the relationship between the independent variables and the dependent variable. It further shows the model correlation coefficients, R, its square, R^2, and an adjusted version of this coefficient as summary measures of model fit. The multiple correlation coefficient R = 0.401 predicts there is a correlation in the relationships between and within the independent variables(Bad State of the Roads, Narrow road space, traffic rules violation, on street parking, poor road network planning, inadequate street furniture).

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.401	.161	.128	.320

Predictors: (Constant), bad state of the roads, Narrow road space, traffic rule violation,
On-street parking, poor road network planning, inadequate street furniture

The R^2 of0.161implies that the predictor variables only account for 16.1% with Adjusted R^2 = 0.128 represents 12.8% of the causative factor of traffic congestion at Onitsha CBD. This implies there are other factors that can explain this variation other than bad state of the roads, Narrow road space, traffic rules violation, on street parking, poor road network planning, and inadequate street furniture.

Policy Recommendation and Conclusion

The need to create vibrant CBDs that rely on sustainable, socio-economic and vibrant environment to support the population at micro and macro levels in the study area is considered important. There is need to expand existing road network capacity to at least two lanes in order to accommodate the ever increasing volume of traffic in the study area with an extension of roads to link the opposite and adjacent districts in Onitsha. This should be done to improve road network and linkages to the CBD. Parking facilities should be established within the CBD. This can be done with a view to prohibit on street parking, and such that it serves as alternate source of revenue for the government. On-street trading should be discouraged in the study area through enforcement.

The factors causing traffic congestion at central business district of Onitsha have been examined and recommendations made. The emphasis should now be on apportioning priorities to all the proposed recommendations and the needs for strict enforcement to achieve the desired result. Effective

traffic management cannot work when there is inadequate road capacity to hold more traffic in the area that is to say that the nature of the road network in Onitsha contributes a major cause to traffic congestion.

Acknowledgement

References

Aderamo, A.J. and Atomode.T.I. (2011) Traffic Congestion at Road Intersection in Ilorin, Nigeria. *Australian Journal of Basics and Applied Sciences*, 5(9):1439-1448.

Aworemi, J.R., Abdul-Azeez, I.A., Oyedokun, A.J. and Adewoye, J.O (2009). A study of the causes, effects and Ameliorative Measures of Road Traffic Congestion in Lagos Metropolis. *European Journal of Social Sciences*. II(1):

Benjamin, O.U (2013). *Factors* Responsible for Traffic Congestion in Nigeria, A Case Study of Mayor Bus Stop and Coal Camp Along Agbani Road in Enugu City, Nigeria. *Journal of Environment and Earth. Science.* 3(3):

European Conference of Ministers of Transport (ECMT) (2007). Managing Urban Traffic Congestion.

Gabriel, F. (2013). Traffic Congestion in Azure, Ondo State, Nigeria: Using Federal University of Technology Azure Road as a case study. *International Journal of Arts and Commerce,* 2(5):

Hair, J., Anderson, R.E, Tatham, R.L. and Black, W.C. (1995). Multivariate Data Analysis. 4th ed. New Jersey: Prentice-Hall Inc.

Joseph. O.U and Anderson A.E. (2012). Traffic Congestion in Major Cities of Nigeria, International Journal of Engineering and Technology Volume 2 No. 8, August, 2012. ISSN: 2049-3444 © 2012 – IJET Publications UK.

Laudau, S. and Everitt, B. (2004). *A Handbook of Statistical Analyses using SPSS*. Chapman and Hall/CRC Press, New York.

Ogunbodede, E.F. (2003). Assessment of Traffic Congestions in Azure (Nigerian) Using GIS Approach: Lessons and Challenges for Urban Substances.

Olayiwola, K.O., Olaseni, A.M. and Fashina, O. (2014). Traffic Congestion Problems in Central Business District (CBD) Ikeja, Lagos Metropolis, Nigeria. *Research on Humanities and Social Sciences*, 4(1):

Onyelowe K.C. (2011). Index Analysis of the Causes of Vehicular Traffic Congestion in South-Eastern Nigeria. *Journal of Emerging Trends in Engineering and Applied Sciences (JETEAS)* © Scholarlink Research Institute Journals, 2011 (ISSN: 2141-7016)

Popoola, M.O., Abiola, S.O. and Adeniji, W.A. (2013). Traffic Congestion on Highways in Nigeria Causes, Effects and Remedies. World Academy of Science, Engineering and Technology. *International Journal of Civil, Structural, Construction and Architectural Engineering,* 7(11):

Williams, B., Brown, T., and Onsman, A. (2010). Exploratory Factor Analysis: A Five-Step Guide for Novices. *Australasian Journal of Paramedicine,* 8(3): Retrieved from http://ro.ecu.edu.au/jephc/vol8/iss3/1