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Factors Responsible for Traffic Congestion in Nigeria, A Case Study of Mayor Bus Stop and Coal Camp Along Agbani Road in Enugu City, Nigeria.

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Abstract
For the purpose of identifying factors responsible for traffic congestion along city roads in Nigeria, 20 variables organized into 4 factors suspected to be relevant factors were articulated in a questionnaire. 230 randomly selected respondents consisting of 55 private car drivers, 50 commercial bus drivers, 15 traffic wardens, 50 traders and 60 residents who are conversant with mayor bus stop and Coal Camp along Agabni Road were requested to weight the variables in accordance with 5 – point Likert Scale. Relative Factor Index (RFI) for the 230 respondents across their responses was computed which yielded variable loadings which determined the relevant factors. Factors identified include physical, technical, landuse and human factors. Some management measures were recommended which include improvement in terminal facilities, landuse relocation, traffic education and traffic personnel improvement.
Keywords, Congestion, traffic, urban routeways, landuse, terminal facilities.

1. Introduction

The continuous road congestion in Nigerian cities which started from the 1970s immediately after Udeoji award which enhanced household income and resulted to increased desire for both private and commercial vehicle ownership is intensifying on daily basis. The daily movement of people in Nigerian cities is becoming more difficult and complex. This is reflected in the increasing bumper-to-bumper traffic being experienced in the major cities during the morning (7:00am – 9:00am) and afternoon (3:00pm – 6:00pm) peak hours (Okpala, 1981). In some cases, such as in Enugu, some distributors and collectors continue to exhibit traffic congestion throughout the day from 8:00am – 9:00pm. It is not uncommon for commuters to spend more than two hours enroute to work, school, market, hospital etc or back home even when to and fro distance is not much. According to Okpala (1981), the situation has become so common that it even appears that traffic hold-ups are becoming acceptable excuses for late attendance to work or even formal and informal meetings.

The chaotic traffic situation in most of the Nigerian cities has been causing people a lot of concern (Oyefesobi, 1981). It is possing formidable challenges to both state governments, Local government Councils, researchers and particularly the city residents. The Enugu state government had braced the challenges by rehabilitating and redeveloping most of the routeways in Enugu city including the construction of new ones, yet traffic congestion is still quite common. If the Enugu State government has aggressively tackled the issue of routeways improvement without an appreciable decrease in the rate of traffic congestion in Enugu city, it simply draws attention to the fact that there remain some germane issues that are yet to be addressed. Such germane issue relates to transportation planning which ought to proceed the present state government's actions. The solution to traffic problems in Enugu city as well as in other Nigerian cities perhaps lies in proper transportation planning and management. This is so because an important phase in the planning processes is exhaustive identification of factors militating against free flow of traffic along urban routeways. Once this phase is omitted or ignored, any adopted solution strategy may likely miss the target. This partly explains why the present state government efforts in Enugu to solve traffic flow problems in Enugu city appear not to be yielding the expected results.

This study aims at providing this missing link by way of making good attempt at identifying the factors which are responsible for traffic problems in Enugu city. In order to do this, a surrogate distributor, called Agbani Road, which is a notorious routeway in terms of all-day traffic flow problem in Enugu city, was chosen for the study. Of particular interest along Agbani Road are two major sections, namely Mayor bus stop and Coal Camp section. These two sections are among the notorious sick spots in terms of traffic congestion in Enugu

city. Many residents will prefer to avoid these two areas, if possible, because of the delay and frustrations caused by traffic congestion.

The search for an enduring solution to the traffic problems will necessarily commence with thorough investigation that will unveil the factors responsible for such problems. This is what this study intends to do with particular reference to selected "traffic sick spots" in Enugu city.
It is instructive to point out that even though this study is limited to a popular distributor in Enugu City, the findings will provide an insight into possible factors which need to be handled in order to eradicate traffic congestion or "go-slow" along most routeways in Nigerian cities.

