LAUTECH JOURNAL OF ENGINEERING AND TECHNOLOGY 4(2) 2007: 92-97

CONTRIBUTION OF COMMERCIAL VEHICLES TO TRAFFIC CONGESTION IN CORE AREA OF IBADAN, NIGERIA

S.O. Fadare[a], C.A. Wojuade[*,b] and G.A. Durodola[c]

[a] Urban and Regional Planning Department, Obafemi Awolowo University, Ile – Ife, Nigeria.
[b]Management Science Department, Ladoke Akintola University of Technology, Ogbomoso.
[c]Capital Project Monitoring Unit, Ladoke Akintola University of Technology, Ogbomoso.

* Corresponding author

ABSTRACT

This paper discusses the contribution of commercial vehicles to traffic congestion in the core of Ibadan, Nigeria. Commercial vehicles in the form of mini-buses, taxis, motorcycles and trucks plying the routes were manually counted between the hours of 7:00am and 7:00pm for a period of one week and their figures were volumetrically documented in passenger car units (pcu). Traffic delays were also observed and noted for their causes, duration and type of vehicles involved for a week.

The result of the analysis showed the volume of commercial vehicle traffic to be 73901 pcu and 15612 pcu for non- commercial vehicles. The result further revealed that a total of 6639 delays amounting to 49 hours of delay time was recorded at the node. It was also evident that the higher the volume of commercial vehicle traffic the more the delay on the roads studied. The study concluded that commercial vehicles contribute more to traffic congestion than non-commercial vehicles in the study area. The study recommends the introduction of high occupancy buses, provision of adequate bus-stops and installation of functioning traffic light among others to reduce traffic congestion on roads at Beere node in Ibadan.

INTRODUCTION

The basic transportation problems of cities all over the world are that of traffic congestion, delay, accident, parking difficulties and environmental pollution. Ayeni (1983) describes these as some of the most pressing and visible of urban problems. Baker (1981) defines traffic congestion as the breakdown of fluent traffic flow due to the inefficiency of the transportation link to handle the volume of traffic. Wikipedia (2006) asserts that congestion occurs when the roadway demand is greater than capacity. Congestion is characterized by slower speeds, longer trip times and increased queuing often caused by vehicles and road users among other things.

Empirical studies showed that traffic congestion is a global phenomenon and the trend is on the increase. For example, Shrank and Lomax (2005) remarked that the current pace of transportation improvement in major urban areas in United States is not sufficient to keep pace with even a slow growth in travel demand. Similarly, Barret (1993) noted that Nigerian urban transport functions in a crisis situation which is caused by high level of urbanization and the inability of transport infrastructural facilities to cope with the high demand resulting from this rapid growth.

In quantifying the magnitude of traffic congestion in United States, Texas Transportation Institute (2003), estimates that in year 2000, the 75 largest metropolitan areas in the United States experienced 3.6 billion litres of wasted fuel and $67.5 billion loss in cost or 0.7% of the nations GDP. Also, Shrank and Lomax (2005) revealed that in 85 urban areas studied in 2003, congestion caused 3.7 billion hours of travel delay, 8.7 billion litres of wasted fuel and total cost of $63 billion in fuel loss.

On modal contribution to traffic congestion, FHWA (2007) reveals that trucking is a major contributor to urban traffic congestion because it is growing faster than passenger vehicle traffic on United States highways accounting for more than 30% of all vehicles. The size and operating characteristics of trucks have a greater effect than personal vehicles on traffic flow and highway level of service. Another study by TMIP (2007) reports that school buses which accounts for 20-25% of traffic on highways and local streets in the morning peak periods is a major cause of traffic congestion in United States.

Omar (2007) reiterated that despite the good roads and infrastructure in Abu Dhabi, congestion still occur due to rapid population growth and increase in number of trucks and commercial vehicles which moves very slowly to load and unload goods. In Nigeria, Ogunsanya (1983) noted that freight vehicles contribute significantly to traffic delay in Lagos metropolis. He reiterated that with a population of about a quarter of non-freight vehicles, freight vehicles contributes over 60% of the total delay problems in the study area and an estimated sum of N22.4 million as delay cost on the four roads

studied for three days. The foregoing indicates that these different modes contribute to traffic congestion at varying degrees.

This study focuses on the involvement of commercial vehicles in traffic congestion in Ibadan. This is as a result of their high frequency of travels, high volume and conveyance of passengers in the city.

Study area

In studying the delay caused by commercial vehicles in the core areas of Ibadan, Beere node comprising of Agodi gate road, Challenge road, Okunola street and Elekuro road is choosen (see Fig 1). The roads provide accessibility to important social, cultural, economic, and administrative centres in Ibadan. The road network in the core areas do not have specific pattern due to haphazard nature of their development. All the studied roads have asphaltic surfaces and they were in good condition. Agodi gate road and Challenge road are dual carriage lanes while Okunola street The classification of vehicle types and their respective passenger car units (pcu) taken after Hobbs (1968) are shown in table 1 below.

