

State of Urban Transport in a Nigerian Traditional City

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Abstract This study appraised the state of urban transport in a Nigerian traditional city. It examined commuters' socio-economic and transit characterization, assessed the quality of transport infrastructural facilities and services, and identified the challenges of urban transport services in Ibadan city, Nigeria. 163 copies of questionnaires were systematic randomly administered on commuters along six (6) selected traffic-corridors in Ibadan. Both descriptive and inferential (Binary Logistics Regression) statistics were used for data analysis. Major findings revealed majority (about 40%) of commuters were civil servants and earn above 90,000 naira as monthly income. Mean Weighted Value results show that taxi (3.913) and motorcycle (3.756) are dominant and most patronized means. Similarly, the availability (4.075), safety (4.000) and affordability (3.625) were most-weighted factors influencing commuting modal choice, while a trip to work (3.718) and market (3.200) are most generated trips in Ibadan. Meanwhile, most of the assessed infrastructural facilities were of poor quality, while peak/off-peak transit issues (4.050) and vehicular mechanical failure (3.487) were major challenges affecting urban commuting. Binary logistics regression results show that the condition of urban transport infrastructural facilities significantly influence overall satisfaction with urban commuting ($p < 0.000$). Cox & Snell's R-Square (36%) and Nagelkerke's R (70%) show that the model is relevant in predicting the relationship between dependent and independent variables. The study concluded that there is a need to improve urban transport system towards ensuring commuters satisfaction and urban development. Hence, recommended among others, integrated transport system with smart devices and improved conventional public transport scheme in Ibadan.

Keywords Cities, Commuters, Ibadan city, Nigeria, Traffic, Urban transport

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1. Introduction

Cities are centres of economic, social, cultural and intellectual activities which result in the drift of the population from rural to urban centres and these congregations have caused cities to expand. They rely heavily on an efficient and effective transportation system that ensures a constant supply of goods and services. It is in this sense that movement and spatial interaction of urban residents occasioned by efficient urban transport are crucial to the effective functioning of the city.

The benefits and importance of economic growth to infrastructure through continual investment have been recognized for a long time. With this, prioritizing infrastructure is part of long-term economic development for most cities. Therefore, cities that have managed to attract investments and enhance competitiveness in a highly globalized economy are those that have vastly improved the range and quality of their infrastructure. In contrast, cities that fail to provide adequate infrastructure are less likely to be competitive, prosperous and sustainable in terms of balancing economic and social development and environmental protection [1, 2].

Transport plays a key role in any given society at any given time as the interaction between the level and pattern of society as well as the average level of living standards is a crucial factor affecting their economic and social progress. The high rate of urbanization being experienced in most developing countries in general and most especially in Nigeria has created mobility challenges and ultimately impeding overall development. This mobility crisis with diverse counterproductive nature of transportation challenges posed serious challenges to spatial growth and development of cities and other urban centres [3, 4]. The success and existence of urban society largely depend upon the efficiency and availability of adequate transport facilities that can guarantee spatial interactions and seamless flows. Without an adequate and efficient supply of transport infrastructure, there can be no necessary maintenance, and well-being of the population, while the productivity of industries would be far below capacity. The provision of suitable transport services, both for inter-urban and intra-urban movement is therefore essential, of which any constraint and hindrance hamper socio-economic growth. As the transport sector makes a crucial contribution to overall economic growth and devel-

opment [5], road transport plays an important role in integrating the various sectors in any given society. Transport is thus, an important component of both rural and urban development programs and also an enabling element for the achievement of global goals and ambition.

Therefore, meaningful development and functionality of urban centres are usually determined by the extent of transport system efficiency. Unfortunately, urban transport in most developing nations including Africa countries and many Nigerian cities is characterised by the inadequate and poor quality of infrastructural facilities, the mismatch between demand and supply, increased rate of accident or crashes as well as management and administrative weakness [5]. Such problems are triggered by interrelated trends such as urban population growth and unplanned and uncoordinated growth of cities, hence, the need to sustaining urban development through refocusing urban transport system in Nigerian cities. As a result, this study examined the state of urban transport in a Nigerian traditional cities with particular reference to Ibadan city, Nigeria towards understanding salient issues in urban commuting and overall development of the country. Based on this study aim, the following objectives were pursued: first, examined the socio-economic characteristics of urban commuters; second, assessed urban transit characteristics; third, examined the quality of urban infrastructural facilities and services, and finally, identified the challenges of urban transport services in Ibadan city.

In other words, this study was structured into five sections for clear and logical understanding. Following the introductory sections was the conceptual underpinning and brief literature review. The third section dealt with the research methodology that gave insight into the study area, sampling procedure, method of data collection and techniques of analysis. The last two sections, that is, section four and five presented the results and discussion of findings as well as the study conclusion and recommendations.

