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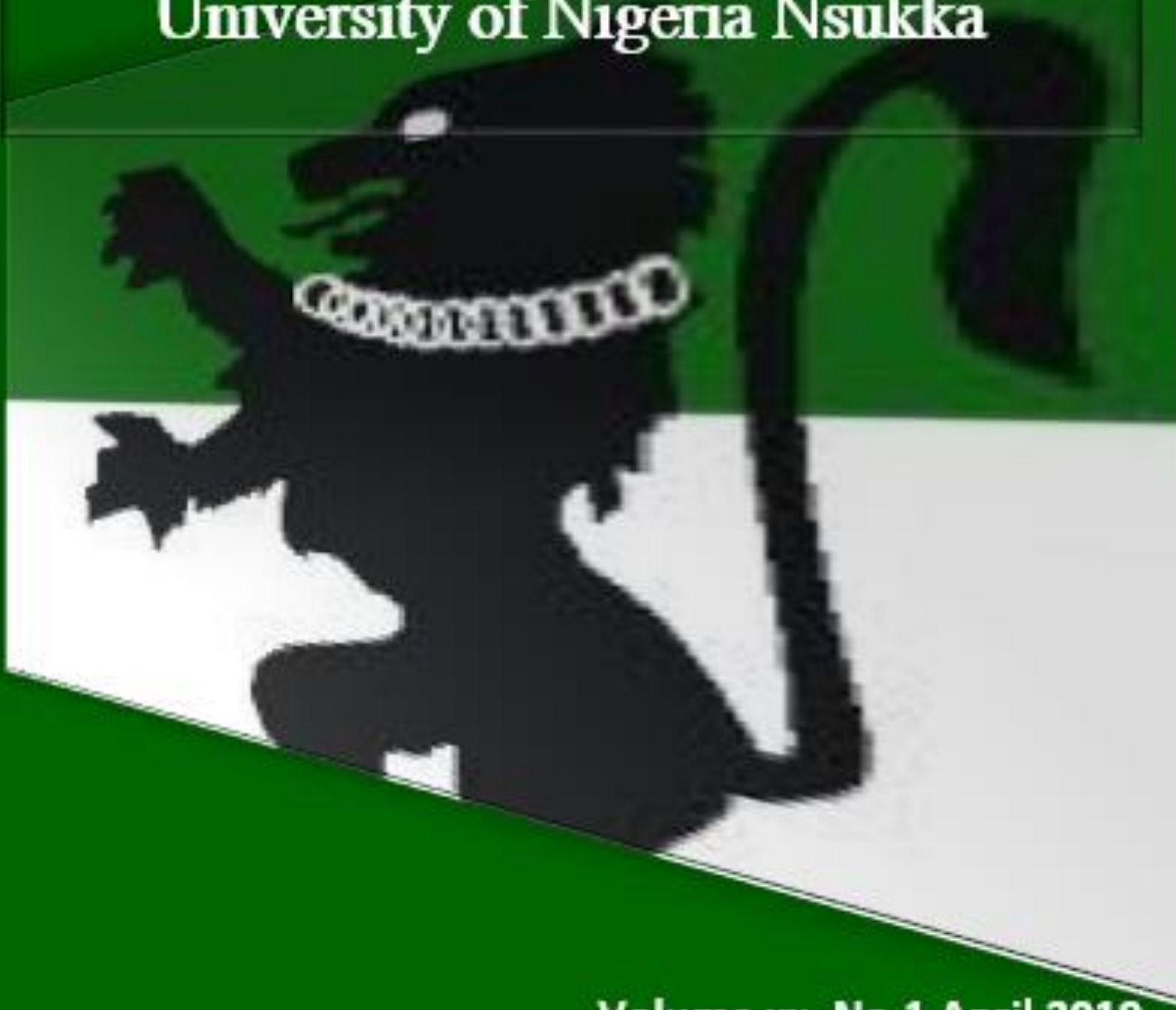

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Passengers' Satisfaction with Public Transportation Diversity: Implications for Rural Mobility in Enugu State, Nigeria

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Abstract

This study investigated passenger satisfaction with the service quality attributes of a diversity of public transport modes and their effects on mobility in rural Enugu state. Seventy sample public road transport hubs and five river ports were selected for this study. Passengers of rural public road and water transport modes were purposively selected to find their entire satisfaction and the variables that influence their satisfaction using a self-rating questionnaire. Data were analyzed using descriptive statistics, correlation, and principal component regression. The results of the analysis depict that passengers were not satisfied with the services provided with 4-wheeled vehicles and canoe boats, while the passengers in the study area were satisfied with motorcycle services provided. Three, two and three underlying factors that influenced passenger satisfaction with services provided with 4-wheeled vehicles, motorcycles and canoe boats respectively were identified. The strength of the dimensions influencing passenger satisfaction with the services of a diversity of public modes in rural Enugu state was identified and their implications for rural mobility discussed. Contingent on the findings, suggestions were made to enhance the services of the diversity of public transport modes to enhance mobility in rural Enugu state.

