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IMPACT OF MARKET PATRONAGE ON THE TRAFFIC SITUATION IN BENIN METROPOLIS, NIGERIA

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ABSTRACT

This paper examines the influence of market patronage on the traffic situation in Benin City, Nigeria. Nine market routes were studied, and a well-structured questionnaire administered randomly and systematically was used to collect data from 407 respondents. Descriptive and correlation techniques were used to analyse the responses. Most of the markets were found to be situated along transit routes, and operated every day, resulting in street trading and parking which contributed 76.2 percent to the traffic situation in Benin metropolis. It is suggested that traffic laws prohibiting street trading and parking be enacted and enforced. The marketplaces should be restructured to accommodate motor parks, and alternative routes to bypass market areas for non-market trips should be considered as well as the provision of priority lanes for High Occupancy Vehicles (HOV).

Keywords: Benin City; Congestion; Market patronage; Traffic situation; Transit modes

INTRODUCTION

Numerous cities have expanded as a result of their proximity to major transportation corridors owing to the economic, commercial, industrial, educational, and religious purposes they provide (Banerjee et al., 2020; Oyalowo, 2022). This implies that the feasibility, attractiveness, and quality of any location of activity are contingent on the efficiency, accessibility, and adaptability of the transportation system. Thus, transportation might be seen as society's blood vessels, with a failure in one area relegating the other sectors to inefficiency. Carley and Christie (2017), and Osawe and Ojeifo (2019) noted that increasing urbanisation, in conjunction with economic development and globalisation pressures, implies that not only will more people live and work in cities, but also that more people will commute and do business over vast distances. Thus, the unprecedented pace of urbanisation in emerging nations such as Nigeria implies that more people would live, work, and trade in the cities, which may result in increased motorisation and strain on existing modes of transport and infrastructure, as already witnessed in Benin City. Roads serve a variety of purposes; they not only connect houses and places of work, but also connect areas of social, cultural, and economic activities. According to Ikegbunam (2014) and Surya et al (2020), the transportation system integrates the prompt delivery of goods and services, people and various vehicular movements in the delivery of resources spatially. The exchange of services and goods is critical to the economic growth of any country (Osoba, 2012; Wan; 2018), and the intensity of land usage is proportional to the number of trips produced, attracted, or dispersed.

Urban landuse and transportation are symbiotic because landuse creates, attracts, and distributes traffic (Nebel et al., 2021), and transportation is a function of landuse and its intensity (Fasakin, 1999; Okoko, 2002). Consequently, the demand for an effective transportation system by people or commodities is determined by landuse arrangement, urban growth, and pace of urbanisation (Moroke et al., 2019; Okeke et al., 2021). Traffic management difficulties vary in scale and intensity with land use, and are inherently a result of urbanisation issues (Ndikom, 2010). These examples demonstrate the notion that land use patterns and types influence transportation planning techniques, particularly the usage of a marketplace as commercial landuse. Thus, Oduwaye et al. (2011), and O'Flaherty (2018) asserted that when land development along route corridors intensifies, traffic management problems grow more severe. According to Ata et al. (2019) and Afrin and Yodo (2020), traffic congestion occurs when the number of cars on a route increases over time. Additionally, increasing motorisation associated with commercial operations affects traffic flow and exacerbates congestion issues (Ndikom, 2008; Nwaigwe, 2019). Numerous metropolitan centres in Nigeria lack sufficient infrastructure that facilitates urban mobility. This is because the fast development of cities across the globe including Nigeria has effects on both land usage and spatial expansion.

According to Ogunbodede (2006), the commuter distance in Akure rose from 5.2 kilometres in 1966 to 6.4 kilometres in 1976, 10.5 kilometres in 1986, 13 kilometres in 1996, and 19 kilometres in 2006. As a result, increased travel duration affects journey attractiveness, transport charges as well as traffic build-up, particularly in commercial landuse. Notably, modal choice, travel distance, travel frequency and travel time of urban residents are impacts of development patterns (Yu et al., 2019). Travel time and cost as well as the ease with which individuals commute go to and return from workplaces are significant in deciding a city's capability to attract commercial activities or not (Auclair, 1999; Bartle & Chatterjee, 2019). As a result, the expansion of transportation infrastructure has catalyzed the socioeconomic growth of Benin City. This is in addition to its cultural feature and the significance of her monarchical status as well as the seat of Local government and State administrations. Congestion, inadequate parking places, and poor maintenance of access roads are some of the urban transportation problems in Benin metropolis. These are made more complex by frequent visits, market patronage, unauthorised parking, and street trading. This is because parking on roadside verges prevalent on many Nigerian transit routes obstructs traffic and narrows the route width. The deployment of management techniques is an economical traffic solution but the lack of its implementation is regrettable (Litman & Fitzroy, 2011).