2. Conceptual Underpinning and Brief Literature Review

2.1. Concept of Affordability, Accessibility and Availability

This study is anchored on the concept of 3As i.e. availability, accessibility and affordability. The concept was used by Reference [6] in examining the state of public transportation services in four states universities in South-Eastern Nigeria. Accordingly, the concept of affordability deals with the extent to which financial implications of a journey to be in a position of making a sacrifice to travel on one hand or the extent to which a trip maker can afford to travel at his desired time. Affordability, therefore, is the ability of public transport users to make necessary journeys to work or school or (any urgent journeys) without curtaining other essential activities as this can force necessitate curtailment of movement.

Availability of public transport refers to route possibilities, timing, frequency and acceptable modes of travel concerning

the purpose of an individual's journey which may be affected or limited by the route and travel time [6], while also, accessibility refers to the ease with which all groups of passengers can use public transport. As an illustration, it is easier to board buses with low steps than those with high steps. This is because the aged, infants/children and the physically challenged as well as those passengers with big luggage may not find public transport easily accessible. Therefore, accessibility equally contends to the ease of accessing the bus stops, acquisition of travel information and to enjoying public transport [7].

The 3As becomes vital to the system but also resolve between costs, fares, revenue, system mismanagement and operation deficiencies among others. As investments in urban transport infrastructure and its operation are paid for exclusively by the fares paid by users, while, the remaining are paid by the government through subsidies in a different form, it is thus, indispensable to integrate availability, affordability and accessibility into urban transport framework. Last, Reference [8] opined that urban mobility cannot be understood as merely the number of trips a person can make over a specific period, but also the capacity to carry out the necessary trips for achieving the basic rights of a citizen, as well as the concern for the environmental impacts that result from the choice. Hence, affordability, accessibility and availability are key ingredients for the expected performance of urban transport.

However, quality is an important competitive factor and a prerequisite of survival in the market. It is a comprehensive value judgment of the service rendered in connection with a given unit, expressed by the degree of meeting or exceeding the materials internal and external specifications relevant to the unit as perceived by the customer. Therefore, service quality is one of the most important factors for measuring the level of demand for a service or product including urban transport [9].

The concept of service quality is then, a comparison between customers' expectation and actual services performed as the extent to which expectations and service performance are similar or different influences the extent to which customers are satisfied or dissatisfied. Like in airline operations where competing organizations such as airlines provide the same types of service, urban transport service also do not provide the same quality of service as the service quality of operators is better known by the trip makers.

2.2. Literature Review

The realization of the need to harness optimum resource potentials for African development through urban transport becomes indispensable in refocusing Africa development agenda. In this regard, the Reference [1] opines that cities that want to be competitive can achieve success through the economic structure, policy levers, growth coalitions, implementation and delivery. By this, policy levers, such as institutions and regulations, infrastructure and land, skills and innovation, enterprise support and finance remained integral to city competitiveness. The extent of urban mobility

can be examined in relation to the extent of motorization in a given society.

Also, the past few decades have seen explosive economic growth and urbanization as more than half of the world's population now lives in urban areas and by 2020, there would be over 500 cities across the world with a population over one million [10]. This rapid urbanization is already straining the infrastructure of many countries. Urban mobility as one of the attributes of urban transport has to do with mobility in an urban area and such mobility has to be planned in such a way to bring about a balance in the inter-relation between city structure and supply of transportation services [11].

Urban transport is associated with a spatial form which varies according to the models being used. In urban situations, mobility and demographic growth have been shaped by the capacity of transport infrastructure ranging from roads, bus routes and rail lines [12]. Urban form in the context of an urban transport system is the spatial imprint on an urban network, while the urban (spatial) structure is the set of relationships arising from the urban form and the underlying movements of goods and people. Thus, globally, the amount of urban land allocated to transportation is often correlated with the level of accessibility, connectivity and mobility.

In other words, the level of motorization and automobile ownership in cities is fast-growing across the world particularly in developed world due to the affluence in the socio-economic status residents [1]. Fortunately, and unfortunately, fortunately, car ownership levels although increasing but are still very low in West African cities as Reference [13] opines that automobile ownership denotes an average of 5-15 per 1000 population unlike in the cities of the developed countries with an average of 20-40 per 1000 cars per 100 inhabitants. These findings corroborated that Reference [14, 15] reported that Nigeria has the lowest level of motorization in West Africa with as low as 4 Vehicles per 1000 inhabitants, while the rate of vehicle growth is much lower than the population growth rate. And unfortunately, despite the level of motorization, the urban transport in West African cities most especially Nigerian cities is still characterized and faced with various alarming mobility and accessibility challenges with undoubtedly hinders the development of these cities in competing with their contemporaries in developed countries [16, 17]. The root of these mismatch is not unconnected to the failure of planning urban transport in line with the growing population surge, weak policy, carefree attitude of Governments, corruption, political instability among others [5]. However, the consequences have resulted in general fall in the urban mobility performance in all parts of the country (Nigeria).

appraised land-use and Ibadan traffic paralysis by analyzing the impact of land-use activities on the free flow of traffic in Ibadan where it was revealed that poor road network coverage, absence of traffic signs, effects of flooding, encroachment of carriageway, street trading and indiscriminate locations of major commercial land uses such as eateries and banks at intersections characterized the city and resulted into traffic bottleneck which invariably have nega-

tive impacts on the functionality of the city. However, the study excluded that these consequences have eaten up the growth of urban transport in the city of Ibadan.