2. Research Methodology

Apart from making reference to some secondary sources, data for this study were mainly primary in origin. Two major methods were adopted for data sourcing. This include fieldwork and questionnaire administration. During fieldwork, studies were limited to routeway studies, traffic flow pattern and volumetric traffic analysis. For the identification of factors responsible for traffic congestion, a total of 230 copies of structured questionnaire were randomly distributed to 55 private car drivers, 50 commercial bus drivers, 15 traffic wardens, 50 traders and 60 residents who were believed to be knowledgeable about the issue at stake. Each questionnaire contains four factors suspected to be responsible for traffic congestion along the road particularly at the chosen two spots and each factor consists of five variables which respondents were requested to weight on a 5 point Likert scale ranging from 5, as predominant, 4 as relevant, 3 as somehow relevant, 2 as unimportant and 1, as very unimportant. Weighting of variables is one of the statistical techniques used to identify, significant variables in empirical studies (Onyefesobi, 1981). Weighted responses from respondents were collated as presented in Table 1.
To determine factors responsible for traffic congestion, Relative Factor Index (RFI) was computed for the 230 respondents across the five variables that explain a factor. The computation was based on the assumption that a respondents score on the variables taken together, constitute empirically derived variables based on his experience. The RFI, then represents the aggregate of the respondent's real score, expressed as a percentage of the aggregate of the respondent's potential or maximum scores on all the five variables which explain a factor.

In statistical terms, the RFI for traffic problems is

$$RFI = \frac{\sum_{i-i}^{N} ei}{\sum_{i-i}^{N} Ei} \times \frac{100}{1}$$

where RFI is the Relative Factor Index for traffic problem variables, N is the number of variables, i for measuring value of the 5 variable, ie is the actual score by the respondents on each variable, and Ei represents the maximum or potential score for each variable. The higher the RFI score, the higher the relative importance of the variable which will also mean a high percentage contribution. From computation, the minimum score for a respondent is 20% while the maximum is 100%. Therefore, for a variable to be accepted, it must have scored at least 20 percent. See Table 2.

3. Findings and Discussion

From RFI loading, the identified factors and variables are as discussed hereunder.

3.1 *Physical Factors*

There are so many through traffic that pass through Mayor bus stop and Coal Camp. Traffic volumetric count shows that on the average a total of 421 vehicles from Garriki end and an average of 468 vehicles pass Mayor bus stop to Garriki end per hour. This is attributed to the fact that Garriki market/park is the only dismemberment and embarkment point for all trips fro Abia, Imo, Rivers, Cross River and Bayalsa states to Enugu city and vice versa. Agbani Road is the only major route way which passed through Enugu city and links Enugu Port Harcourt express way to Enugu – Onitsha – and 9th Mile – Markurdi Road. Such a link road

is bound to be traffic busy throughout the day. In such a busy road, any slight impedance factor is likely to lead to traffic congestion. Such impedance factors include (1) Mayor bus stop is a typical on-street bus stop without laybye. This causes a lot of traffic problems (ii) the bus stop is between two medium residential density layouts – Idaw River and Achalla Layout. These two layouts are densely populated and as such there are so many human traffic competing with vehicular traffic (iii) there is no alternative route to bye-pass Mayor bus stop. (iv) the existence of many cross junctions which are major traffic conflict points. At Coal Camp there are (20) twenty cross junctions and a major one at Mayor bus stop. While studying traffic problems in Owerri, Agbaeze (2006) find out that physical factors appear to be one of the intractable problems facing transport management.

3.2 *Landuse Factor*

Landuse such as industrial, commercial and residential are powerful attractors and generators of traffic (Creighton, 1970). Coal Camp is a major small scale industrial centre which deals mainly with iron welding and motor-parts fabrication activities as well as sales of all sorts of auto-spare parts. These activities are located at Tinker within Coal Camp which is a high density layout. Secondly, Coal Camp is located very close to Ogbete Main Market which is also a major traffic generator and generator. Similarly, at Mayor bus stop, there is also the Mayor Market which is also about 1.5m away from Garriki Main Market. These situations have attracted so many hawkers, vendors, road side trading as well as numerous stores and shops lined up along the road, thus creating favourable condition for traffic hold up.