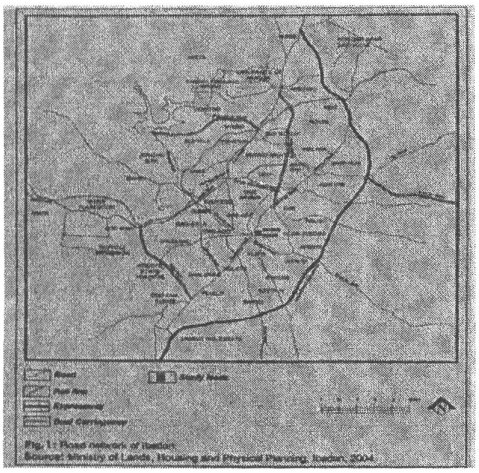

Table 1: Passenger car units

Type of vehicle	units
Motorcycle	0.75
Car and taxi	1.00
Mini bus	2.00
Bus and truck	3.00

The second type of data involved collection of information on traffic delay. Traffic delay is the time lost by vehicles due to inefficiencies in the traffic or traffic control devices, which may be fixed or operational. Fixed delay normally happens at the road intersection while operational delay is as a result of inadequacies of vehicles on the road. Using observatory method, the road is divided into segments with each point having an obstructed view and Elekuro road are single lanes. However, the four roads lack good drainage, traffic lights, walkways and bus-stops which may cause traffic delay.

The choice of Beere node for this study is due to the fact that the area falls within high-density residential areas where majority of low-income earners reside and where majority of commercial vehicles ply daily. The car ownership in the area is very low hence majority of the people depend largely on public transport.

Research methodology

Two types of data were collected for the study. The first is traffic count of vehicles by type. The vehicles were categorized into two groups – commercial vehicle comprising of mini-buses, taxis, motorcycles and trucks and private cars. Using manual counting, the type and number of vehicles that passed on the roads between 7.00 am and 7.00 pm for seven consecutive days were recorded in passenger car units (pcu) by field assistants stationed on each of the roads. from where the field assistants can observe the vehicles on the road. The stretch of road studied is 400m along each route and the field assistants were positioned 100m apart. Delays for the purpose of data collection cover stops in vehicle movement. Information was obtained on the cause of delay, duration of delay and the vehicles involved in delay between 7.00 am and 7.00 pm for seven consecutive days. The recording was done on hourly basis to know the variation at different time of the day. The information obtained were analyzed and discussed in the following sections.

Analysis of result

The result of the traffic survey revealed that a total of 89,513 passenger car units (pcu) were recorded on the roads. These comprise of 73,901 pcu for commercial vehicles and 15,612 pcu for non-commercial vehicles. The commercial vehicle represents 82.6% of the total passenger car units counted on the roads.

The distribution of the vehicles in table 2 shows that commercial vehicles are more than non-commercial vehicles on all the roads. Agodi gate road has the highest pcu traffic of both categories of vehicle types, although the percentage of commercial traffic to non-commercial traffic is lowest on this road than others.

Similarly, Elekuro road recorded the lowest of both categories of vehicles even though it records the highest percentage 90.4% of commercial vehicles on the roads at the node. The non-commercial vehicles record revealed that Agodi gate road accounts for highest percentage 22.1% and others account for 20.5%, 11.6% and 9.6% on Challenge road, Okunola street and Elekuro road respectively. The variation in the traffic volume is as a result of different land uses along the roads.

Furthermore, the table shows that the four roads have similarities in temporal traffic

Table 2: Temporal distribution of average passenger car units per week by vehicle types

	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	Total
Agodi gate road													
Commercial vehicles	1731	2165	2479	2219	2155	1589	1765	2020	2093	2132	2277	1926	24547 (77.9)
Non-commercial vehicles	472	588	658	640	582	484	564	560	604	572	638	592	6954 (22.1)
Total	2203	2753	3137	2859	2737	2069	2329	2580	2665	2736	2915	2518	31501 (100.0)
Challenge road													
	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	Total
Commercial vehicles	1742	1910	2014	1707	1352	1356	1556	1583	1544	1682	1697	1619	19762 (79.5)
Non-commercial vehicles	410	490	516	422	350	374	400	424	392	430	458	440	5106 (20.5)
Total	2152	2400	2530	2129	1702	1730	1956	2007	1936	2112	2155	2059	24868 (100.0)
Okunlola street													
	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	Total
Commercial vehicles	1227	1420	1554	1392	1365	1210	1342	1443	1190	1317	1675	1265	16400 (88.4)
Non-commercial vehicles	136	162	188	226	166	132	150	180	200	217	200	194	2146 (11.6)
Total	1363	1582	1742	1618	1531	1342	1492	1623	1390	1529	1875	1459	18546 (100.0)
Elekuro road													
	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	Total
Commercial vehicles	1013	1317	1176	1149	1058	895	957	1083	1071	1205	1123	1145	13192 (90.4)
Non-commercial vehicles	115	129	136	121	104	90	111	126	102	140	127	105	1406 (9.6)
Total	1128	1446	1312	1270	1162	985	1068	1209	1173	1345	1250	1250	14598 (100.0)

The figures in bracket are percentages
Source: Field Survey, 2005.

