

## Research Article

### ACCESSIBILITY FACTOR IN THE PATRONAGE OF MARKETS IN BENIN CITY, NIGERIA

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#### ABSTRACT

**Aim:** To examine accessibility as a factor in the patronage of markets in Benin City, Nigeria. **Study design:** Quantitative research –case study social survey. **Place and Duration of Study:** In Benin City, Nigeria between March 2017 and November 2021. **Methodology:** Geographic location, market regularity (daily or weekly), culture and historic relevance, CBD function, traffic confluence criterion, and homogeneity of service attributes were reasons why 9 markets were surveyed out of the 20 marketplaces identified in Benin City. For the shifty nature and the infinite population of the traders, 407 respondents (traders) were purposively sampled and the questionnaire was administered by 36 field assistants between 12.00pm and 2.00pm. Collected data were analysed at descriptive and bivariate levels with SPSS-25, and results were presented in graphs, tables and matrices. Spearman Rho and Kendall's Tau tests confirmed the relationship between market accessibility and patronage. The Graph theoretical analysis explained the extent to which the markets were connected, accessed, and patronised. **Results:** Mini-buses with 48.40% and private automobiles 33.2% were the most patronised travel modes, and alternative access to market places ( $\bar{x} = 3.38$ ;  $\sigma = 13.91$ ) was the most influential factor for market patronage. Correlation coefficient ( $r=0.955$ ,  $p<0.05$ ,  $n=407$ ) existed among market accessibility and traders population in the market. This reveals that the level of markets' accessibility reflects their level of patronage. The index of 10 shows that Yanga Market and Eki-Oba were most connected, accessed, and patronised. **Conclusion:** Market patronage and productivity are based on accessibility and satisfaction of traders with location hence, Yanga Market and Eki-Oba were most connected, accessed, and patronised. The study advises on alternative routes, especially for non-market destination trips. The investigation and in-depth presentation of evidence on topical issues concerning market accessibility and patronage would help academicson similar information to advance research frontiers. The outcome offers vital insights for city planners, policymakers, and managers.

**Keywords:** Accessibility, Market patronage, Marketplace (Eki), Road network, Benin City.

#### INTRODUCTION

According to Surya *et al* (2020) and Ikegbunam (2014), the movement of persons, materials, services and commodities from one location to another makes the distribution of resources spatially possible by the transportation system. Movement and exchange of services and commodities are intimately linked to contemporary life (Barceló, 2019; Gupta *et al.*, 2018) owing to their multifaceted roles, the certainty of contact, and dynamic structure. Consequently, Okoko and Fasakin (2007) observed that the quality of people's economy and social inclination relies on efficient, comprehensive, and coordinated multimodal transportation infrastructure capable of facilitating the delivery of services and products. Road infrastructure has been considered as the blood-streams of social interaction and civilisation (Müller, 2021; Ayo-Odifiri *et al.*, 2017; Sarkar, 2013) hence, road connection at intra- and inter-regional levels amplify economic success. On the account of Denpaiboon *et al.*, (2018) and Oyesiku (2002), the forms and patterns of infrastructure distribution that promote accessible, healthy, convenient, and orderly use of land are consequences of the rights to land and land-use techniques. This indicates that efficient regulation of urban land use and public activities are significant to deciding land use and transportation concerns. Karner (2018) and Rodrigue (2013) reported that the perception of accessibility is a twofold concept of 'location', that estimates 'space' in terms of transportation infrastructure with referential attributes like population and economic activities; and the 'distance' consequent on physical space between positions. That is why distance only exists where there is a linkage of two locations

through an accessible route. Accessibility which could therefore be considered a traffic control measure describes the level of interaction among people, the relationship between people and places of activities as well as makes the activities reachable and useable. Therefore, a traffic approach that would organise transport, protect vulnerable road users, optimise existing transportation infrastructure for safety, and easy access and flow as well as rerouting as required (Darvishan & Lim, 2021) without necessary meddling with the physical environment. On this premise, Wang *et al.* (2018), and Litman and Fitzroy (2011) argued that the control measures are economical, safe, and strategic, but lament their infrequent use. Particularly, this is to improve arrival time, reduce traffic hitches, save money and space on roads and parking, save energy, reduce emissions as well as enhance mobility choices for non-motorised transport. Dominique-Ferreira (2021) and Adeagbo (2004) asserted in the evaluation of accessibility that regardless of whether a market is traditional or contemporary, traffic and parking issues in urban markets play an important part in the socio-economic development of a society. According to the study, the market is fundamental to the development of any community, and the ease of use of an appropriate and suitable site for trading as and access to these activity centres are key factors. This would certainly enhance traffic flow and interaction efficiency. Thus, Greenwald (2019) and Rajesh (2019) advocated for a short-term plan Transportation System Management (TSM) that takes full advantage of existing transit infrastructure, services, and modes. TSM is a set of deliberate activities intended to cause changes in the demand-supply equilibrium of the diverse modes of transportation. This measure safeguards pedestrians, and without doubt promotes the usage of para-transit options (Fasakin, 2000), and encourages the choice of alternative routes. Conversely, Transportation Demand Management (TDM) idea seeks to reduce traffic situations using a variety of techniques that include carpooling, ride-sharing, and bus priority

