The Cause, Effect and Possible Solution to Traffic Congestion on Nigeria Road (A Case Study of Basorun-Akobo Road, Oyo State)

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ABSTRACT : *Due to increase in population and the attraction of human activities into urban region which in turn leads to the growth of vehicle ownership and use, there is demand for road space which has led to increase in the number of public transport operation. Consequently, the demand for road space is greater than the supply because the rate of provision of transport facilities is less than the rate of growth of vehicle ownership and use which result into traffic congestion. Traffic congestion is the impedance of vehicles imposed on each other due to speed-flow relationship in conditions where the use of transport system approaches capacity. Traffic congestion in Nigeria, taking Basorun-Akobo Road in Ibadan Oyo State as a case study has been analysed using experimental and theoretical approaches. These involve traffic counting and delay survey. In order to carry out effective research work on the case study road, the method adopted were traffic counting and traffic delay survey. The effect of traffic congestion on the study area are Waste of time, Delay movement, Accident, Inability to forecast travel time, Fuel consumption, Road rage and environmental pollution. Possible solutions to traffic congestion on the case study area is to: Dualize the Road, Provide Adequate Parking Space, Construct proper Drainage and Install Traffic Control Devices.*

I.   Introduction

Road became important means of transportation during the reign of Roman Empire. Roman's kingdom modernized, used road effectively compared to the existing usage of road whereby ox, man, chariot, camel, bull were used as major carrier in road transportation. But the invention of the motor vehicle meant that roads were no longer meant for pedestrians, chariot and animals. The invention called for improvement of the state of the roads, which led to increased speeds and danger to road users. This then called for a proper construction and control of traffic to increase efficiency of the roads in traffic performance.

Demand for highway travel by people continues to grow as population increases, particularly in the metropolitan area and the construction of new highway capacity to accommodate this growth in travel has not kept pace. Congestion results when traffic demand approaches or exceeds the available capacity of the road system. While this is a simple concept, it is not constant because traffic demand may vary significantly depending on the season of the year, the day of the week and even time of the day. Nevertheless, the overall effect of congestion on Nigeria Highway cannot be accurately quantify due to uncounted and diversified effects it has on the national capacity but its significant effect can be seen on service delivery, good delivery, pollution, discomfort, excessive fuel consumption, excessive vehicle maintenance – all these accounted for economic loss. The problem of traffic congestion has reached an alarming rate in Nigeria especially in many cities. However, there is a general feeling that the traffic flow should be free to allow free movement of goods and service but reverse is the case own to the overcrowding of the road users (vehicles) on the road and this manifest through a number of problems which include:

- Delay: this is the time lost while traffic flow is impeded
- Inability to forecast travel time accurately, leading to drivers allocating more time to travel and less time on productive activities.
- Wastage of fuel and increasing air pollution: releasing of CO (carbon monoxide) and other pollutant by congested car account for environmental and health problem which range from nose running to global warming.
- Wear and tear on vehicles as a result of idling in traffic and frequent acceleration and braking, leading to more frequent repairs and replacements.
- Stressed and frustration: discomfort that comes from stop and go condition of the traffic congestion cause discomfort and weakness of passengers and motorists.More so, congestion increases the tendency of collision which may lead to series of injuries and fatality.
- Perishing of some agricultural produce: Many agricultural products such as tomatoes, mangoes etc.

The overall effects of traffic congestion can be broadly be categorized under; Health effects, Environmental effects, and Economy effect. Nigeria vision of becoming one the first 20[ths]trongest economy in the world cannot be achieved unless the spate of traffic congestions on our road is nullified. This is due to the facts that ineffective transportation system dwarfed the economy. Jerome D. &et. al (2005), noticed major challenge in road transportation as congestion which result to immeasurable impact on country's economy, he suggested that, congested free road will enhance efficient mobility of goods and services and then make road transportation as most preferred transportation mode.

Filani and Olateru (1976) said that traffic congestion exists in Ibadan and that the situation is growing worse each day in spite of some adhere step being taken to alleviate the situation. He noted that traffic jams are more attributable to bad traffic management and for traffic education of the road users. On the basis of this analysis, he suggested ways of improving traffic management and educating the road users on the use of urban highway for mutual convenience. Some of this suggestion includes setting up of mobile courts and re – introduction of the municipal bus transport service of which it operation would reduce number of mini buses and taxi plying the existing with.It must however be noted that the mobile court was recently introduced in Ibadan but the frequent strive action of the public transportation union partly face it to park up. The attempt and the willingness of the researcher to cover all congested roads in the country in executing this research work would be tedious, time wasting owing to distance security and the complexity of the Nigerian roads. Thus,Basorun-Akobo road will be used by the researcher out of the numerous roads in Nigeria. And also, there are numerous factors which cause congestion (as described by US department of Highway) but this research work focuses on one 'Physical Bottlenecks' (Capacity). Basorun-akobo road has 10 prominent junctions (Basorun-oja, Yanbule, General gas,Oolopo-meji, Fisco, Baptist, Iyana-olopa,Omolayo, Oje, and Akala) out of which 3 were subjected to the study.