Traffic management alleviates traffic congestion and pollution, while also saving fiscal resources on road and parking costs, conserving energy, and providing mobility alternatives for non-drivers. That is, making the greatest possible use of existing transportation infrastructure to reach an acceptable degree of safety and traffic flow optimisation

(Ndikom, 2010), as well as rerouting trip makers when required. Market location and distribution patterns affect traffic flow in Benin City since numerous marketplaces are situated along road corridors. Obe et al. (2017), Hodder (2018), and Audu and Oshewolo (2021) differentiated periodic markets from daily markets. Market occurrence (weekly or daily) in the City of Benin exacerbates existing crowded traffic conditions. A casual examination shows that quantitative attention to conflict and management of high automobile and pedestrian traffic particularly in market areas is insufficient. Thus, with massive traffic concerns like uncoordinated traffic, inadequate traffic management mechanism, and the scarcity of funds apportioned to transport and market facilities, the urgency to study the impact market patronage has on the situation of traffic in Benin metropolis, and develop proactive measures to enhance traffic flow through the market places is crucial.

MATERIALS AND METHODS

The study area

The City of Benin is made-up of Oredo, Ikpoba-Okha, Ovia-North East, Uhunmwonde, and Egor Local Government Areas, and situated at 77.8m above sea level; and found between the latitudes of $06^{0}19'$N and $06^{0}21'$N and the longitudes of $05^{0}34'$E and $05^{0}44'$E. Benin City existed before the colonial era as Benin Kingdom, and has served as the State capital of former Mid-Western and Bendel States, and also the present Edo State. According to Odemerho (1988) and Ajibade (2021), Benin City is underlain by a Miocene-Pleistocene-age sedimentary deposit usually called the Benin formation. This soil nature makes commercial activities and social interaction attractive, practicable and consistent. The study area is found in the humid forest zone of Nigeria with 1,086,882 (NPC, 2006) population, and an estimated increase of 1,837,329 by 2021 (3.5 percent growth rate). March/April to October/November is the rainy season in Benin City, and 'August Break' is a brief dry spell in August. Owing to rural-urban drift, socioeconomic, cultural, religious as well as political benefits, Benin City is rapidly growing. According to Godwin et al. (2011), Aihevba (2019) and Ayo-Odifiri et al. (2021), the massive moat, bronze casting, and abundance of alluring traditions and cultures make Benin City famous and serve as a tourism destination. Many of the physical developments in the heart of Benin developed without careful planning because they grew organically, and this devises a detrimental effect on the cityscape. In Benin (Bini) dialect, the market is referred to as 'Eki'.

Methods

The research elicited data from primary and secondary sources. From Figure 1, Nine (9) markets were studied out of the twenty (20) found in Benin City because of their availability of common service attributes, traffic confluence, regularity, Central Business District (CBD) role, geographic position, and historical and cultural fame. The primary data for this study were gathered using a systematic random sampling method to distribute 407 questionnaires to the road users, and a three-month traffic survey was conducted physically and electronically between 6 am and 6 pm (12 hours) every day to find out the amount of traffic in Benin City. The questionnaire for road users was used to collect data on trip regularity, traffic congestion, and market patronage, and was supported with current and relevant secondary literature data from MDPI, ScienceDirect, Elsevier, Researchgate, and Google Scholar databases. Forty-two (42) field assistants were engaged to administer the questionnaire and measure traffic on the routes leading to the marketplaces being investigated.

The impact of market patronage on the traffic situation in Benin City was examined in this study. It established the relationship between the regularity of trip and market patronage, transit modes and traffic congestion, and marketplace and goods and services patronage as well as the use of private automobile and transportation conditions. Also, the level of patronage of marketplaces, traffic situation and market patronage, and analysis of trip volume in Benin City were considered. Nine markets were studied out of the twenty selected for study based on the availability of common service attributes, locational criteria, regularity, historical and cultural importance, CBD role, and traffic confluence. The data for this research was gathered utilising a structured questionnaire instrument and a systematic random sampling method. Additionally, personal observation and traffic count surveys were conducted. The findings of the surveys were compiled and interpreted using descriptive and correlational analytical techniques which were presented in figures and tables.