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(Wang *et al.*, 2022; Okoko, 2006). Stressing further, Luo *et al.*, (2021), and Hasnine and Habib (2020) reported TDM as an intervention aimed at modifying travel choices to achieve more desired transport, socioeconomic, and environmental goals but curtailing negative travel effects. That means, it is strategic to improve access to centres of activities like the marketplaces and transport infrastructure. TDM is an intervention to the continuing large-scale supply of road infrastructure to improve efficient transportation, environmental attractiveness, social justice, and effective use of existing infrastructure. Some contemporary ways to manage the movement of people include road pricing, fuel taxes, mass transit intervention, and traffic regulation laws (Rode, 2019; Ndikom, 2010; Ohieagbunem, 2007), and also transport policies for operational accessibility. Others are traffic segregation and restriction, one-way scheme, bus priority, parking strategy, and options of land use that provide for alternate access. Human settlement is seen as a naturally diverse, yet interdependent system. A key component of the system is the marketplace affected significantly by variables such as accessibility, mode of transportation, socioeconomic status of the traders, distance, location, and variety of products (Qi *et al.*, 2019; Omole, 2009). For this reason, urban land uses particularly for commercial uses such as market centres require sufficient, convenient, and efficient transportation infrastructure as well as viable access. Mehta (2019) and Ojo (1966) opined that the marketplace serves as the focal point for commercial activities in any community and a source of appeal, particularly in residential land use. Consequently, establishing road connections to ease access to these market locations would be quite inexpensive and would save vital man-hours for urban growth and development. Urban growth is influenced by the availability of a suitable and appropriate site for trade operations as well as closeness to centres of activity. According to Zhong (2020), Mehta (2019) and Adeagbo (2004), market centres offer an everyday occasion for interactions, and in addition to the economic benefits, it serves a social role and focal point for the community, a gathering place as well as contributing to environmental well-being. In ancient and contemporary times, a network of the road as transportation means has an essential role in modernisation, sustainable development, and everyday activities (Dai & Menhas, 2020; Wan *et al.*, 2018). Oviedo *et al.*, (2019) and Rogers (2003) noted that a high-quality road network improves access to activity spaces, national economic development, decreases travel times and costs, and makes areas more economically desirable. Omole (2009) emphasised that market centres are significant to people's social, cultural, religious, economic, and political lives. Despite the dearth of attention on the patronage of market centres and its development since the independence of Nigeria, it yet fosters integration between production economies and consumption platforms. Socio-culturally, there is a notion that as soon as knowledge is distributed in a marketplace, it is easily disseminated across the town by market customers. Similarly, traditional market areas serve as social hubs for activities such as courting, visits, idea exchange, drumming and dancing, reunions, and celebrations (Kluevankova *et al.*, 2021; Akanle & Omotayo, 2020; Anthonia, 1973), and the trading of goods and service which accessibility tends to facilitate. Additionally, a marketplace promotes economic, cultural, and socio-political cohesiveness in support of social growth. Historically, many old Oba (King) palaces were situated near market areas because of the sacred nature of marketplaces. Moreso, the religious significance of market centres particularly among the Binis cannot be overstated. According to oral tradition, many market locations in Bini were designated holy sites for a variety of festivities, sacrifices and ceremonies, and were given associated traditional names (Ayo-Odifiri, 2017). Expectedly, a place where the gods and spirits are appeased and thought to congregate as well as dwell on trees at the market arena. However, as much as the Bin orthodox tradition

identifies the significance of a marketplace, so were the early Christian and Moslem missionaries using the market centres as a location for evangelism due to her large population. Abaka and Kumasenu (2021), Oduntan (2021), and Olorunfemi (1999) confirmed the oral story that the earliest church in Badagry, Nigeria was constructed between two public marketplaces and that the major mosque in Akure is situated opposite Oja-Oba. In a similar vein, Ayo-Odifiri, (2017) reported that Auchi central mosque is situated within the premises of Ughiele market, while the Baptist Church in Benin City is situated near Eki-Oliha. Activities of commerce such as selling and purchasing are substantial attractors and distributors of traffic with a preference for road corridors to ease access. Benin City's well-developed road network (Ayo-Odifiri, 2017) presents a variety of transportation challenges notably, traffic conflict and impedance at locations of trading activities. Several markets are located in areas of historical and cultural importance, and these contribute to the large volume of traffic around them. Access to and through market areas, market patronage and their distribution pattern impact traffic flow in the City of Benin because many of the markets hold transit corridors. Kithuka (2019), Aithal (2018), Ikechukwu and Innocent (2018) and Eben-Saleh (1999) distinguished between daily and periodic markets. In particular, the regularity of the markets (daily or weekly) aggravates the already congested traffic situation in the study locale. A cursory observation points out the inadequacy of literature and empirical study on accessibility as a factor in market patronage especially in ancient urban areas like Benin City, Nigeria. For that reason, traffic conflict between automobiles and pedestrians around market locations due to on-street trading and parking, sizable traffic issues, paucity of intra-city transport policies and traffic control mechanism, and scarcity of budgetary provision and allocation of resources to transport and market infrastructure has become intolerable. It has become exigent to empirically examine issues of market accessibility and patronage, offer practical actions for viable travel patterns to and through market locations, and eased the traffic situation in Benin. This paper surveys accessibility as a factor in the patronage of markets in Benin City, Nigeria.

## MATERIAL AND METHODS

### Study Locale

Benin City is situated between 06°19'N and 06°21'N latitudes, and 05°34'E and 05°44'E longitudes at a height of 77.8m above sea level. It is a pre-colonial urban area located in the southern part of Nigeria and has served as the capital of the then Mid-Western and Bendel States, and present-day Edo State. Benin is in the tropical-rainforest region with 1,086,882 (NPC, 2006) people, and a 3.5 percent growth rate estimated projection of 1,837,329 by 2021. Apart from the population shifts, Benin City has seen significant growth as a result of rural-urban migration, and tourists' attraction to the bronze casting and vast Benin moat. Additionally, many physical developments across the length and breadth of the City violates town planning rules (Agheyisi & Aghedo, 2021) especially outside the city-core, and perhaps because the city grew organically. 'Edo' refers to the geographical, linguistic setting of Bini, dialect, language, and people. The people of Bini Kingdom refer to themselves as 'Oviedo' or 'Ovioba', and the marketplace is called 'Eki'