3.3 *Human Factor*

Every vehicle driver appears to be in a hurry and as such impatient and intolerant which lead to traffic bottlenecks. From bio data analysis, 94% of the drivers who served as respondents have first school leaving certificate as highest certificate while the rest are WASC attempted. 96% learnt driving outside driving school. Drivers with these characteristics are unlikely to posses adequate congenial route way behaviour to enable them observe traffic codes. This leads to high incidence of violation of traffic rules and regulations. They are also bound to be mannerless and indiscipline and thus likely to disobey traffic wardens.

There is also the problem of inadequate traffic wardens and even the few existing ones appear to compromise ethics and thus ignore careless parking of vehicles along a busy road. At Coal Camp there is no provision for traffic warden while at Mayor bus stop the traffic wardens usually appear overwhelmed by the chaotic traffic situation.

3.4 *Technical Factors*

Agbani Road is a major traffic corridor which connects all the residential layouts in Enugu North and those in the Enugu South Local government areas. Mayor bus stop is a major bus stop in Enugu South Local Government Area while Coal Camp functions like an industrial village. These situations attract and generate much traffic. Because of Mayor Market and numerous stores and shops that are juxtaposed to each other without provision for parking spaces vehicle drivers resort to road side parking. At Coal Camp, the road board walks have been converted to shops and workshops thus narrowing the road right-of-way and in the absence of pedestrian walkways, there is persistent traffic congestion. Another technical factor relates to the ugly habit of attaching canopies in front of shops and stores which project almost to the drainage line thus reducing spaces for vehicular parking. Customers then resort to on street parking which obstruct traffic flow. With the recent prohibition of operation of motorcycles including the commercial ones (Okada) within Enugu city, emphasis has shifted to operation of tricycles called Keke-Napep. Since almost all the operators of Keke-Napep are those laid off by banning of Okada, the traffic nuisance meant to be eradicated by banning motorcycle in Enugu city is still being pepetrated by Keke-Napep. Since Mayor bus stop and Coal Camp are pull centres for Keke-Napep, the two spots suffer the externality effects of Keke-Napep operation.

One peculiar technical problem at Coal Camp is the existence of so many faulty and unserviceable vehicles indiscrimately parked by the road sides awaiting sale or repair in addition to sound ones that are displayed for sale. All these enhance traffic congestion.

4. Recommendation

4.1 *Provision of alternative Routss and Bye-passes.*

72% of traffic that pass through Mayor bus stop and 52% of those that pass through Coal Camp are external to external traffic who ply the road as a shortcut. This volume of traffic can be reduced by construction of good alternative bye passes. Existing roads such as Meniru – Esso bus stop road through Idaw River can be redeveloped into a collector to bye pass Mayor bus stop.

Similarly, Goldsmith Road and Mbanugo Road at Coal Camp can be redeveloped into collectors to serve as Coal Camp bye-pass. construction of bye-passes has been one of the effective devices for redressing traffic congestion, for instance, the Benin bye-pass had reduced traffic congestion within Benin centre (Omo, 2004).

4.2 *Landuse Relocation*

For every city in Nigeria, there is a great need to integrate transportation and landuse planning. Landuse and transport form a closed loop system and interact very much (Adenle, 1981). Landuse planning will involve relocation of major landuser that attract and generate traffic enormously to elsewhere. Thus Mayor market and Tinker (industrial area) in Coal Camp should be relocated. Alternative sites exist, one, at a site between Meniru Road and Garriki Army Barracks for relocation of Mayor Market. This site consists of privately owned plots but can be acquired by state government on the basis of overriding public interests. Tinker can be relocated to Ugwuaji along Enugu-Port Harcourt expressway at a site already acquired for the establishment of mechanic village.