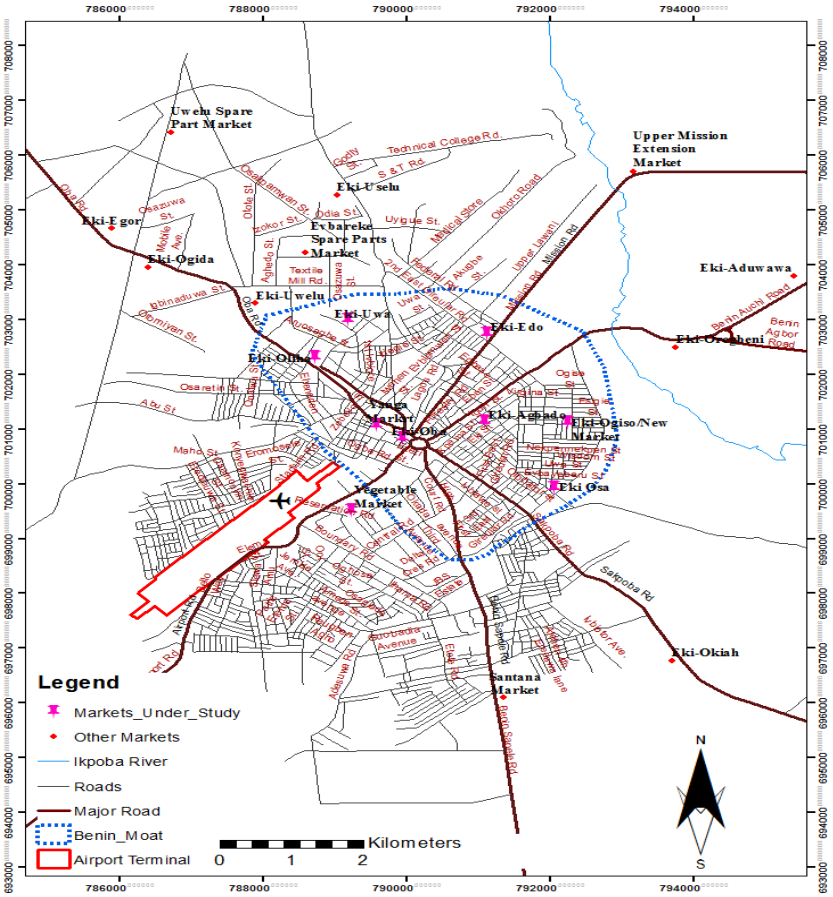


Figure 1: Map showing the road network and market places in Benin City.

Source: Ministry of Lands and Survey Benin City, Edo State.

DISCUSSION OF RESULT

Trip regularity, transit mode, traffic congestion, market patronage, market location, and traffic volume are among the findings presented.

Regularity of trips and market patronage

Table 1 presents the respondents' perspectives on weekly travels. About 39.3 percent indicated they make 7 to 8 journeys weekly on market routes while 36.9 percent said they make 5 to 6 trips. Similarly, 13.8 percent claimed they make more than 9 trips on the market route each week while 10.1 percent reported making 3 to 4 journeys per week. According to the data presented, about 76.2 percent of the respondents commute between above 5 times per week on various market routes, adding to other causal factors of traffic challenges on the market routes in Benin City.

Table 1: Respondents' perception of trip regularity

S/No	Trip regularity	Frequency	Percentage (%)
1.	1- 2 trips	00	0.00
2.	3-4 trips	41	10.00
3.	5-6 trips	150	36.90
4.	7-8 trips	160	39.30
5.	≤ 9 trips	56	13.80
Total		407	100

Transit mode and traffic congestion

Table 2 presents the outcome of the correlation of traffic congestion with the modes of transit in the study area. Spearman's rho and Kendall's Tau tests were used to investigating the relationship between traffic congestion (TRACON), movement of goods (MOVE), traffic impedance (TRAFIM), marketplace (MARP), transit modes (TRAMOD), and use of a private automobile (PRIVAUT) as variables of transit mode and traffic congestion in Benin City.

Table 2: Correlation results between transit modes and congestion of traffic

Traffic Congestion Variables	Spearman Rho Test			
	TRACON	**TRAFIM**	**MARP**	**PRIVAUT**
TRACON	1.000	0.468**	0.404**	0.297**
TRAFIM		1.000	0.338**	0.337**
MARP			1.000	-0.066
PRIVAUT				1.000
		Kendall's Tau Test		
MOVE	0.313**	0.314**	0.048	0.628**
TRAMOD	0.106*	0.140**	0.143**	0.499**

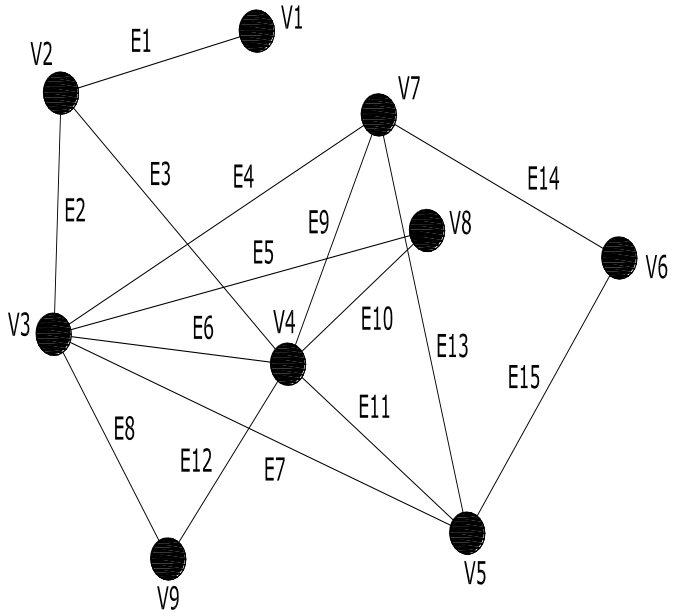
** Correlation is significant at 0.05 Alpha level.