Reference [18] observed that the lack of modern planned physical development in most Nigerian urban centres is one of the major contributors to many traffic bottlenecks and urban transport issues being experienced today. The findings of Reference [3, 19, 20] and that of Reference [17] observed that weak road management, faulty intersections, narrow carriage width, haphazard on-street parking, poor road network coverage, poor intermodal system, absence of traffic signs, lack of intelligent transport system, encroachment of carriageway, street trading and indiscriminate locations of major commercial land uses among others, obviously contribute to urban traffic crisis and paralysis, most especially congestion and unpredictable travel time and cost in the city of Ibadan. These quagmires combined, often result in traffic bottleneck which invariably has negative impacts on the functionality of the city system, such as time-wasting in travel time, environmental pollution and road accidents among others. With these backdrops, there is need to understanding the state of urban transport system towards addressing transport challenges in the city of Ibadan and achieving efficient and safe mobility means, improved traffic flow and travel time in Ibadan city, Nigeria.

3. Material and Methods

3.1. Study Area

Ibadan is located in the southern part of Oyo state of Nigeria. According to Reference [15], Ibadan has an estimated area of 3,123.32km² (45,312.50 hectares). At Present, Ibadan had 11 local government areas namely Ibadan North, Ibadan North-East, Ibadan North-West, Ibadan South-East, Ibadan South-West, Lagelu, Oluyole, Ido, Ona-Ara and Oluyole. The city is bounded in the North by Afijio Local Government, on the East by Osun State, on the West by Ibarapa-East Local Government and in the South by Ogun-State. There are several industries in Ibadan which include the Nigeria Breweries Plc, Nigeria Bottling Company, 7up bottling company and many other companies situated in Oluyole and Olubadan Industrial Estates. The land area of Ibadan covers 463,33Km² hectares which are inhabited by 2,603,502 according to a projected population of 2006 [15]. Public transport services are provided mainly by the private sector, these services are however supplemented by the state government-owned Trans City Transport Company (TCTC)/Pacesetter whose vehicles operates more intercity transportation than intra-city. Public transport is mainly by taxis, minibuses, tricycles and motorcycles within Ibadan City.

3.2 Methods

Both primary and secondary sources of data are employed for this research. The primary sources of data include questionnaire administration complemented by route familiari-

zation and observation. This source gathered data on the trip pattern of commuters, trip generation, distribution and modal choice as well as factors influencing modal choice in urban transit and operational performance of urban transit in the study area. The secondary sources employed for this study include the use of the library, internet and maps. Data obtained through this source provided wide and in-depth views on the theme of this research. Secondary data also gives insight into the theoretical background and platform for reviewed interactions.

The commuters inventory at different bus stops in the study area was taken with due regard to the number of intending passengers/commuters awaiting urban transit along the corridors as well as the condition of transit infrastructural facilities. A set of questionnaires are designed and administered on the commuters in the study area to get their views on the study objectives. However, the sample frame for this study consists of the commuters/passengers in the study area. The stratified random sampling was used to select the screening traffic corridors and the first group of respondents (commuters) in the study area. Based on this, commuters/passengers involved in urban transport along major corridors in Ibadan city were screened in as a key component of this study. It is on this premix that inventory of commuters waiting at major bus stops along six (6) stratified randomly selected corridors (Ojo- Iwo road, Iwo road – New Garage, Challenge – Dugbe, Dugbe- Ojo road, Dugbe- Molate road, Mokola – Eleyele road) were identified and enumerated resulting in 32 bus stops with 2km radius apart of spatially closed bus stops. The sample size for the study population was taken from the 544 commuters enumerated at different stratified randomly selected bus stops along the selected corridors within the delineated radius. Based on this, 30% sample size equivalent of 163 respondents was selected and sampled for data collection through the administration of the questionnaire to along the selected bus stops. Having identified and stratified the bus stops into major and minor groups based on the enumerated population of commuters found awaiting urban transit to their destinations, the final

selection of respondents was made on the principle of the random sample at each bus stop.

It is important to state that data was first collected for this study in June 2017 and a follow-up/ updated data later in November 2019. The methods of data analysis used are descriptive and inferential. Descriptively, simple frequencies distributions with frequency tables, pie charts, and histograms are drawn to support illustrations on the responses of respondents based on five-point Likert scale with a relative index of variables determined through Summation of Mean Weighted Value. According to Vagias (2006) cited in Salisu et al (2020), MWV for a variable is obtained through the addition of the product of the number of responses to each aspect and the respective weight value attached to each rating. This is expressed quantitatively as thus:

$$MWV = \frac{\sum_{i=1}^n X_i Y_i}{\sum_{i=1}^n Y_i}$$

Where:

MWV = Summation of Mean Weighted Value,

X_i = number of respondents to rating i

Y_i = the weight assigned a value ($i = 1, 2, 3, 4, 5$)

Inferentially, and Binary Logistics Regression analysis were both simultaneously used for the analysis and postulated hypothesis testing. Data presentation and analysis were both accomplished through the use of Statistical Package for Social Sciences SPSS IBM version 21.