4.3 *Traffic Management*

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 an effective traffic management and control, both manual and electronic devices must be combined in view of the epileptic nature of power supply in Enugu city as elsewhere particularly at major traffic conflict points. In order to obviate the incessant power outage and its adverse consequences on traffic management, it is recommended that each traffic control light stand must be accompanied by the installation of a 12 Volts standby power generator. Such small generators are quite inexpensive and costs between N9,000.00 – N12,000.00 per generator and quite readily available. Such standby power generators should be used to supply power to the traffic lights as soon as the Power Holding Company of Nigeria "holds" its power. This will go a long way to improve the use of traffic electronic control devices in traffic management in Nigeria particularly now that it appears that most vehicle drivers in Nigeria appear to obey traffic lights more than traffic wardens, perhaps, because the consequences of disobeying traffic lights is often grave.

4.4 *Traffic Education*

Traffic education is the conscious training of all road users, most especially the vehicle operators including the Keke-Napep operators in proper and lawful behaviour on public highways (Meyor, 1978). Traffic education should emphasize knowledge of road traffic laws and highway codes, comprehension of road signs and traffic signals, knowledge of ones 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 don'ts of driving and highway uses.

4.5 *Adequate Terminal Facilities*

One important aspects of transportation management is provision of terminal facilities and regulations on their use (Oduola, 1981). Terminal facilities include motor parks, bus stops, garages and lay-byes (Orioke, 1981). Parking facilities are essential instrument in proper traffic control in the cities and overall traffic management (Agbaze, 2003). One way of achieving this objective is to dismantle all canopy attachments which obstruct store and shop frontages and the prohibition of displaying goods for sale within fore set backs and along board walk of roads. This will make spaces available for customers' car parking and hence reduce the incidence of road side parking which interrupt traffic flow.

5. Conclusion

Traffic problems along routeways 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 congestions in Nigerian cities.

For this to take place it is advisable that Urban Transport Planning and Management Committee (UTPMC) 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 their recommendations. Law enforcement is about the most important aspect of traffic control. Any defaulting driver must be spotted and punished either by fine, puncturing of tyres or charged to court and any dishonest traffic warden must be exposed and disciplined (Adedimila, 1981).

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Table 1: Factors Responsible for Traffic Problems in Coal Camp District

	1st reason	2nd reason	3rd reason	4th reason	5th reason	Total
1. Physical Factor: Design capacity of the distributors are inadequate under the current traffic	29	55	36	39	71	230
(b) So many through traffic	101	43	35	27	24	230
(c) The roads are dilapidated and pot holed	39	51	74	45	21	230
(d) Inadequate number of distributors and collectors	46	61	47	43	33	230
(e) So many cross junctions which cause traffic bottleneck	15	22	47	64	82	230
2. Land use Factor (a) Coal Camp is a major small scale industrial area	77	52	41	31	29	230
(b) Proximity to Ogbete main market	53	56	63	32	26	230
(c) It is a zone of diversified landuse	31	44	54	69	32	230
(b) So many itinerant hawkers, vendors and road side trading	68	51	31	49	31	230
(c) Coal Camp is now almost like a mechanic village	80	41	22	51	36	230
3. Human Factor: (a) Vehicle drivers are impatient and intolerant	69	37	53	37	34	230
(b) Pedestrians have no designated route	49	34	49	39	59	230
(c) Road users disregard traffic regulations	30	44	54	31	71	230
(d) So many uneducated and unlicensed drivers	67	50	29	40	44	230
(e) Absence of traffic wardens	89	63	39	22	17	230
4. Technical Factors: (a) Serviced by one of the major bus routes (Agbani Road) in Enugu.	71	57	29	39	34	230
(b) So many road side parkings due to absence of parking spaces	46	61	47	43	33	230
(c) There is always acute competition for						

road space between vehicles and "Okada" Motorcycles	59	39	43	19	70	230
(d) So many poorly maintained vehicles on the road	39	51	45	74	21	230
(e) So many abandoned unserviceable vehicles along the road sides.	15	47	22	60	86	230