The coefficient of the Spearman rho correlation test (Table 2) between the congestion of traffic and traffic impedance shows statistical significance ($r_s = 0.468$, $p < 0.05$). The effect of this outcome is that traffic flow is impeded by increased congestion level Benin City. Similarly, the correlation between congestion and the location of the market accounted for $r_s = 0.404$, $p<0.05$. The foregoing implies that, wherever commercial activities are situated along route corridors, circulation menace is likely to occur. Additionally, the measurement of the correlation ($r_s = 0.338$) was significant statistically ($P<0.05$) between traffic impedance and marketplace as a possible cause of congestion. It is an indication that the tendency of commercial activities to inhibit circulation flow is when markets are found along transit routes. A statistically significant coefficient of correlation ($r_s = 0.337$, $p<0.05$) existed among traffic impedance and private use of automobiles. This suggests that private use of automobiles could hinder free traffic in the study area.

From the correlation test of Kendall's Tau (ɽ) (Table 2), a strong positive coefficient statistically significant (ɽ = 0.628, n = 407, $p <0.05$) occurred between the movement of goods and the use of private automobile variables. The positive relationship implies that private automobile use increases the movement of goods to and from markets in the study area. Again, a statistically significant positive relationship (ɽ = 0.499, $p<0.05$) was found to exist between the use of private automobiles and transit modes; showing a moderately positive contribution of the use of private automobiles to the operational transit modes in the City of Benin. Observing the statistically significant ($P <0.05$) coefficient (ɽ = 0.314) found between traffic obstruction and movement of goods to and fro marketplaces, reveals that the conveyance method of items to marketplaces may hinder circulation flow mainly if private car services are engaged. A positively weak (ɽ = 0.313) coefficient is statistically significant at $P<0.05$ occurred when traffic congestion correlated with the movement of goods to market areas in Benin City. Therefore, the method of moving goods and services to marketplaces in the study area aggravates the traffic situation on the roads connecting the marketplaces to other activity areas. The above findings cohere with the assertion of Ata et al. (2019) and Afrin and Yodo (2020) that traffic congestion occurs when the number of cars on a route increases over time.

Location of market and patronage of services and goods

The normal distance a potential buyer is ready to undertake to consume a commodity is the range of services and goods (Omole 2005). The Shimbel connectivity matrix (Table 3) was used to calculate the distance between the marketplaces surveyed for this study. This indicates that at the Oba Ovoranmwen Square (Ring road) where the Oba palace is located, Eki-Oba and Yanga markets closest to traders were located 189m apart. The study revealed that the location and arrangement of Eki-Oba and Yanga market conform to the hexagonal principle (central place theory) of Walter Christallar (1933). This implies that each of these markets serves six other markets (Figure 2). The other seven (7) remaining markets of the nine (9) selected for this research do not adapt owning to the intervening opportunities they offer that break the hierarchical principles among them.



Edge	Road	Vertex	Market
E_1	Television	V_1	Eki-Uwa
E_2	Siluko	V_2	Eki-Oliha
E_3	Ekenwan	V_3	Yanga
E_4	Mission	V_4	Eki-Oba
E_5	Akpakpava	V_5	Eki-Osa
E_6	Ekenwan	V_6	Eki-Ogiso
E_7	Sakpomba	V_7	Eki-Edo
E_8	Airport	V_8	Eki-Agbado
E_9	Mission	V_9	Vegetable
E_{10}	Akpakpava		
E_{11}	Sakpomba		
E_{12}	Airport		
E_{13}	Murtala Muhammed Way		
E_{14}	New Lagos		
E_{15}	2nd East Circular		

Figure 2: graph analysis of the road network connecting the markets in Benin City

Table 3: Shimbel binary connectivity matrix (one step or direct link)

Edge Node	1	2	3	4	5	6	7	8	9	Total Nodes (Indices)
1. Eki-Uwa	0	1	-	-	-	-	-	-	-	1
2. Eki-Oliha	1	0	1	1	-	-	-	-	-	3
3. Yanga Market	-	1	0	1	1	-	1	1	1	**6***
4. Eki-Oba	-	1	1	0	1	-	1	1	1	**6***
5. Eki-Osa	-	-	1	1	0	1	1	-	-	4
6. Eki-Ogiso	-	-	-	-	1	0	1	-	-	2
7. Eki-Edo	-	-	1	1	1	1	0	-	-	4
8. Eki-Agbado	-	-	1	1	-	-	-	0	-	2
9. Vegetable Market	-	-	1	1	-	-	-	-	0	2