3.3 Research Hypothesis

The postulated hypothesis was tested to establish the relationship between quality of urban transport infrastructural facilities and commuters overall satisfaction with urban commuting in the study area. The research hypothesis was tested using Binary Logistics Regression and thus, presented in the null form as:

H₀: Quality of urban transport infrastructural facilities does not influences commuters overall satisfaction with urban commuting in the study

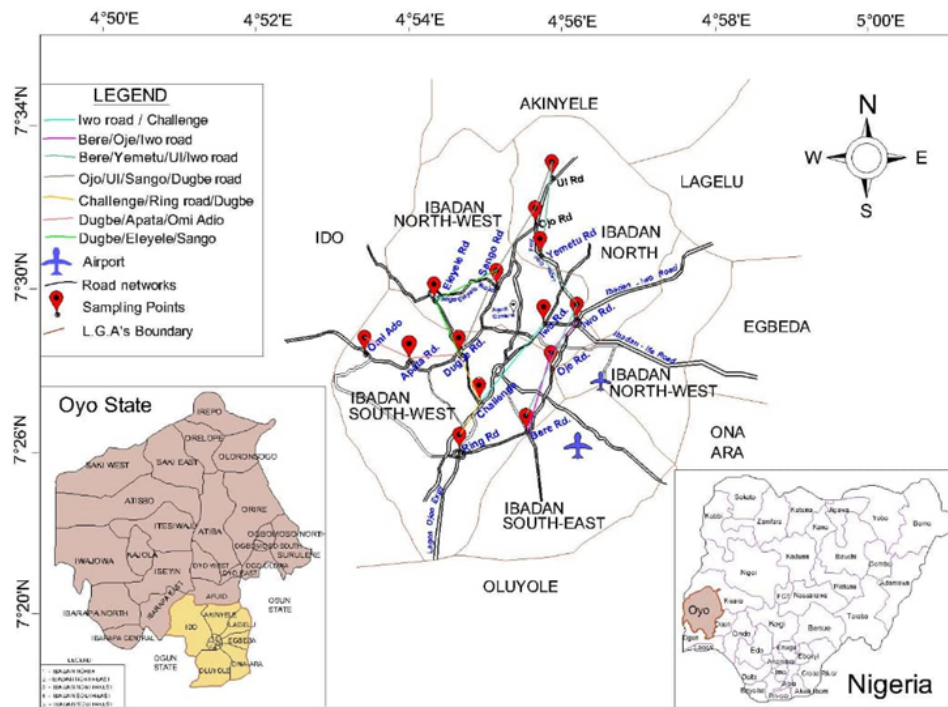


Figure 1. Map of Ibadan city in Oyo State, Nigeria showing the route corridors and sampling points

Source: Reference [17]

4. Results and Discussion

4.1 Socio-economic Characteristics of Urban Commuters

The socio-economic characteristics of commuters sampled along the selected corridors varied in components. Figure 2 shows the age classification of commuters in the study area in which commuters with age less than 24years has the lowest frequency (8.1%). Also, more than a quarter (28.8%) is 25-35years, while those with 36-45years accounted for 31.3% and only 20.6% are 46-55years. The remaining 11.3% are 56years and above. This analysis showed that respondents are adult and their view on urban transit in the study area could be relied on as a reflection of their experience.

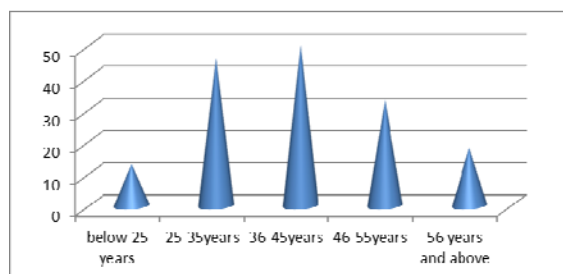


Figure 2. Age Groups of Commuters

The respondents sampled in the study area belong to various working groups in the society as shown in Table 2 where 3.1% are unemployed and 38.8% are civil servants. Also, 28.8% are private employee, 21.9% have their business

Table 1 reveals that more than half of commuters (60 %) are married, slightly more than a quarter (25.6%) is single and the divorced accounted for 7.5% while the remaining 6.9% accounted for widow/widower. This shows that the married are constantly involved in urban transportation towards meeting their socio-economic obligations in the study area than the single. Also, it is observed that 2.5% of the commuters have no formal education, 16.3% has primary school education, 30% has secondary school education and 51.3% possessed higher degrees in that ascending order. It can be deduced from this analysis that commuters have various categories of academic qualifications and thus, their views could be relied on as they truly understand the context of information required from them.