### Methods

This study analyses the transportation modes, the connection of roads linking the marketplaces, the market's accessibility, and market patronage in Benin City. As a result, data were collected on the connection and accessibility of roads to marketplaces, level of market patronage, and available modes of transportation. On account of

geographic location, market regularity (daily or weekly), culture and historic relevance, CBD function, traffic confluence criterion, and homogeneity of service attributes nine (9) markets (45%) were chosen and surveyed from the twenty (20) marketplaces identified in the City of Benin. For the shifty nature of some market patrons (sellers and buyers) and their infinite population, purposive sampling techniques was adopted to administer a close-ended questionnaire to elicit information from traders in the selected market centres. Meanwhile, since the shifty nature of traders on daily patronage in all the selected markets makes the population unpredictable, a decision on sample size from an infinite population as suggested by Frontend and William(2009), and also emphasised and used by Bello and Omoh (2018)is adopted in this research thus:

$$n = \frac{(Z_{\alpha/2})^2 PQ}{e^2} \dots \dots \dots (1)$$

- P = Positive probability response(0.7)
- Q = Negative probability response (0.3)
- Z<sub>α/2</sub> = 1.96 from the critical table Z of 0.05 under infinity (∞)
- e = Error tolerable (0.05)
- α = Level of significance (0.05)
- n = Sample size

Substituting the values into equation 1, 323 was calculated as the a sample size (n);

$$n = \frac{(1.96)^2 (0.7) (0.3)}{(0.05)^2}$$

$$n = \frac{(3.8416) (0.7) (0.3)}{(0.0025)}$$

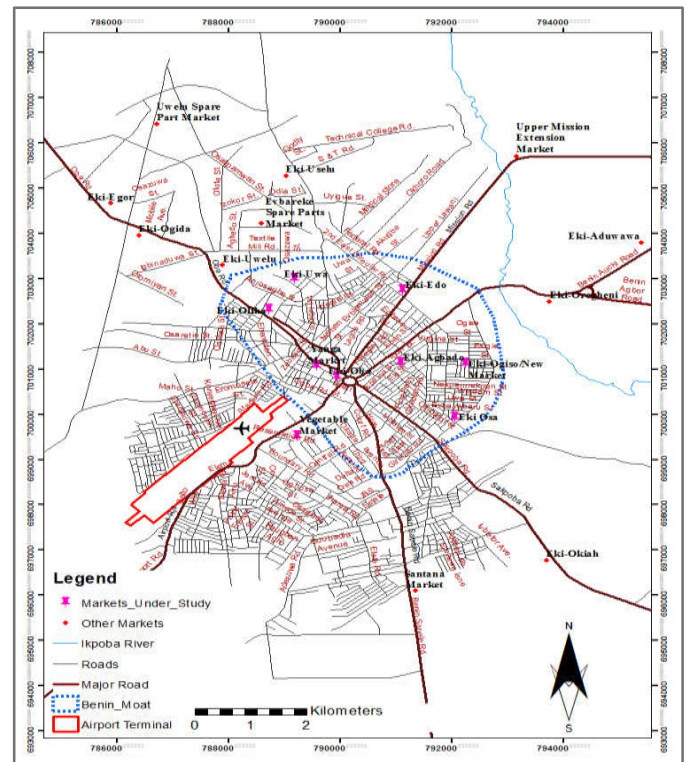
$$n = 323$$

The calculation indicates that as a result of the infinite population, 323 respondents were considered to be logically adequate minimum sample size. Consequently, this study sampled 407 (5% of the number of stalls per selected market) respondents. This coheres with the report of Fasakin (2000) that it is unsafe to use a severely confined statistical formula to obtain a sample size and proportion for a flexible association of a study population. As said, because of some sellers without fixed selling spots, and also difficult to differentiate customers in many cases, the actual number of traders in the market was unable to be ascertained. For this study, therefore, the number of stalls was used to identify sellers authorized to occupy stalls in the market. Data were collected at specified locations and times to ensure that the researcher reached the intended respondents. The questionnaires were distributed to traders in the afternoon (between 12.00pm and 2.00pm) when many had settled down for their daily activities. A total of 36 field assistants were engaged for this survey, and 4 field assistants were attached to each of the 9 selected markets. The survey data gathered were analysed at descriptive and bivariate levels with Statistical Package for Social Sciences(SPSS-25) and Microsoft excel 13, and the results were presented in a descriptive graph, tables and matrix. The correlation analysis was conducted using Spearman Rho and Kendall's Tau tests to confirm the relationship between accessibility to market and market patronage variables in the study area. To validate this relationship a hypothesis was formulated that is, there is no relationship between market accessibility factors and market patronage in Benin City.

**Table 1. Sample size determination and questionnaire administration**

3	Eki-Oba	Oba Market	2,240	112
4	Eki-Edo	New Lagos	1,720	86
5	Vegetable Market	Airport	140	7
6	Eki-Ogiso	2 <sup>nd</sup> East Circular	320	16
7	Eki-Osa	2 <sup>nd</sup> /3 <sup>rd</sup> East Circular (M. M. Way)	760	38
8	Eki-Agbado	Akpakpava	840	42
9	Eki-Uwa	West Circular (Television)	400	20
<b>Total</b>			<b>8,140</b>	<b>407</b>

Furthermore, the roads and places of market are represented with their Bini traditional names as shown in Figure 1. To explain inter-and intra-market connections, road connectivity, accessibility, patronage and distance-matrix indices were simulated and examined. The route plan was changed to a line diagram independent of the width, standard, or quality of the road. Thereafter, Graph-theoretic analysis was conducted to find the extent to which the nodes (marketplaces) were connected, accessed, and patronised. The accessibility matrix measured the connection of routes, accessibility and patronage level, and the routes needed to network the market via the shortest link was established.