Sum = 18

Some of the journeys are redundant because matrix is seldom involved with how a place is self-linked, hence the diagonal of the single origin-destination trips were coded zero (0) (Table 3). Two (2) steps at least, are needed to come-back to the start-point, as a result, no trip on the diagonal was coded one (1). In the matrix, one signifies a step or shortest connection, and the non-diagonals cells are coded null. Typically, in a situation where demand exceeds supply for a road space level of service, traffic congestion suggestively occurs (Ajala, 2019; Shen et al., 2020); therefore, it is not in what way to eliminate congestion but by what method to prevent its extreme occurrence. Congestion is characterised by a condition at which it is difficult for motorists to move at allowable acceleration since they are likely to be inhibited by the existence of other motorists. When average speed reduces with increased interaction, transit routes become overcrowded, and conditions of traffic flow unstable. Drivers, then, opt for alternative roads to reach their destination faster than simply queuing.

This choice of route is reasonably considered relative to the availability of road connections and the acquaintance of drivers with the linkage. With this reality, easy connectivity of the selected markets is greatly enhanced to increase the patronage expected in the markets. More so, traffic congestion levels would be reduced on the market routes as soon as adequate traffic management strategies are adopted, and connectivity improves in the metropolis. Hence, the completeness of a specified network has a direct bearing on traffic circulation within the network.

Use of private automobiles and traffic condition

Passenger Car Units (PCU) is used as a factor employed to convert the capacity of different vehicles into an equivalent traffic value using passenger car as reference vehicle (Raj, 2019). In the same vein, Shalini and Kumar (2014), and Sharma and Biswas (2021) used PCU to calculate the impact of a transport mode on the variables of traffic (headway, speed, and density) associated with a standard passenger car. This exposes the volume of passenger cars that are displaced by other respective modes under prevailing roadways and conditions. PCU is adopted for diverse types of vehicles and presents varied degrees of interruption with other traffic (Kadiyali, 2011); it is essential, therefore, to collate all the vehicle types as a unit. Flow is expressed as passenger car unit per hour or per day, consequently, Adams, Zambang and Opoku-Boahen (2014) reported that flow is the vehicular volume through a road section per unit of time.

The following PCU values for the individual type of vehicle were adopted (Kadiyali, 2011; Osoba, 2012; Parvathy et al., 2013):

i.	Motorcycle or Scooter	0.50
ii.	Pedal Cycles	0.33
iii.	Passenger Car, or Pick-up Van	1.00
iv.	Light-weight Commercial Vehicles	1.50
v.	Buses	3.00
vi.	Trucks, Trailer, Agricultural Tractors	4.50
vii.	Cycle Rickshaw	2.00
viii.	Hand Cart	3.00
ix.	Horse-Drawn Vehicle	4.00
x.	Bullock Cart	8.00

Furthermore, from Table 4, the average daily traffic volume measured in PCU per route (179,167) in Benin was highest along the Oba market road with 34,909 passenger cars, closely followed by New Lagos road (34,543), 32,387 on Akpakpava road and 30,254 on 3rd East Circular road. This affirms the traffic situation in Benin City as well as indicates an implication of traffic congestion along these routes. Thus, it suggests that the increased use of private vehicles exacerbates the traffic challenges being experienced in Benin City. For that reason, sufficient and cautious traffic control measures are essential to carefully alleviate the emerging trend of traffic challenges in Benin metropolis.

Table 4: average daily traffic volume per PCU per route

S/No	Route	Station Point	Traffic Volume in PCU Equivalence			
			Cars (1)	Buses (3)	Trucks (4.5)	Total
1.	West Circular	Baptist School	4,012	3,015	194	7,221
2.	Siluko	T.V. Junction	3,207	14,376	576	18,159
3.	Oba market	Yanga Market	5,237	29,307	365	34,909
4.	3rd East Circular	I.C.C.	5,571	23,076	1,607	30,254
5.	2nd East Circular	Ogiso	2,556	1,359	41	3,956
6.	New Lagos	Lawani Junction	6,116	27,504	923	34,543
7.	Akpakpava	Eguadase Junction	10,158	19,488	2,741	32,387
8.	Airport	The Observer Junction	7,358	9,921	459	17,738
	Total		**44,215**	**128,046**	**6,906**	**179,167**

Source: Author's Fieldwork, 2021

Although security and early arrival at desired destination remain important aspects considered in a successful journey, ineffective means of movement and poor infrastructure have affected traffic flow, patronage, and market viability. Where these issues abound, traffic menace is likely to develop, particularly if the primary operational transport capacity is limited.

Level of market patronage

From the 407 respondents in Table 5, 63.1% said most of the markets are held daily while 19.9% said they hold every 3 days. Furthermore, 14.5% patronise the markets every 5 days while 2.5% said once a week.