Table 1. Marital Status and Education Level of Commuters

Status	Freq.	%	Education	Freq.	%
Single	41	25.6	No formal educ.	4	2.5
Married	96	60.0	Primary cert.	26	16.3
Divorced	12	7.5	Secondary cert.	48	30.0
Widow/widower	11	6.9	Higher degree	82	51.3
Total	160	100	Total	160	100

Authors' Fieldwork, 2019

and the remaining 7.5% are students. Hence, commuters in the study area are economically engaged and this makes them involve in intra-urban commuting daily to their various places of work.

Table 2. Occupation of Commuters

Occupation	Freq.	%
Unemployed	5	3.1
Civil servant	62	38.8
Private employee	46	28.8
Personal business	35	21.9
Student	12	7.5
Total	160	100.0

Authors' Fieldwork, 2019

Analyzed data on an average monthly income of commuters is presented in Figure 3 where it is observed that 2.5 % earns less than #18,000 monthly and 5% earns #18,000-30,000 on monthly basis. Also, 26.3 % of commuters sampled earns #31,000-#60,000, while 31.9% earns #61,000-#90,000 and the remaining 34.4 % earns above #90,000. This showed that the majority of respondents earn above the national minimum wage of #18000 per month in the study area.

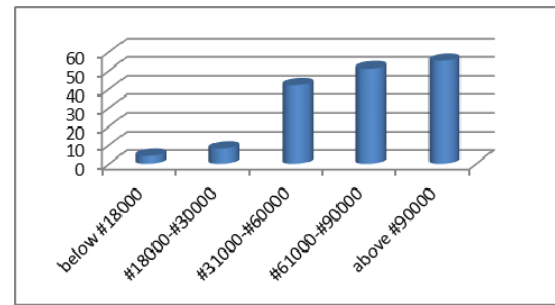


Figure 2: Average monthly Income of commuters

4.2 Urban Transit Characterization in Ibadan City

Table 4 presents the results of the relative index of the extent of patronage of urban transport by commuters in the study area on a five-point Likert's scale. The gradation of the values in ascending order consists of Not Available (NA=1), Not Patronized (NP=2), Rarely Patronized (RP=3), Patronized (P=4) and Very Patronized (VP=5). From this analysis, it was observed that Taxi is highly and very patronized by the commuters as it has the highest relative index of 3.912 which is far exceeding 2.796 estimated values for mean index value.

Also, the above is closely followed by Motorcycle with an index value of 3.756, while Minibus has a value of 3.456 and Pace-setter Transport Service Bus which is rarely patronized with 3.050 index value. However, both bicycle and tricycle are not been used by sampled respondents for their daily movement.

Table 3. Relative Index of Patronage Rate of Urban Transit Means

Means	NA	NP	RP	P	VP	TWV	MEAN	RIV	RK
Minibus	0	64	135	244	110	553	3.4563	2.796	3
Motorcycle	0	42	96	288	175	601	3.7563		2
Taxi/Cab	0	36	75	280	235	626	3.9125		1
Unlicensed car	0	200	117	20	80	417	2.6063		5
PTS	0	152	48	208	80	488	3.0500		4
Bicycle	0	0	0	0	0	0	0		6
Tricycle	0	0	0	0	0	0	0		6

Authors' Fieldwork, 2019

Commuters were asked on the contributions of different factors in influencing their patronage of urban transportation means in the study area and the relative index of their responses is presented in Table 4. With the use of 5 points Likert's scale on the values which consist of Indifference (I=1), Not Considered (NC=2), fairly Considered (FC=3), Considered (C=4) and Highly Considered (HC=5). Of the seven factors identified, and with the mean index value of 3.347 estimated, it is observed that availability is the pre-dominating factor influencing the patronage of urban transit

in the study area. By this, availability has the highest relative index mean of 4.075 far exceeding the MIV and is closely followed by safety consideration with an index value of 4.000 and affordability which has a value of 3.625. Aside from this, accessibility (3.325), speed (2.900), reliability (2.893) and lastly comfort with an index of 2.612 are ranked in that descending order among the deciding factors influencing patronage of urban transit. Therefore, the availability of any transport means is usually given priority and preference by urban commuters in their patronage of urban transit.

Table 4. Factors Influencing Patronage Rate of Urban Transport Means

Means	I	NC	FC	C	HC	TWV	MEAN	RIV	RK
Comfort	36	56	201	80	45	418	2.612	3.347	7
Affordability	28	50	39	28	435	580	3.625		3
Accessibility	15	12	189	256	60	532	3.325		4
Availability	11	8	42	256	335	651	4.075		1
Reliability	37	74	60	152	140	463	2.893		6
Speed	19	100	69	256	20	464	2.900		5
Safety	9	0	66	320	245	640	4.000		2

Authors' Fieldwork, 2019

The relative index of the average distance of commuters from their home to various places is presented in Table 5. Using 6 point Liker's scale with values that consist of Not applicable =1, less than 5Km =2, 5-10Km =3, 11-15Km=4, 16-20Km =5 and above 21Km =6 with a mean index value of 2.9191. From this analysis, it is observed that distance to work is ranked 1st with 3.718 which has the highest relative index that is far exceeding 2.199 estimated value for mean index value. Also, distance to market is ranked second with a

mean index value of 3.200 and followed by distance travel to a social gathering (2.012). The distance to the religious centre has an index value of 1.975, distance to the hospital has a value of 1.9250, and distance to friends/relative has a value of 1.687, while commuters rarely visit post office as this has least index value (0.8750) in the analysis. Hence, journey to work and journey to shopping/market are the predominant trips being made by commuters in the selected corridor.