**Figure 1. Map of Benin metropolis showing road network and market centres**

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

## RESULTS AND DISCUSSION

The study's results are presented and discussed the location of market and transportation modes, road connectivity and market accessibility, and accessibility and market patronage.

### Location of market and transportation modes

An effective transportation system indicates safe and timely arrival at one's destination (Okoko & Fasakin (2007) therefore, inefficient modes of transportation, scarcity of transport infrastructure, and, inadequate access could distress the sustenance of trading habits at

S/No	Market centre	Route	Stalls	5% of stalls
1	Eki-Oliha	Siluko	1,680	84
2	Yanga Market	Oba Market	40	2

market centres. Then again, where these challenges abound, traffic congestion is likely to be noticed, exclusively, when the passenger capacity of the commonly used mode of transportation is small. Figure 2 suggests that 48.40 percent of respondents used mini-buses for market trips, while private vehicles accounted for 33.20 and 9.80 percent was calculated for taxi cars, foot was 5.50 percent, and tricycle 1.20 percent where 1.50 percent stated they use trucks. Minibuses and private car use was high bearing in mind the capacity of cars with not more than four (4) passengers, where a bus accommodation capacity is between eight (8) to eighteen (18) passengers per journey. Therefore, frequent use of personal cars increases the volume of traffic on the market routes, and this could inhibit traffic flow.

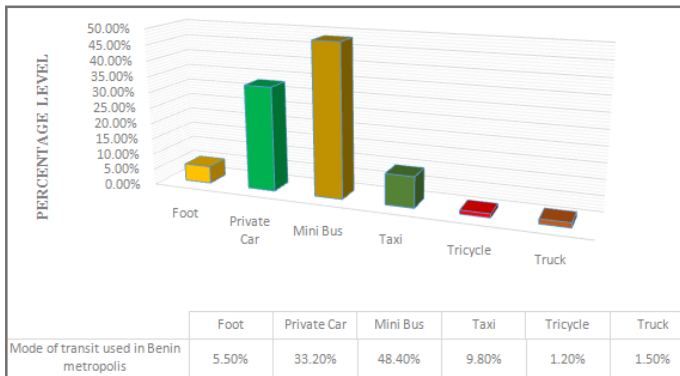


Figure 2. Transportation modes used in Benin metropolis

Road connectivity and market accessibility

The perception of accessibility could be viewed in the concepts of 'location' where space is assessed with transport infrastructure with referential attributes like population and economic activities, and the other 'distance' is derived from the physical separation of locations (Karner, 2018; Al-dami, 2015; Rodrigue, 2013). Distance only exist where there is a link between two locations using transport. To investigate the indices of accessibility, edges (road networks) and nodes (junctions) are required. These indices are useful to identify and detect growth, patronage level, and change within a network structure. As a result, Figure 3 reveals a line-diagram connection regardless of the class of road networking the surveyed marketplaces in Benin City, where the 9 nodes (n) represent the market centres, and 15 edges (e) the routes leading to the market centres. The accessibility matrix of the shortest path in the connection of routes leading to the 9 markets and the quantity and arrangement of the links between the marketplaces are shown in Table 2. A boxed value indicates the number of inter-nodal links, whereas zero (0) signifies no link. The distance between the marketplaces is described as the number of intervening routes on the shortest path networking them. Table 2 presents that nine markets (nodes) and 15 routes (edges) were in the connection of roads selected in Benin metropolis. This specifies the number of links between the markets (Figure 3) as well as the links from one market to another. Furthermore, the accessibility indices establish that Yanga Market and Eki-Oba with an index of 10 each were the most accessible nodal points. This suggests that the market requires 10 intervening edges from other markets in the network. Eki-Oba and Yang market located at the Oba Ovoranmwun Square were the most accessed, patronised and populated with human and vehicular traffic. In the same vein, Eki-Osa and Eki-Edo accounted for index 13 each, Eki-Oliha had index 14, and both Eki-Agbado and Vegetable Market had index 16. Similarly, index 19 was calculated for Eki-Ogiso (New Market), and Eki-Uwa with the highest index of 21 was the least accessed market. This implies that the lower the index value, the higher the accessibility. This is to say that, when accessibility is high, the level of patronage (human and

vehicular traffic) will also be high, and propensity to hinder the flow of traffic in the study area. The total accessibility value of index 132 represents the overall sum of the straight links in the entire network. Likewise, from Figure 3, the pattern and distribution of the markets in Benin City reveal that many were situated along the transportation route, and by that easily accessed which could be a factor for the huge population, regular patronage, and a high number of human and vehicular traffic seen in the study area.