Table 5: Regularity of the markets

Periodicity of the Markets	Frequency	Percent
Once a Week	10	2.5
Every 5 Days	59	14.5
Every 3 Days	81	19.9
Daily	257	63.1
Total	407	100.0

Source: Author's Fieldwork, 2021

There is, therefore, an overwhelming belief that a higher number of traders patronise the markets almost on daily basis. The frequency of market patrons as a result of daily market patronage could exacerbate traffic challenges along the market routes in Benin metropolis, thus hindering other motorists and commuters whose destinations are not the marketplaces.

Market patronage and traffic situation

Table 6 reports the perception of the extent to which traffic is induced by the patronage of market centres in the City of Benin. A 5-point scale was used to rank the responses where 5 indicates very high consent and 1 very low consent. Consequently, an $\bar{x} \geq 3.0$ is considered an acceptable mean score of positive observation but where the mean score is $\bar{x} < 3.0$, the weighted score is assumed to be a negative observation. From the findings, the main influential determinants are decided by scores higher than the average benchmark value of 3.00. Based on the above assumption, therefore, traffic impedance on roads ($\bar{x} = 3.77$; $\sigma = 10.12$) took preference over others. This reveals that the market is a key factor influencing traffic impedance on roads in Benin metropolis. Others were regularity of traffic congestion on market routes ($\bar{x} = 3.33$; $\sigma = 12.89$), the contribution of the market location to the regularity of traffic congestion ($\bar{x} = 3.33$; $\sigma = 15.45$), level of traffic congestion ($\bar{x} = 3.26$; $\sigma = 14.39$), and regularity of market ($\bar{x} = 3.23$; $\sigma = 13.01$).

Table 6: Market patronage and traffic congestion in Benin metropolis

S/No	Level of market patronage-induced traffic	Weighted sum (Σ)	Weighted mean ($\bar{x}$)	Standard Deviation (σ)	Decision
1.	market relocation to ease traffic	1273	3.13	1.155	Significant
2.	regularity of traffic congestion on market routes	1356	3.33	1.289	Significant
3.	the traffic situation on market routes	1260	3.10	1.574	Significant
4.	traffic impedance on roads	1535	3.77	1.012	Significant
5.	level of traffic congestion	1328	3.26	1.439	Significant
6.	contribution of the market location to the regularity of traffic congestion	1354	3.33	1.545	Significant
7.	regularity of market	1313	3.23	1.301	Significant

Note: VH= Very High (5), H= High (4), A= Average (3), L= Low (2), VL= Very Low (1)

From the foregoing, the results above agree with similar surveys on market patronage and traffic congestion by Omisore and Akande (2009), Ajala (2019), Qi et al. (2019), and Shen et al. (2020) who affirmed that the location and regular patronage of market exacerbates traffic situation. Ayo-Odifiri et al. (2017) emphasised that the location of the market and its patronage, traffic volume, street trading and parking are some grave causes that hinder the movement of vehicles where the markets are situated but the choice of alternative access as well as the application of traffic management techniques could ease the inhibitions.

Analysis of traffic volume in Benin City

Table 7 shows that traffic volume on the roads to marketplaces in the study area was high in at evening with 90.4%, market days (62.2%), and morning (55.3%) while 39.6% said traffic volume was very high in the morning. Similarly, 59.2% of respondents reported average traffic volume in the afternoon and 49.1% throughout the day. However, 40.8% opined that traffic volume was fairly high in the afternoon in Benin City. The above analysis implies the high volume of traffic in the morning, evening and market days as well as throughout the day along market routes substantiates the existence of traffic problems experienced daily in Benin City.

Table 7: Periods of High Traffic Volume in Benin Metropolis

Level/ Period of Traffic	Morning		Afternoon		Evening		Market Days		All Day	
	F	%	F	%	F	%	F	%	F	%
Very High	161	39.6	0	0.0	39	9.6	154	37.8	191	46.9
High	225	55.3	0	0.0	368	90.4	253	62.2	16	3.9
Average	21	5.2	241	59.2	0	0.0	0	0.0	200	49.1
Fairly High	0	0.0	166	40.8	0	0.0	0	0.0	0	0.0
Low	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	407	100.0	407	100.0	407	100.0	407	100.0	407	100.0

Source: Author's Fieldwork, 2021

CONCLUSION AND POLICY GUIDELINES

The traffic situation in metropolitan areas contributes to infrastructure and socioeconomic decay and ineffectuality if not addressed timely and adequately. It is a noticeable impedance to spatial interaction and commerce in the urban precinct. This study looked at the impact of market patronage on the traffic situation in Benin City. It verified the impact of trip regularity, transit mode, traffic congestion, market patronage, market location, and traffic volume. Based on the availability of common service attributes, locational criteria, regularity, historical and cultural importance, CBD role, and traffic confluence, nine markets were assessed of the twenty selected. A structured survey questionnaire was used to elicit information for this research using a systematic random sampling approach. Data were also collected through personal observation and a traffic count survey. The data collected was analysed descriptively and in correlation were reported in figures and tables. Most of the markets were found to be situated along transit routes, and operated every day, resulting in street trading and parking which exacerbates the traffic situation in Benin metropolis.