Table 5. Factors Influencing Patronage Rate of Urban Transport Means

Distance	NA	<5	6-10	11-15	16-20	>20	TWV	MEAN	RIV	RK
to work	0	21	22	66	176	310	595	3.7188	2.919	1
to social gathering	0	55	140	60	32	35	322	2.0125		3
to relatives	0	73	142	27	28	0	270	1.6875		6
to the religious centre	0	89	94	33	16	0	277	1.9750		4
to market	0	29	36	96	216	135	512	3.2000		2
to hospital	0	56	146	63	28	15	308	1.9250		5
to post office	84	52	108	56	0	0	300	.8750		7

Authors' Fieldwork, 2019

The relative index of operational characteristics of Urban Transport means used by commuters is shown in Table 6 with the use of 5 points Liker's scale. With the values on the scale that consist of Indifference (I=1), Poor (P=2), Fair (F=3), Good (G=4), Very Good (VG=5) and relative index mean value of 3.201. From this analysis, it is observed that negotiated fair is high with 4.268 indexes which are far ex-

ceeding the MIV of 3.201. This is closely followed by unscheduled service with a value of 3.981 and fixed fare service with a value of 3.556, while schedule service has an index value of 1.000. Thus, schedule service is not in operation in the study area, unlike the other three distinguished characteristics which had a mean index value above 3.201.

Table 6. Operational Characteristics of Urban Transport Means

Characteristics	I	P	F	G	VG	TWV	MEAN	RIM	RK
Schedule	160	0	0	0	0	160	1.000	3.201	4
Unscheduled	3	0	98	159	220	480	3.981		2
Fixed fare	9	0	154	150	96	409	3.556		3
Negotiated fare	6	18	45	144	470	683	4.268		1

Authors' Fieldwork, 2019.

4.3 Quality of Urban Transport Infrastructural Facilities and Services

Table 7 shows the relative index of the functional conditions of urban transport infrastructure facilities in the study area. Using 5 point Liker's scale with values that include Not Available (NA=1), Deplorable (D=2), Fair (F=3), Good (G=4) and Very Good (VG=5) as well as a relative mean

index of 1.968. It is deduced from the analysis that carriageway capacity is very good as it is ranked the highest (4.687) which is far exceeding 1.968 mean index value, while road marking has the index of 3.887, road signage and lightning has 2.993 and pedestrian crossing 1.637. Others are passengers' shield with an index value of 1.331, route in-

formation has 1.175, while layby has a value of 1.025 and road surface and pedestrian bridge have 1.000 index values each. Hence, this analysis shows that urban transit infrastructure such as signage, layby, passenger shield, lane marking, and pedestrian bridge are less pronounced in the study area.

Table 7. Quality of Urban Transport Infrastructural Facilities

Condition	NA	D	F	G	VG	TWV	MEAN	RIV	RK
Carriageway capacity	0	0	12	168	570	750	4.687	1.968	1
Road surface	160	0	0	0	0	160	1.000		8
Passenger's shield	115	74	24	0	0	213	1.331		5
Lay bye	156	8	0	0	0	164	1.025		7
Road marking	0	0	234	88	300	622	3.8875		2
Road signage & lightning	54	0	105	140	180	479	2.993		3
Vehicle/Route information	132	56	0	0	0	188	1.175		6
Pedestrian crossing	101	48	81	32	0	262	1.637		4
Pedestrian bridge	160	0	0	0	0	160	1.000		8

Authors' Fieldwork, 2019

The condition of vehicular facilities used for urban commuting was an understudy and the result was presented in Table 8 using ten indicators. The result of the analysis revealed the mean index value of 2.55. Accordingly, the lightning system of the vehicles are in good condition among other parts used as indicators with a relative index value of 4.025 and is closely followed by a braking system which has an index value of 3.6, while space capacity of the vehicles is ranked third (2.5667). However, other indicators have their index values lower than the overall mean index value

for the entire analysis; hence their conditions are far below average denoting their dysfunctional or epileptic nature. As a result, most of the vehicles surveyed have a poor physical appearance, deplorable tyre, high emission rate, and poor steering rack condition. Ditto to the absence of broken mirrors and absence of restraint systems that characterized most of the vehicles observed for the study. With this, the condition of public vehicles used for urban commuting in Ibadan city appeared to be mostly not worthy of being used for passengers commuting since many of them are not in good operating condition.