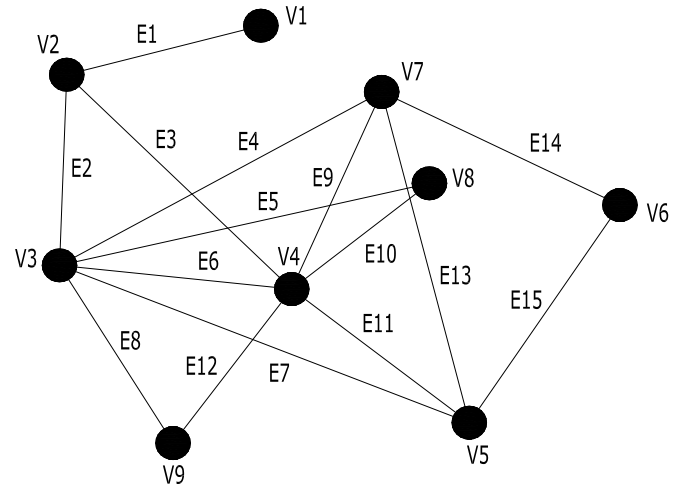


Figure 3. Graph analysis of roads linking the surveyed markets in the study area

Edge	Road	Node	Market
E1	Television	N1	Eki-Uwa
E2	Siluko	N2	Eki-Oliha
E3	Ekenwan	N3	Yanga
E4	Mission	N4	Eki-Oba
E5	Akpakpava	N5	Eki-Osa
E6	Ekenwan	N6	Eki-Ogiso
E7	Sakpomba	N7	Eki-Edo
E8	Airport	N8	Eki-Agbado
E9	Mission	N9	Vegetable
E10	Akpakpava		
E11	Sakpomba		
E12	Airport		
E13	Murtala Muhammed Way		
E14	New Lagos		
E15	2 <sup>nd</sup> East Circular		

Table 2. Accessibility matrix of the shortest route

Node/Edge	1	2	3	4	5	6	7	8	9	Node index
1. Eki-Uwa	0	1	2	3	3	4	3	3	3	21
2. Eki-Oliha	1	0	1	1	2	3	2	2	2	14
3. Yanga market	2	1	0	1	1	2	1	1	1	10*
4. Eki-Oba	2	1	1	0	1	2	1	1	1	10*
5. Eki-Osa	3	2	1	1	0	1	1	2	2	13
6. Eki-Ogiso	4	3	2	2	1	0	1	3	3	19
7. Eki-Edo	3	2	1	1	1	1	0	2	2	13
8. Eki-Agbado	3	2	1	1	2	3	2	0	2	16
9. Vegetable market	3	2	1	1	2	3	2	2	0	16

Total = 132

### Accessibility and market patronage

Table 3 describes the views of the respondents on all the items examined on accessibility factors and market patronage in Benin City. The ranked responses on a scale of five (5) indicate high acceptance to one (1) which indicates low acceptance. The mean score ( $\bar{x}$ )  $\geq 3.0$  is accepted as a significant positive perception but if  $\bar{x} < 3.0$ , the weighted score is taken for negative perception. From the findings, the weighted mean scores above a benchmark value of 3.00 decided the influential determinants hence, alternative access to marketplaces ( $\bar{x}=3.38$ ;  $\sigma = 13.91$ ) took preference over others. This means that a key factor influencing traders' patronage of the surveyed markets is the availability of alternative access to the marketplaces. Others include satisfaction with access to marketplace ( $\bar{x} = 3.33$ ;  $\sigma = 15.45$ ), market accessibility ( $\bar{x} = 3.32$ ;  $\sigma = 14.48$ ), satisfaction with road connection ( $\bar{x} = 3.23$ ;  $\sigma = 13.23$ ), and regularity of personal car use ( $\bar{x} = 3.09$ ;  $\sigma = 16.08$ ). Using the outcome of the factors to explain the relationship between the results of this survey and those of other studies, the above findings are in agreement with other allied investigations on accessibility and patronage of public spaces. Particularly due to similarity of accessibility and patronage indices, Qi *et al.*, (2019), and Omisore and Akande (2009) confirmed that accessibility plays a decisive role in the patronage of products and services, and to attract patronage and achieve social and economic satisfaction, there have to be accessible roads and other infrastructure to those sites. Similarly, condition of the road, traffic volume, market location, on-street trading and parking, driver's attitude, pedestrian and vehicular conflict were identified by Ayo-Odifiri *et al.*, (2017) as some critical factors that impede traffic flow during market patronage but could be eased through alternative access to the market centres as revealed in the findings of this study.

**Table 3. Accessibility factor for market patronage in Benin City**

S/N	Level of market Accessibility	Weighted sum ( $\Sigma$ )	Weighted mean ( $\bar{x}$ )	Standard Deviation( $\sigma$ )	Decision
1.	Satisfaction with road connection	1315	3.23	1.323	Significant
2.	Satisfaction with access to a marketplace	1354	3.33	1.545	Significant
3.	Alternative access to a marketplace	1375	3.38	1.391	Significant
4.	Regularity of personal car use	1256	3.09	1.608	Significant
5.	Market accessibility	1352	3.32	1.448	Significant

**Decision rule:** VH= Very High ( $\leq 5.0$ ), H= High ( $\leq 4.0$ ), U= Uncertain ( $\leq 3.0$ ), L= Low ( $\leq 2.0$ ), VL= Very Low ( $\leq 1.0$ )

### Indices of the relationship between market accessibility and level of patronage

Table 4 reveals the correlation between market accessibility and patronage indices in Benin City. As a result of the heterogeneous measurement scale, Spearman's rho and Kendall Tau tests were conducted between the variables of market accessibility (ACCESS), satisfaction with market location (SATMARK), satisfaction with a variety of products in the market (VARIETY) and the number of traders (TRADERS) as pull factors for market patronage. The Kendall's Tau ( $\tau$ ) correlation test (Table 4) shows that the coefficient between market accessibility and the number of traders in the market was statistically significant at  $n=407, \tau=0.955, p<0.05$ . This reveals that the level of accessibility of the markets in Benin metropolis