A marketplace is considered the growth pole where physical development revolves, consequently, the demand for feasible and resilient thoughts to prevent traffic-flow clogs on transit

routes and leap-frog development, and drive an aesthetically pleasing environment is obligatory. Therefore, the following are recommended to improve market patronage, modal choice, traffic flow, and interaction along market areas in Benin City.

i. Urban planning 'plug-in technique' should be adopted to accommodate motor parks, and address street parking and trading at market centres;
ii. Existing street graphics and street furniture should be maintained regularly, and parking fees to constraint use of private automobiles be implemented at peak hours on market routes;
iii. Non-market trips should be rerouted;
iv. The provision and enforcement of priority lanes for High Occupancy Vehicles (HOV) is suggested to reduce the volume of small passenger vehicles on intra-city roads; and
v. A robust legislative and judicial framework for traffic regulations prohibiting street trading and parking be enacted and enforced to prosecute violators.

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COMPETING INTERESTS
No competing interest is declared.

REFERENCES

Afrin, T., & Yodo, N. (2020). A survey of road traffic congestion measures towards a sustainable and resilient transportation system. *Sustainability*, *12*(11), 4660.

Aihevba, P. O. (2019). The dramatic memorialisation of significant historical landmarks in African festivals. A close examination of the coronation of the 40th Oba of Benin. *International Review of Humanities Studies*, *4*(1).

Ajala, A. R. T. (2019). Analysis of traffic congestion on major urban roads in Nigeria. *Journal of Digital Innovations & Contemporary Research in Science, Engineering & Technology*, *7*(3), 1-10.

Ajibade, F. O., Olajire, O. O., Ajibade, T. F., Fadugba, O. G., Idowu, T. E., Adelodun, B., ... & Pham, Q. B. (2021). Groundwater potential assessment as a preliminary step to solving water scarcity challenges in Ekpoma, Edo State, Nigeria. *Acta Geophysica*, *69*(4), 1367-1381.

Ata, A., Khan, M. A., Abbas, S., Ahmad, G., & Fatima, A. (2019). Modelling smart road traffic congestion control system using machine learning techniques. *Neural Network World*, *29*(2), 99-110.

Auclair, C. (1999). *Measures of travel time in Cities.* Urban Age Spring 1999, World Bank.

Audu, M., & Oshewolo, R. (2021). Nigeria up to 1914: Some emerging political and economic issues. In *Nigerian Politics* (pp. 25-35). Springer, Cham.

Ayo-Odifiri, O. S., Alasa, O. A, Ogoh, N., Obajina, T. O., & Rosemary Chinonye Emeana, C. R. (2021). Traffic Management Concept of Sustainable City Development in Nigeria. *International Journal of Research and Innovation in Social Science (IJRISS)*, 5(7), 83-89.

Ayo-Odifiri, O. S, Fasakin, J. O., & Henshaw, F. O. (2017). Road connectivity approach to eased traffic congestion on market roads in Benin Metropolis, Nigeria. *American Journal of Engineering Research (AJER)*, 6 (6), 41-48.

Banerjee, A., Duflo, E., & Qian, N. (2020). On the road: Access to transportation infrastructure and economic growth in China. *Journal of Development Economics*, *145*, 102442.

Bartle, C., & Chatterjee, K. (2019). Employer perceptions of the business benefits of sustainable transport: A case study of peri-urban employment areas in South West England. *Transportation Research Part A: Policy and Practice*, *126*, 297-313.

Carley, M., & Christie, I. (2017). *Managing sustainable development*. Routledge.

Fasakin, J. O. (1999). The operational characteristic of commercial motorcycles in urban Nigeria: a bilateral analysis of a mega city experience and a township situation. *Journal of Urban and Environmental Research, Federal University of Technology, Akure*, 1(1):1-18.

Godwin, O.A., Peter, A.O.O. and Alex, E. U. (2011). Changing rainfall and anthropogenic-induced flooding: impacts and adaptation strategies in Benin City, Nigeria. *Journal of Geography and Regional Planning*, 4(1):42-52.

Hodder, B. W. (2018). Periodic and daily markets in West Africa. In *The development of indigenous trade and markets in West Africa* (pp. 347-358). Routledge.

Ikegbunam, F. I. (2014). Onitsha urban road transport ystem: implications for urban transport planning. *International Journal of Applied Science and Technology*, *4*(4), 250-256.

Kadiyali, L. R. (2011). *Traffic enginerring and transport planning.* New Delhi: Khanna Publishers.