Table 8. Quality of Vehicle Used

Indicators	VG	G	F	P	VP	TWV	RIM	MIV	RK
Physical appearance	3	78	216	12	15	234	2.7	2.550	5
Tyre condition	30	52	132	80	0	294	2.45		6
Space capacity	12	92	132	72	0	308	2.5667		3
Braking condition	1	8	117	296	10	432	3.6		2
Steering rack condition	29	120	87	0	10	246	2.05		8
Lighting system	24	12	99	0	285	483	4.025		1
Emission rate	22	144	47	28	0	251	2.0917		7
Restraint system condition	55	116	27	0	0	192	1.6		10
Fire safety condition	13	142	18	68	65	306	2.55		4
Side mirrors	53	74	87	4	0	218	1.8167		9

Authors' Fieldwork, 2019

The quality of service render by urban transport operators were assessed by commuters and the relative index of the results are presented in Table 9. Using 5 point Likert's Scale with a value that consists of Indifference (I=1), Poor (P=2), Fair (F=3), Good (G=4) and Very Good (VG=5) and a relative index value of 2.457. From this analysis, it is observed

that adequacy is the prime quality of the service with 3.637 which is far exceeding the mean index value. This is followed by safe driving (3.618), frequency (3.406), vehicle interior (2.943), and seating arrangement (2.706). Other variables are comfort (2.625), reliability (2.625) and courtesy which accounted for 2.93 indexes.

Table 9. Quality of Service Render by Operators

Parameters	I	P	F	G	VG	TWV	MEAN	RIV	RK
Seating arrangement	7	164	90	132	40	433	2.706	2.457	5
Comfort	24	122	123	76	75	420	2.625		6
Courtesy	23	210	82	16	5	335	2.093		8
Vehicle interior	9	104	162	116	80	471	2.943		4
Reliability	27	196	123	56	0	402	2.262		7
Adequacy	4	22	93	428	35	582	3.637		1
Frequency	6	26	162	336	15	545	3.406		3
Safe driving	6	28	138	252	155	579	3.618		2

Authors' Fieldwork, 2019

Table 10 presented the result of the commuters overall satisfaction with urban transport services operation in Ibadan city. The table revealed that the highest proportion of the commuters (60.1%) were not satisfied with the urban transport service operation within the city, 20.3% accounting for 33 of the respondents attest to their satisfaction rate as strongly dissatisfied, 14.7% were satisfied while the remaining percentage of the respondents (4.9%) equivalent of 8 commuters was strongly satisfied with the operational performance of the urban transport services in the city.

Table 10. Commuters Overall Satisfaction with Urban Transport Services

Indices	Freq.	Percentage
Strongly satisfied	8	4.9
Satisfied	24	14.7
Dissatisfied	98	60.1
Strongly Dissatisfied	33	20.3
Total	163	100

Authors' Fieldwork, 2019

4.4 Challenges of Urban Transport Services in Ibadan

Table 11 shows the relative index of six challenges that influence Urban Transport Patronage in the study area in which peaking/off-peak issues ranked most with an index value of 4.050. This is followed by mechanical failure (3.487) and insecurity (3.018) while waiting time (2.587), journey time (2.512) and poor vehicle maintenance ranked least among the challenges in urban transport patronage in the study area.

Table 11. Challenges in Urban Transportation Patronage

Challenges	I	VL	L	H	VH	TWV	MEAN	RIV	RK
Peak/ off peaking issues	5	10	63	60	270	408	4.0500	2.444	1
Waiting time	6	160	183	0	65	414	2.5875		4
Journey time	21	94	246	28	10	399	2.5125		5
Insecurity	1	118	120	224	10	473	3.0188		3
Mechanical failure	5	38	150	260	105	558	3.4875		2
Vehicle maintenance	32	70	237	56	0	395	2.468		6

Authors' Fieldwork, 2019.

4.5 Hypothesis Testing

H₀: Quality of urban transport infrastructural facilities does not influences commuters overall satisfaction with urban commuting in the study

Further investigations were conducted using a binary logistic regression model to determine whether or not the condition of urban transport infrastructural facilities statis-

tically influences commuters overall satisfaction with urban commuting in the study area. Thus, the dependent variable (that is, the variable to be predicted) which is the overall satisfaction with urban commuting is dichotomously coded as strongly satisfied/satisfied [satisfaction] = 1 and dissatisfied/ strongly dissatisfied [dissatisfaction] = 0, while the independent variables (predictors) of condition of carriage-way capacity, road surface condition, passenger's shield, lay bye, road markings, road signage, vehicle/route information,

pedestrian crossing/walkway and pedestrian bridge were also coded on dichotomous basis (Not Available/Deplorable/Fair =0, Good/Very Good =1) see Table 7. However, this binary logistic regression analysis is used to model and examine the relationship between a dependent variable and independent variables as it establishes the extent of the relationship between a binary outcome variable and a group of predictor variables (see Table 12).