reflects their level of patronage, and this defines the viability and productivity of the markets. Similarly, the coefficient between satisfaction with market location and the number of traders in the markets calculated revealed a statistically significant ( $p<0.05$ ) correlation ( $\tau = 0.457$ ). This means that satisfaction with market location influences the number of traders in the market. In addition, a correlation coefficient of  $\tau = 0.378$  statistically significant at  $p<0.05$  existed between the variety of products and the number of traders in the markets. Indicating that the level of market patronage is a function of satisfaction of traders with a variety of products available in the market. Likewise, the Spearman Rho correlation coefficient calculated between market accessibility and market satisfaction was  $r_s=0.522, n=407, p<0.05$ . This implies that accessibility is one of the factors that explain the satisfaction of traders with the market location. In the same vein, looking at the relationship between market accessibility and the variety of products in the market, a positive coefficient of  $r_s=0.376$  statistically significant ( $p<0.05$ ) was calculated. This shows that market accessibility contributes to the variety of products available in the market, and satisfaction with the level of patronage. On the other hand, there was a statistically significant coefficient in the relationship between satisfaction with market location and the variety of products in the markets ( $r_s=0.361, n=407, p<0.05$ ). Patronage, viability and productivity of market centres are based on accessibility and satisfaction of traders with market locations. Owing to the significant correlation between market accessibility and market patronage indices, the null hypothesis was rejected and to accept the alternative hypothesis that says there is a correlation between market accessibility factors and market patronage in Benin City was accepted.

**Table 4. Results of correlation between market accessibility and patronage**

		Spearman's Correlation Test	Rho
Accessibility Indices	ACCESS	SATMARK	VARIETY
ACCESS	1.000	0.522**	0.376**
SATMARK		1.000	0.361**
VARIETY			1.000
		Kendall's Tau Correlation Test	
TRADERS	0.955**	0.457**	0.378**

\*\*Correlation is significant at the 0.01 level (2-tailed).

### SUMMARY AND CONCLUSION

The research examined the transportation modes, the connection of roads linking marketplaces, market's accessibility, and market patronage in Benin City. In identifying the various transit modes, it was observed that 48.40% for minibuses and 33.2% for private automobiles were predominantly operated transportation modes along the market routes. Satisfaction with access to the marketplace ( $\bar{x} = 3.33$ ;  $\sigma = 15.45$ ), market accessibility ( $\bar{x} = 3.32$ ;  $\sigma = 14.48$ ), satisfaction with road connection ( $\bar{x} = 3.23$ ;  $\sigma = 13.23$ ), and regular personal car use ( $\bar{x} = 3.09$ ;  $\sigma = 16.08$ ) were outcomes of market location, activity, patronage, inadequate road connection, and limited access to the market centres. This is to say that patronage, viability and productivity of a market centre are based on accessibility and satisfaction of traders with market location, and the statistically significant level of market accessibility and the number of traders in the market accounted reflect the level of market patronage. From the graph theory analysis, many markets are situated along transportation routes which put them at easy access advantage

responsible for high and regular patronage and increase the volume of traffic in Benin City. Specifically, the most accessed, populated and patronised with vehicular and human traffic were Eki-Oba and Yang market situated at the Oba Ovoranmwen Square, and there is an indication that the markets require and service 10 intervening routes and other markets in the network. This study thoroughly investigated and presented in-depth current evidence on topical issues about accessibility, the marketplace places, and patronage to help academics on similar information to advanced research frontiers, and the outcome offers vital insights for city planners, policymakers, and managers. More so, further research on market patronage and traffic situation, as well as accessibility and fire safety in marketplaces through a systematic review and qualitative techniques, would expand the coverage of this research. This proposed future approach will aid scholars to verify and validating the quantitative results of this study and give direction to policymakers.

## POLICY GUIDELINES

In light of the results, this research makes some suggestions to improve accessibility and market patronage in Benin City. That is, all access roads should be made motor able to allow for non-market journeys to bypass the market areas without traffic constraints. Traffic indicators, other street graphics and furniture should be provided at all road intersections. Vehicle garages should be provided at all market centres for public and personal vehicles to discourage on-street parking that often inhibits access. The option of vertical development of market stalls and parking lots by planning approaches and flexible architectural design schemes could be explored to house traders buying and selling along walkways. Between Eki-Oba and Yanga market situated at the CBD, that are most connected, accessed, and patronised should be provided with a pedestrian bridge. Parliamentary and judicial will to execute traffic control strategies would ensure the discipline of road users and allow for a large volume of traffic unhindered. Viable consideration of a marketplace as a fulcrum and growth hub before physical development to avert blight, slum, and sprawl in the built-up environment is essential.

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## Competing Interests

No competing interest was declared.