II. Methods

Prior to the actual work, preliminary investigation was carried out along the case study road to determine the best approach to be used in dealing with the research problems. The whole road was surveyed by three men and it was observed that noticeable congestions was within the APCON in Basorun to OlopoMeji in Akobo, all fall within 2 local government. Researcher then restricted investigation to the area described above, which consists of four noticeable junctions (BaosrunOja, Yanbule, General Gas and Olopo-meji)- all covers 1.55km. Based on the nature of the research work, the researcher employed scope that consists an experimental investigation and theoretical study. The experimental investigation involved traffic counting and delay surveying. In this section, researcher examined visible causes of congestion on the case road, studying traffic stream which involved traffic direction peak period and other factors that are physically affecting the easy flow of traffic along the study area. Theoretical aspect of the research work was primarily based on the analysis of the data gathered through traffic counting and delay survey and translation of this data in relation to the level of service.
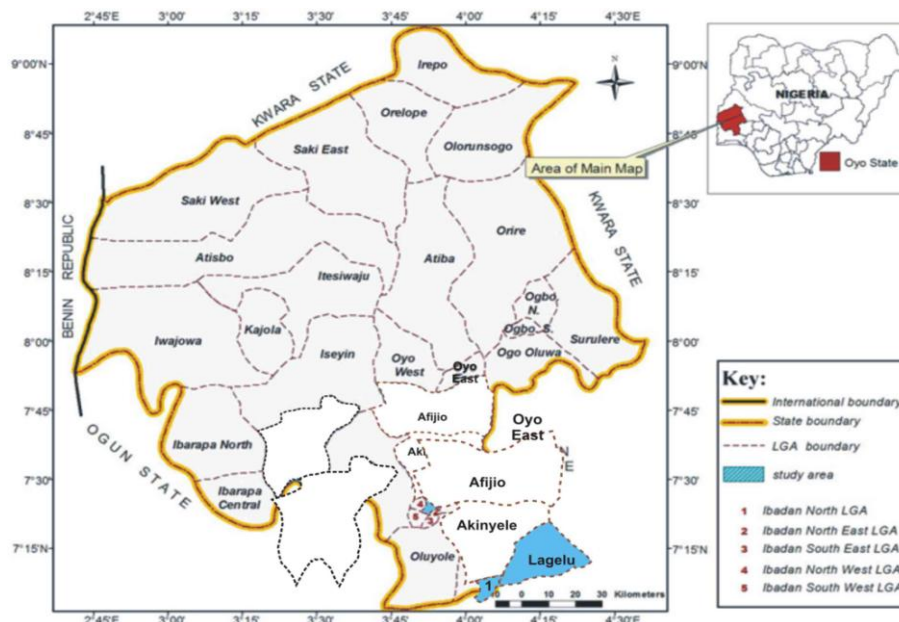

Fig. 1: Map of Nigeria; Showing Location of the study area (Ibadan, Oyo State)

2.1 Traffic Counting

There are various technique and methods used in traffic survey (traffic counting) but for the purpose of this research work, manual counting was adopted. Preliminary investigation has incited researchers and thus carried out traffic counting at general gas.

Manual counting: in this case, an observer will be assigned to a particular station (General gas) along the case road, record on a sensor sheet the easy passage of traffic according to the classification. The counting (number of vehicles) was based assessed per hour, all heavy duty vehicles were converted to passenger car by multiplying them with factor of three (3).

Data sought out at the end of the counting were analyzed using appropriate tools. Manual counting is usually carried out for a day or week because it is impossible to manually carry out the counting for a longer period. For the purpose of this research work, counting was carried out for a week between 7am to 8am daily.

The following data were generated:

Traffic density: This is the number of vehicle in a given length of road at an instantaneous time. It is measured in vehicles per kilometers.

Traffic flow: This is the quantity of vehicles in space measured in an interval of time. Measured in vehicle per hour

Speed: This is the distance travelled by vehicle during a unit time. i.e. rate of movement of traffic. It is measured in kilometer per hour or mile per hour**.** Speed was determined by sampling a set of vehicles, noting their travel time (with the use of stop watch) on a predetermined length of road along the case road.