Source: Fieldwork, 2012

Table 2: Identification of RFI

S/N	Factors	1st reason	%	2nd reason	%	3rd reason	%	4th reason	%	5th reason	%	RFI	%
1	**Physical Factor**												
1a	Design capacity is inadequate under the current traffic	29	12.6	55	23.7	36	15.1	39	17.9	71	30.7	622	18
1b	So many through traffic	101	43.9	43	18.5	35	14.6	27	12.4	24	10.4	860	24.8
1c.	The roads are dilapidated and potholed	39	17.0	51	22.0	74	31.0	45	20.6	21	9.1	732	21.1
1d	Inadequate number of distributors and collectors	46	20.0	61	26.3	47	19.7	43	19.7	33	14.3	734	21.2
1e	So many cross junctions which cause traffic bottleneck	15	6.5	22	9.5	47	19.7	64	29.4	82	35.5	514	14.8
	Total Response (Physical Factor)	**230**	**100**	**232**	**100**	**239**	**100**	**218**	**100**	**231**	**100**	**3462**	**100**
2	**Land use Factor**												
2a	Coal Camp is a major small scale industrial area	77	24.9	52	21.3	41	19.4	31	13.4	29	18.8	807	21.4
2b	Proximity to Ogbete main market	53	17.2	56	23.0	63	29.9	32	13.8	26	16.9	768	20.4
2c	It is a zone of diversified land use	31	10.0	44	18.0	54	25.6	69	29.7	32	20.8	663	17.6
2d	So many itinerant hawkers, vendors and road side trading	68	22.0	51	20.9	31	14.7	49	21.1	31	20.1	766	20.3
2e	Coal Camp is now almost like a mechanic village	80	25.9	41	16.8	22	10.4	51	22.0	36	23.4	768	20.4
	Total Response (Land use Factor)	**309**	**100**	**244**	**100**	**211**	**100**	**232**	**100**	**154**	**100**	**3772**	**100**
3.	**Human Factor:**												
3a	Vehicle drivers are impatient												

	and intolerant	69	22.7	37	16.2	53	23.7	37	21.9	34	15.1	760	20.7
3b.	Pedestrians have no designated route	49	16.1	34	14.9	49	21.9	39	23.1	59	26.2	665	18.1
3c	Road users disregard traffic regulations	30	9.9	44	19.3	54	24.1	31	18.3	71	31.6	621	16.9
3d	So many uneducated and unlicensed drivers	67	22.0	50	21.9	29	12.9	40	23.7	44	19.6	746	20.3
3e	Absence of traffic wardens	89	29.3	63	27.6	39	17.4	22	13.0	17	7.6	875	23.9
	Total Response	**304**	**100**	**228**	**100**	**224**	**100**	**169**	**100**	**225**	**100**	**3667**	**100**
4.	**Technical Factor**												
4a.	Serviced by one of the major bus routes (Agbani Rd) in Enugu	71	30.9	57	22.4	29	15.6	39	16.6	34	14.3	782	22.8
4b	So many road side parking due to absence of parking spaces	46	20.0	61	23.9	47	25.3	43	18.3	33	13.9	734	21.4
4c	There is always acute competition for road space between vehicles and “Okada”	59	25.7	39	15.3	43	23.1	19	8.1	70	29.4	688	20.0
4d	So many poorly maintained vehicles on the road	39	17.0	51	20.0	45	24.2	74	31.5	21	8.8	703	20.5
4e	So many abandoned unserviceable vehicles along the road sides	15	6.5	47	18.4	22	11.8	60	25.5	80	33.6	529	15.4
	Total Response	**230**	**100**	**255**	**100**	**186**	**100**	**235**	**100**	**238**	**100**	**3436**	**100**

Source: Fieldwork, 2012

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