## REFERENCES

- Surya B, Ahmad DN, Sakti HH, Sahban H. Land use change, spatial interaction, and sustainable development in the metropolitan urban areas, South Sulawesi Province, Indonesia. *Land*. 2020;9(3):95. <https://doi.org/10.3390/land9030095>. Accessed October 25, 2021 at: <https://www.mdpi.com/2073-445X/9/3/95>
- Ikegbunam FI. Onitsha urban road transport system: implications for urban transport planning. *International Journal of Applied Science and Technology*. 2014; 4(4):250-256.
- Barceló J. Future trends in sustainable transportation. In *Sustainable Transportation and Smart Logistics*. 2019; 401-435. Elsevier. <https://doi.org/10.1016/B978-0-12-814242-4.00016-8>. Accessed October 25, 2021 at: <https://www.sciencedirect.com/science/article/pii/B9780128142424000168>
- Gupta JG, De S, Gautam A, Dhar A, Pandey A. Introduction to sustainable energy, transportation technologies, and policy. In *Sustainable Energy and Transportation 2018*; 3-7. Springer, Singapore. [https://doi.org/10.1007/978-981-10-7509-4\\_1](https://doi.org/10.1007/978-981-10-7509-4_1). Accessed October 25, 2021 at: [https://link.springer.com/chapter/10.1007/978-981-10-7509-4\\_1#citeas](https://link.springer.com/chapter/10.1007/978-981-10-7509-4_1#citeas)
- Okoko E, Fasakin JO. Trip generation modelling in varying residential density zones: an empirical analysis for Akure, Nigeria. *Medwell Journals, the Social Science*. 2007; 2(1):13-19.
- Müller M. Structure and Background: The Influence of Infrastructures on Human Action. In *Technology and the City*. 2021; 121-136. Springer, Cham. [https://doi.org/10.1007/978-3-030-52313-8\\_7](https://doi.org/10.1007/978-3-030-52313-8_7).
- Ayo-Odifiri OS, Fasakin JO, Henshaw FO. Road connectivity approach to eased traffic congestion on market roads in Benin Metropolis, Nigeria. *American Journal of Engineering Research (AJER)*. 2017; 6 (6): 41-48.
- Sarkar D. Structural Analysis of Existing Road Networks of Cooch Behar District, West Bengal, India: A Transport Geographical Appraisal. *Ethiopian Journal of Environmental Studies and Management*. 2013; 6(1):74-81.
- Denpaiboon C, Panitchpakdi K, Kanegae H, Selanon P, Boonnun Y. Influences of Urban Infrastructure Development on Urban Forms and Lifestyle of Greater Bangkok. *Nakhara: Journal of Environmental Design and Planning*. 2018; 14:95-110. <https://doi.org/10.54028/NJ20181495110>.
- Oyesiku OK. From womb to tomb: Inaugural Lecture, Olabisi Onabanjo University, Ago-Iwoye. 2002.
- Karner A. Assessing public transit service equity using route-level accessibility measures and public data. *Journal of Transport Geography*. 2018;67:24-32. <https://doi.org/10.1016/j.jtrangeo.2018.01.005>. Accessed January 17, 2022 at: <https://www.sciencedirect.com/science/article/abs/pii/S0966692317303794>
- Rodrigue JP. *The geography of transport systems* (3rd ed.). London: Routledge. 2013.
- Darvishan A, Lim GJ. Dynamic network flow optimization for real-time evacuation reroute planning under multiple road disruptions. *Reliability Engineering & System Safety*. 2021;214:107644. <https://doi.org/10.1016/j.res.2021.107644>. Accessed January 17, 2022 at: <https://www.sciencedirect.com/science/article/abs/pii/S095183202100185X>
- Wang Y, Szeto WY, Han K, Friesz TL. Dynamic traffic assignment: A review of the methodological advances for environmentally sustainable road transportation applications. *Transportation Research Part B: Methodological*. 2018;111:370-94. <https://doi.org/10.1016/j.trb.2018.03.011>. Accessed October 25, 2021 at: <https://www.sciencedirect.com/science/article/pii/S0191261517308056>
- Litman T, Fitzroy S. Safe travels: evaluating mobility management traffic safety impacts. 2011; Accessed October 25, 2021 at: [www.vpti.org](http://www.vpti.org).
- Dominique-Ferreira S, Braga RJ, Rodrigues BQ. Role and effect of traditional markets: The internationally awarded case of Barcelos. *Journal of Global Scholars of Marketing Science*. 2021; 1-23. <https://doi.org/10.1080/21639159.2020.1808852>. Accessed January 17, 2022 at: <https://www.tandfonline.com/doi/abs/10.1080/21639159.2020.1808852>