2.2 Delay Survey

Delay reduces the running speed below what might be considered an acceptable speed. In carrying out of delay study, registration number method was used whereby the Registration Number of vehicles passing the surveys were noted by observers. Intermediate observers were used to trace the path of vehicles within the surveys area. Journey times were obtained by recording the time at which the vehicles pass the survey system (scene).

Base on the result of the preliminary investigation and traffic counting data obtained, delay surveys were carried out in the morning and in the afternoon.

Three scenes were formed along the case road; one between APCON to BasorunOja (280m), second is between Yanbule to General Gas (250m) and the third is between General Gas to OlopoMeji junction (310m).

III.   Results and Analysis

The data here shows various results obtained on difference practical test carried out in the field (road). These include traffic volume (AHV), delay survey and Level of service (LOS).
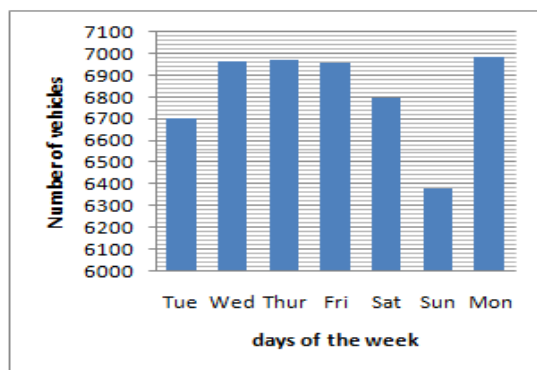
Traffic Volume:

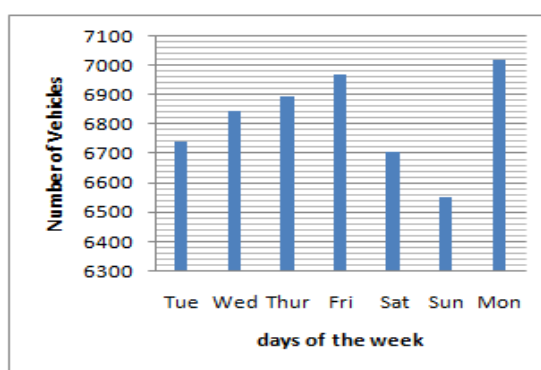Fig. 2: Weekly Traffic Distribution (Coming: Akobo to Basorun)

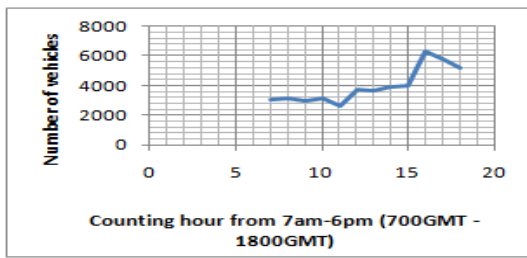Fig. 3: Weekly Traffic Distribution (Going: Basorun to Akobo)

Fig. 4: Hourly Traffic Distribution
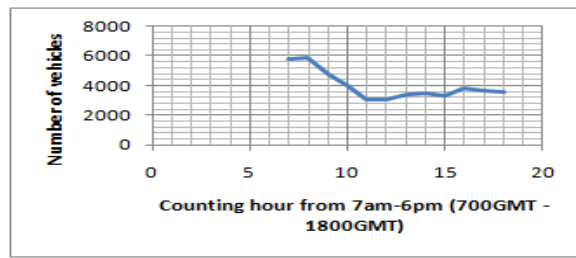(Coming: Akobo to Basorun)

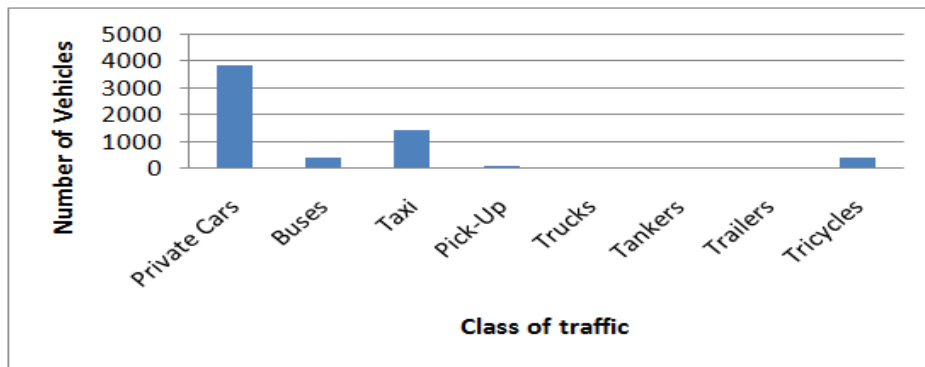Fig. 5: Hourly Traffic Distribution
(Going: Akobo to Basorun)

Fig. 6: Vehicular Distribution

3.1 Level of Service

Vehicles were counted per lane to determine the operational situation of each lane of the case study road. Data obtained were compared with the Level of Service A as best highway condition and with service C as fairly condition.