Kopp, A., Block, R. I. and Iimi, A. (2013). Turning the right corner: ensuring development through a low-carbon transport sector. Directions in development: environment and sustainable development. *World Bank*, Washington DC, USA. 181. Retrieved January 18, 2018 from http://documents.worldbank.org/curated/en/2013/01/17782806/turning-right-corner-ensuringdevelopment-through-low-carbon-transport-sector.

Litman, T. and Fitzroy, S. (2011). *Safe travels: evaluating mobility management traffic safety impacts.* Retrieved June 26, 2013 from http://www.vpti.org.

Moroke, T., Schoeman, C., & Schoeman, I. (2019). Developing a neighbourhood sustainability assessment model: An approach to sustainable urban development. *Sustainable Cities and Society*, *48*, 101433.

Ndikom, O. B. (2008), Harnessing Nigerian cabotage law for grass root development of costal and Niger Delta region. *Journal of applied education and vocational Research*, 5(2).

Ndikom, O. B. C. (2010). *Elements of Transport Management.* Nigeria: Bunmico Publishers.

NPC (2006) National Population Commission, provisional census figure of Nigeria.

Nwaigwe, D. N., Amiara, C. A., Okwunze, C. F., & Egege, C. C. (2019). Analytical Study of Causes, Effects and Remedies of Traffic Congestion in Nigeria: Case Study of Lagos State.

Obe, O. J., Omole, F. K., Okosun, S. E., Ayo-Odifiri, O. S., & Omokhafe, C. O. (2017). Assessment of Urban Market Renewal Projects on the Development of Akure, Nigeria. *Assessment*, *9*(4).

Odemerho, F. O. (1988). "Benin City: a case study of urban flood problems.," in *Environmental issues and management in Nigerian development*, Sada, P. O. and Odemerho, F. O., Eds., Ibadan: Evans brothres.

Oduwaye, L., Alade, W. and Adekunle, S. (2011). *Landuse and traffic pattern along Lagos- Badagry corridor, Lagos, Nigeria* (reviewed paper) proceedings of Real Cord 2011 Tagungsband. Edited by Marked Schrenk, Vasily Popovich, and Peter Zeile 525-530.

O'Flaherty, C. A. (Ed.). (2018). *Transport planning and traffic engineering*. CRC Press.

Ogunbodede, E. F. (2010). *Assessment of traffic congestion in Akure, Nigeria using GIS approach: lesson and challenges for urban sustenance.* Retrieved December 20, 2011 from http://download.sue-mot.org/Conference-2007/Papers/Ogunbodede.pdf.

Okeke, F. O., Gyoh, L., & Echendu, F. I. (2021). Impact of land use morphology on urban transportation. *Civil engineering journal*, *7*(10), 1753-1773.

Okoko, E. (2002). Some factors influencing on-street parking in Ikare-Akoko, Ondo State, Nigeria. *International Journal of Social Science and Policy Issues.* 1(1):202-207.

Osawe, A. I., & Ojeifo, M. O. (2019). Unregulated Urbanization and challenge of environmental security in Africa. *World Journal of Innovative Research (WJIR)*, *6*(4), 1-10.

Osoba, S. B. (2012). Appraisal of parking problems and traffic management measures in central business district in Lagos Nigeria. *Journal of Sustainable Development.* 5(8):105-115.

Oyalowo, B. (2022). Implications of urban expansion: land, planning and housing in Lagos. *Buildings and Cities*, *3*(1).

Parvathy, R., Sreelatha, T., & Koshy, R. Z. (2013). Development of new pcu values and effects of length of passenger cars on pcu. *International Journal of Innovative Research in Science, Engineering and Technology*, *2*(1), 344-351.

Raj, P., Sivagnanasundaram, K., Asaithambi, G., & Ravi Shankar, A. U. (2019). Review of methods for estimation of passenger car unit values of vehicles. *Journal of Transportation Engineering, Part A: Systems*, *145*(6), 04019019.

Sharma, M., & Biswas, S. (2021). Estimation of Passenger Car Unit on urban roads: A literature review. *International journal of transportation science and technology*, *10*(3), 283-298.

Shen, T., Hong, Y., Thompson, M. M., Liu, J., Huo, X., & Wu, L. (2020). How does parking availability interplay with the land use and affect traffic congestion in urban areas? The case study of Xi'an, China. *Sustainable Cities and Society*, *57*, 102126.

Wan, C., Yang, Z., Zhang, D., Yan, X., & Fan, S. (2018). Resilience in transportation systems: a systematic review and future directions. *Transport reviews*, *38*(4), 479-498.

Yu, L., Xie, B., & Chan, E. H. (2019). Exploring impacts of the built environment on transit travel: Distance, time and mode choice, for urban villages in Shenzhen, China. *Transportation research part E: logistics and transportation review*, *132*, 57-71.