18. Adeagbo A. Accessibility, traffic and parking problems in urban markets International Journal of Transport Studies. 2004; 1(2):29-39.
19. Greenwald JA. It takes green to go green: An Atlanta-based evaluation of employer-provided commuting incentives as a method to overcome work site car-dependency (Doctoral dissertation, Georgia Institute of Technology). 2019. <http://hdl.handle.net/1853/61810> Accessed January 17, 2022 at: <https://smartech.gatech.edu/handle/1853/61810>
20. Rajesh S, Shashank P, Abhirup D, Tolu A, Zorro D, Zakarya A, Albo M. Sustainable Transportation in Metropolitan Cities; Berlin, Helsinki, New Delhi and Pune. InIOP Conference Series: Earth and Environmental Science. 2019; 297(1):012025. IOP Publishing. [10.1088/1755-1315/297/1/012025](https://doi.org/10.1088/1755-1315/297/1/012025).
21. Fasakin JO. The commercial motorcycle in the Nigeria transport service: a landuse analytical approach to its operational characteristics in Akure Township. Unpublished PhD thesis, Urban and Regional Planning Department, Federal University of Technology Akure, Nigeria. 2000
22. Wang Y, Geng K, May AD, Zhou H. The impact of traffic demand management policy mix on commuter travel choices. Transport Policy. 2022; 117: 74-87. <https://doi.org/10.1016/j.tranpol.2022.01.002>. Accessed January 17, 2022 at: <https://www.sciencedirect.com/science/article/abs/pii/S0967070X22000026>
23. Okoko E. Urban transportation planning and modelling. Akure: Millennium Publishers. 2006.
24. Luo R, Fan Y, Yang X, Zhao J, Zheng S. The impact of social externality information on fostering sustainable travel mode choice: A behavioral experiment in Zhengzhou, China. Transportation research part A: policy and practice. 2021; 152:127-45. <https://doi.org/10.1016/j.tra.2021.07.003>. Accessed January 17, 2022 at: <https://www.sciencedirect.com/science/article/abs/pii/S0965856421001877>
25. Hasnine MS, Habib KN. Transportation demand management (TDM) and social justice: A case study of differential impacts of TDM strategies on various income groups. Transport Policy. 2020;94:1-10. <https://doi.org/10.1016/j.tranpol.2020.05.002>. Accessed October 25, 2021 at: <https://www.sciencedirect.com/science/article/abs/pii/S0967070X19303269>
26. Rode P, Heeckt C, da Cruz NF. National Transport Policy and Cities: Key policy interventions to drive compact and connected urban growth. 2019. Accessed January 17, 2022 at: [https://urbantransitions.global/wpcontent/uploads/2019/08/CUT\\_2019\\_transport-paper\\_FINAL-FOR-WEB.pdf](https://urbantransitions.global/wpcontent/uploads/2019/08/CUT_2019_transport-paper_FINAL-FOR-WEB.pdf)
27. Ndikom OBC. Elements of transport management. Nigeria: Bunmico Publishers. 2010
28. Ohieagbunem EI. Analysis of traffic management in Benin City, Nigeria. International Journal of Transportation Studies. 2007; 3(1):44-56.
29. Qi X, Si Z, Zhong T, Huang X, Crush J. Spatial determinants of urban wet market vendor profit in Nanjing, China. Habitat International. 2019; 94:102064. <https://doi.org/10.1016/j.habitatint.2019.102064>.
30. Omole FK. Analysis of some factors affecting market patronage in Osun State, Nigeria. Asian Journal of Business Management. 2009; 1(1):24-31.
31. Mehta V. Streets and social life in cities: a taxonomy of sociability. Urban Design International. 2019; 24(1):16-37. <https://doi.org/10.1057/s41289-018-0069-9>.
32. Ojo A. Yoruba culture: a geographical analysis. Ile-Ife: University of Ife Press. 1966.
33. Zhong S, Crang M, Zeng G. Constructing freshness: the vitality of wet markets in urban China. Agriculture and Human Values. 2020;37(1):175-85. <https://doi.org/10.1007/s10460-019-099872>.
34. Dai J, Menhas R. Sustainable development goals, sports and physical activity: the localization of health-related sustainable development goals through sports in China: a narrative review. Risk management and healthcare policy. 2020;13:1419. <https://dx.doi.org/10.2147%2FRMHP.S257844>.
35. Wan C, Yang Z, Zhang D, Yan X, Fan S. Resilience in transportation systems: a systematic review and future directions. Transport reviews. 2018;38(4):479-98. <https://doi.org/10.1080/01441647.2017.1383532>.
36. Oviedo D, Scholl L, Innao M, Pedraza L. Do bus rapid transit systems improve accessibility to job opportunities for the poor? The case of Lima, Peru. Sustainability. 2019; 11(10):2795. <https://doi.org/10.3390/su11102795>.
37. Rogers, M. (2003). Highway engineering, Oxford: Blackwell Publishing Ltd.
38. Kluvankova T, Nijnik M, Spacek M, Sarkki S, Perlik M, Lukesch R, Melnykovych M, Valero D, Brnkalkakova S. Social innovation for sustainability transformation and its diverging development paths in marginalised rural areas. Sociologia ruralis. 2021; 61(2):344-71. <https://doi.org/10.1111/soru.12337>.
39. Akanle O, Omotayo A. Youth, unemployment and incubation hubs in Southwest Nigeria. African Journal of Science, Technology, Innovation and Development. 2020;12(2):165-72. Accessed January 17, 2022 at: <https://journals.co.za/doi/abs/10.1080/20421338.2019.1624311>
40. AnthoniaQOB. The supply and distribution of yams in Ibadan market. The Nigerian Journal of Economics and Social Studies. 1973;9(1):33-49.
41. Abaka E, Kumasenu GX. Slavery, remembrance, and sites of historical memory inline-graphic: the case of Badagry. African Economic History. 2021; 49(1):104-26. <https://doi.org/10.1353/aeh.2021.0004>.
42. Oduntan O. Samuel Ajayi Crowther, 1806-1891. In Oxford Research Encyclopedia of African History. 2021. <https://doi.org/10.1093/acrefore/9780190277734.013.959>.
43. Olorunfemi AO. Problems and prospects of commercial markets in Akure. Unpublished B.Tech. Dissertation, Urban and Regional Planning Department, Federal University of Technology Akure, Nigeria. 1999.
44. Ayo-Odifiri OS. Traffic management in the nexus of markets in Benin metropolis, Nigeria. Unpublished PhD thesis, Urban and Regional Planning Department, Federal University of Technology Akure, Nigeria. 2017
45. Kithuka DM. An analysis of the role of periodic markets in rural development in Mukaa Sub-County; Makueni County (Doctoral dissertation, University of Nairobi). 2019.
46. Aithal R. Reflections from a periodic market in rural India. In bottom of the pyramid marketing: making, shaping and developing BoP markets. 2018. Emerald Publishing Limited.
47. Ikechukwu EE, Innocent I. Roles of periodic markets in fostering rural development in Emohua Local Area Rivers State, Nigeria. 2018.
48. Eben-Saleh MA. Alkhalaf: the evolution of the urban built form of a traditional settlement in South-Western Saudi-Arabia, International Journal of Building Science and its Application. 1999; 34(6):549-669.
49. NPC (National Population Commission) provisional census figure of Nigeria. 2006.
50. Agheyisi JE, Aghedo I. Neighborhood Vulnerability to security threats in Benin City: the role of informal housing and the built environment. African Studies Quarterly. 2021;20(4). <https://asq.africa.ufl.edu/files/V20i4a2.pdf>.

51. Freneund JE, William FJ. Quick Statistics. London: Penguin. 2009.
52. Bello YO, Omoh BJ. Dining experience and customers' satisfaction in fast food industry. *International Journal of Research in Arts and Social Sciences*. 2018; 11(2), 280-300.
53. Al-dami HAN. Measuring the accessibility of road networks: Diwaniya/Iraq as a case study. *Journal of Current Research and Academic Review*. 2015;3(2):173-182.
54. Omisore EO, Akande, CG. Accessibility Constraints of Patronage of Tourist Sites in Ondo and Ekiti States, Nigeria. *Ethiopian Journal of Environmental Studies and Management*. 2009; 2(1).

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