Table 1: Level of Service

Time	Lane Description	No. Of passenger car per mile (1.6km) per lane	Level of Service
7am-8am	Akobo – Basorun	118	F
	Basorun – Akobo	72	F
8am – 9am	Akobo – Basorun	101	F
	Basorun – Akobo	48	E
9am -10am	Akobo – Basorun	109	F
	Basorun – Akobo	47	E
10am- 11am	Akobo – Basorun	79	F
	Basorun – Akobo	45	E
11am – 12pm	Akobo – Basorun	41	E
	Basorun – Akobo	47	E
12pm-1pm	Akobo – Basorun	42	E
	Basorun – Akobo	33	E
1pm-2pm	Akobo – Basorun	42	E
	Basorun – Akobo	38	E
2pm-3pm	Akobo – Basorun	41	E
	Basorun – Akobo	72	F
3pm-4pm	Akobo – Basorun	48	E
	Basorun – Akobo	51	F
4pm -5pm	Akobo – Basorun	69	F
	Basorun – Akobo	111	F
5pm-6pm	Akobo – Basorun	44	E
	Basorun – Akobo	111	F

Interpretation: During the evening and morning peak periods, and during evening, morning low period when traffic was controlled, the data obtained for level of service is presented in above. During peak periods (7:30am – 9am & 4pm – 5pm), the traffic on this road is operated under level of service F. Operation of the road is found under level of service E only in the mid-day

3.2 Discussion of Results

The most noticeable congestion problem along the study road was found during the peak hour (between 7:30am and 8:30am while coming from Akobo towards Basoruun and between 3:45pm and 4:30pm while going towards Akobo from Basorun). This is because of the concentration of individual workers' vehicles (which covers 62% of all vehicles plying the road) that leave for work during morning and return home during afternoon. Sunday traffic pattern was completely different from other traffic pattern (Appendix 8 & 9). Peak period was found between 8am -9am while afternoon peak period was found between 1pm – 2pm). This was a result of significant number of churches situated at Basorun. The road would have completely be free from congestion during moderate traffic-flow period, but due to some defect (Portholes), offline manoeuvre, driver behaviour and lack of crossing facilities along the road; congestion usually be at play. Average delay time between Basorun to Olopo-meji 6minutes and ideal time is just 15seconds. Ideal times is the times taking for a vehicle travelling on 56km/h to pass through the length of road survey (900m) under prevailing condition. Vehicle form a long queue when traffic contacts small interference even during the low period of traffic as the traffic is being operating under level of service F in most time.

IV. Conclusion and Recommendation

4.1   Conclusion

The conclusion for this research work is based on the results obtained in the experiments as follows.
* The case study road operates under level of service F (in most time) which is generally unacceptable and level of service E during low traffic period.
* Defects on the road also constitute significantly to congestion
* The case study road lack parking bay and thus parking vehicles inhibit the free-flow of traffic
* Average delay on case road is 6minute which is unacceptable as ideal time on that road course is just 15seconds
* The pick hourly traffic is found between 7:45am and 8:30am and 4:00pm – 4:45pm for morning and evening peak period respectively.
* Private cars are the most vehicular type that ply the road
* Most congested section of the road was found between Yanbule and General Gas.
* Morning congestion (coming) exceeded afternoon congestion (going)
* Factors such as bad road (pothole) responsible for congestion (especially between general gas and Olopomeji junction

4.2   Recommendation

It was found that Basorun –Akobo road is characterized with daily traffic congestion; thus, followings were recommended based on findings:
* Proper attention and management should be given to Basorun-Akobo Road due to the importance of the road
* The road should be dualized to enhance free-flow of traffic: Scholars in highway engineering (such as John J. Fruin) believed that level of service A is unrealistic in urban area roads, however, urban area typically adopts standard varying between C and D and E sometimes depend on the area, size and characteristics of traffic, any road operate beyond this should be dualized.
* Channelizing devices or traffic control devices should be installed especially as the junctions to aid flow as traffic wardens judgement is inaccurate.
* Parking bay or lot should be provided along the road
* The road should not be encroached with shops (market).

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