Table 3: Distribution of total delay by causes

Cause of delay	Number of total delay				Total
	Agodi gate road	Challenge road	Okunola street	Elekuro road	
Improper parking	784	898	858	695	3235 (48.7)
Breakdown vehicle	9	14	8	7	38 (0.6)
Accident	3	3	2	1	9 (0.1)
Road junction	235	50	-	-	285 (4.3)
Road intersection	624	800	684	522	2630 (39.6)
Union fees collection	140	-	100	96	336 (5.1)
U-turn	35	32	39	-	106 (1.6)
Total	1830 (27.6)	1797 (27.1)	1691 (25.5)	1321 (19.9)	6639 (100.1)

The figures in bracket are percentages
Source: Field Survey, 2005.

Table 4: Commercial vehicle traffic volume and delay in the four roads

Road	Volume pcu	Delay %
Agodi – gate road	24547	27.6
Challenge road	19762	27.1
Okunola street	16400	25.5
Elekuro road	13192	19.9
Total	**73901**	**100.1**

Source: Field Survey, 2005.

Table 5: Contribution of commercial vehicles to delay

Commercial vehicles	Agodi gate road	Challenge road	Okunola street	Elekuro road	Total
Mini-buses	713	507	588	516	(74.2) 2294
Taxes	94	38	26	34	(6.2) 192
Motorcycles	155	104	149	82	(15.9) 490
Buses/Truck	49	18	29	18	(3.7) 114
Total	(32.7) 1011	(21.6) 667	(24.7) 762	(21.0) 650	(100.0) 3090

The figures in bracket are percentages
Source: Field Survey, 2005.

Table 6: Delay time of commercial vehicles

Vehicle type	Delay time (mins)				Total
	Agodi gate road	Challenge road	Okunola street	Elekuro road	
Motorcycles	48	29	44	31	(8.7) 152
Taxes	51	27	17	20	(6.6) 115
Mini-buses	311	285	249	213	(60.7) 1058
Private cars	100	113	76	70	(20.6) 359
Buses/Truck	29	8	12	9	(3.3) 58
Total	(30.9) 539	(26.5) 462	(22.8) 398	(19.7) 343	(99.9) 1742

The figures in bracket are percentages
Source: Field Survey, 2005.

Table 7: Temporal distribution of time wasted (mins) on roads per week by commercial vehicles

Types of Delay	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	Total
Fixed	87	108	118	101	90	83	94	106	95	104	111	97	(40.7) 1194
Operational	120	193	184	160	110	100	96	128	120	181	193	157	(59.3) 1742
Total	207	301	302	261	200	183	190	234	215	285	304	254	(100.0) 2936

The figures in bracket are percentages
Source: Field Survey, 2005.

REFERENCES

Ayeni, B. (1983) "The development of an urban land-use transportation model for Lagos, Nigeria". Nigerian Geographical Journal. Vol. 26 No. 1& 2 pp 59-79.

Baker, R.G.V. (1981) "A model of traffic dispersion from a congestion road". Transportation Research B. Vol. 15B No. 5 pp. 319-327.

Barret, R. (1993) "Nigeria urban mass transport in crisis", In: Ikya, S.G. (ed) Urban Passenger

http://www.fhwa.dot.gov/policy/2004cpr/chap 13. htm.

Hobbs, F.D. (1979): Traffic planning and engineering. New York, Pergamon International Library, 542 p.

Ogunsanya, A.A. (1983): "Contribution of freight vehicles to urban traffic delays: The case of Lagos, Nigeria". Nigerian Geographical Journal. Vol. 26 No. 1 & 2 pp. 125-137.

Omar (2007): Traffic congestion in Abu Dhabi. http://www.writefix. com/writing/cause/traffic.htm .

Shrank, D. and Lomax, T. (2005) "Urban traffic congestion costs the USA $63 billion per annum," Texas Transportation Institute. http://www.citymayors.com/transport/congestion_usa.html.

Wikipedia (2006): Traffic congestioin. http://en.wikipedia.org/wiki/traffic_ congestion.

TMIP (2007): Accounting for commercial vehicles in urban transportation models. http://tmip.fhwa.dot.gov/clearinghouse/docs/accounting/sect_5_literature.stm.

Texas Transportation Institute (2003) '' Traffic congestion in the United States," Wikipedia encyclopedia. http://en.wikipedia.org/wiki/traffic_ congestion.