Interestingly, the model through the Chi-square result shown in Table 12 was used to test the overall significance of predictors (independent variables) in the binary logistic regression model as used. The results show a Chi-square value of 175.681 and probability of $p < 0.000$. Therefore, the dependent variable is significantly predicted by the independent variables (predictors). Hence, the commuters overall satisfaction with urban commuting is statistically influenced by the condition of urban transport infrastructural facilities in the study area. More so, to understand the extent of variation, the dependent variable can be explained by the model (the equivalent of R^2 in multiple regression), the result of Cox & Snell R^2 and Nagelkerke R Square values were both pre-

sented. Hence, from Table 12, the explained variation in the dependent variable based on this study model ranges from 35.5% to 69.7% respectively indicating a strong relationship between predictor and prediction.

Furthermore, the variables in equation Table 12 shows the contribution of each independent variable to the model and its statistical significance through the Wald Test (Wald column) and statistical significance of the test in the Sig. column (Table 12). From the result, condition of carriageway capacity ($p=0.019$), road surface ($p=0.032$), and pedestrian's shield ($p=0.000$) added significantly to the model prediction, while road signage ($p=0.326$), vehicle/route information ($p=0.816$), pedestrian crossing ($p=0.994$), lay by ($p=0.798$), pedestrian bridge ($p=0.935$), and road makings ($p=0.199$) did not significantly add to the model. Hence, only three (3) out of nine (9) predictors best predict the model. The findings depict that a unit change or improvement in the condition of the urban transport infrastructural facilities will bring an increase in commuters satisfaction with urban commuting in the study area.

Table 12. Binary Logistics Regression Analysis Classification Table

Table 12: Binary Logistic Regression Analysis Classification Table

omnibus Tests of Model Coefficients							
		Chi-square	Df	Sig.			
Step 1	Step	175.681	9	.000			
	Block	175.681	9	.000			
	Model	175.681	9	.000			
Model Summary							
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square				
1	109.793 ^a	.355	.697				
a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.							
Variables in the Equation							
		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 1 ^a	Road signage	-1.212	1.234	.964	1	.326	.298
	Vehicle/Route information	-.293	1.257	.054	1	.816	.746
	Carriageway capacity	1.834	.779	5.548	1	.019	6.258
	Road surface	1.470	.976	2.270	1	.032	4.348
	Pedestrian crossing	.006	.870	.000	1	.994	1.006
	Lay bye	.319	1.244	.066	1	.798	1.375
	Pedestrian bridge	-.036	.443	.007	1	.935	.965
	Road marking	.463	.360	1.651	1	.199	1.588
	Passenger's shield	4.329	.778	30.995	1	.000	75.880
	Constant	-2.725	1.461	3.479	1	.062	.066

5. Conclusion and Recommendations

This research had examined urban transport efficiency in Ibadan metropolitan area of Oyo State. The study was able to identify socio-economic attributes of commuters and resi-

dents as well as the pattern of movement and constraints to mobility in the area. Generally, the study observed a high rate of use of para-transit means of transport in form of cabs and minibuses, low use of high capacity mass transit as represented by Pacesetter Transport Service bus and non-usage of bicycles in the study corridors.

The study concluded that urban transport system in the study area is inefficient and not matured considering the poor operational characteristics of urban transport service which has been adversely influencing the level of satisfaction of urban trip makers compared to Lagos, the only city in Nigeria included in Urban Mobility ranking index [12, 16].

To have efficient urban transport system in the study area, it is recommended among others the use specified para-transit means such as taxi, motorcycles, tricycles, bus/minibus and unlicensed cab should to be thoroughly regulated. By this, the urban corridors should be judiciously used by high carrying capacity carriers with consideration for the actual and perceived volume of commuters and traffic generators. Thus, improved conventional public transport scheme along major corridors in Ibadan. This shall improve the safety and security of commuters and operators along the route. Second, considering the traffic volume and number of commuters and pedestrians along the corridor, pedestrians' facilities, most especially sidewalk and pedestrian bridge have to be adequately situated and provided at designated locations along the route for safety reasons; thus, the use of pedestrian crossing at such trunk A road should be discontinued.

Also, failed portions of the roads most especially at junction need urgent attention for fixing to ensure an efficient flow of traffic on those portions, and along the corridor. Fourth, urban transit infrastructure in the study area needs urgent improvement to make the city competes favourably with other major cities in the world. Specifically, route information, lay-by, dedicated lane and commuter waiting shed needs to be provided at specific locations along the route. Fifth, there is a need to harmonize the existing proliferation of bus stops and waiting for bays along the route in line with international best practices. Hence, the spatial examination of locations of existing bus stops has to be carried out to have a fair interval for new ones.

Also, urban transport service should be properly monitored and regulated by the government, while the proliferation of transit operators and services have to be checked and harmonized like being done in other major cities of the world. The present urban transport features such as negotiated fare, vehicle maintenance, branding, unscheduled services and sole operators have to be accurately regulated and controlled to achieve enhanced performance and improved urban transit services in the city. Thus, the use of an integrated transport system with smart information devices is highly recommended and encourage for better urban mobility and accessibility efficiency towards achieving sustainable development of Nigeria cities and the nation at large.

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