Key words: Passenger Satisfaction; Public Transport; Diversity; Rural Mobility; Implications

Introduction:

The word "rural" connotes different meanings to different people depending on their background. What is regarded in developed countries as rural may be regarded as urban in developing countries. Madu (2010: 1) defined rural areas "as areas of low population density, utilizing land extensively and exhibiting distinctive socio-cultural characteristics

associated with the rural setting". Rural areas in this study are referred to those areas in Enugu State with low population density, as well as those areas with high population density but in which a greater proportion of the inhabitants are predominantly engaged in primary production and equally lacking in most basic amenities. Unreliable services, low vehicle numbers and vehicle diversity, as well as poor integration of services and planning often explain the high transport costs and service gap in rural Nigeria (Ale, 2013; Sumaila, 2014) in which Enugu State is a part. For an efficient transport system, a diversity of modes is required. Good accessibility to rural areas is of paramount importance to the developing countries like Nigeria where rural population constitutes about 65.0% of the country's inhabitants (Omole, Owoeye and Ogundiran (2012)). The need to implement effective rural public transportation system to increase mobility and accessibility to essential services, make personal travels easier, and increase the quality of life for citizens in rural communities is undeniable (Majkut, 2011). Because rural people have low motorized vehicle ownership level, efficient transport systems are vital in rural communities to help them to overcome isolation and enhance their accessibility to basic needs of life. But the characteristics of rural areas present some barriers to improving and developing public transportation that will be accessible to majority of rural dwellers. For instance, rural dwelling and other centers of attractions are distributed over large areas; level of demand for transport is unpredictable, including low population density and very few potential number of passengers (Velaga, Nelson, Wright, Farringtor and Farringtor (2012). As a result, an effective rural transport relies on a variety of means or modes of transport to move passengers and goods, with the type and diversity depending on infrastructure, environmental conditions, users and demand (Starkey and Njenga, 2010). Improving sustainable rural mobility that will enhance the quality of life of rural people requires the support of transport diversity. Transport diversity (also called transportation options, and multi-modalism) refers to quantity and quality of transport diversity/options available in a particular

situation (Litman, 2014). In this paper, transport diversity refers to different public transport modes used in the provision of transport services in rural Enugu State. The objective of Nigerian Government in rural transport policy is to develop rural roads to facilitate rural accessibility (Draft National Transport Policy, 2010). As a result, transport planners and policy makers in Nigeria have focused on the improvement of rural roads as the main remedy to low mobility in the country on the assumption that private sector initiatives would respond to the resultant demand for transport services especially public transport service. In rural Enugu State, Minibuses, pickup vans, car taxis, trucks< 7tones, and motorcycles are used by private sector to provide rural public roads transport services while canoe boats are used to provide rural public water transport services in the riverine areas of the state. They are designed and used for moving people and goods from one place to another notwithstanding the poor operating environment. The operators of these vehicles often operate on poorly maintained and low-volume roads with poor safety standards. The vehicles are generally comprised of old ones and mostly provided by private sector. The combination of old vehicles and poor maintained rural transport infrastructures increase vehicle operating costs which are transferred to the service users and tend to be inflated because of the low density of demand. To improve rural public transport modes in rural Enugu state, it is important to find out from passengers themselves the improvements they need to enhance the services provided by the diversity of the mode options which can improve their mobility and accessibility to socioeconomic facilities in the area. This is because the provision of rural public transport services is passenger-centered. By identifying the key dimensions that offer value and influence passenger satisfaction, polices and strategies can be put forward to stimulate and enhance the use of diverse transport modes (both formal and informal ones) to provide efficient, affordable, frequent, more capacity, more comfort and safety etc to improve mobility in rural Enugu state. Previous studies on rural transportation services in rural Enugu state focused on effects of road transportation problems on rural

development (Eneje 2001), constraints to rural public transportation operators (Ali 2013), transport constraints on food crops production and marketing (Nnadi 2013, Asogwa, 2014), but the levels of riders' satisfaction with the existing services provided with a diversity of public transport modes have received little or no research attention. Assessing users' perception of the public transport services provided with the variety of transport modes is necessary to identify areas to improve rural transport services to enhance rural mobility in Enugu State. Thus, this study investigated the passengers' perceived level of services of public transport provided with a diversity of public transport vehicle options in rural Enugu State. Four basic objectives pursued to achieve this aim were to (1) understand the passengers' perception of quality of the service elements of public transportation provided with a diversity of the available public transport vehicle options in rural Enugu State; (2) identify the factors that affect their satisfaction with public transport services in the study area (3) assess the relative impact of the identified factors on the overall satisfaction of passengers with the public transport services(4) discuss the implications of the findings for rural mobility in the study area.

Materials and Methods

Study Area

Enugu State is one of the 36 States of the Federal Republic of Nigeria. The State is located approximately between latitudes 5^0 55' and 7^0 08' North of the Equator and longitudes 6^0 35' and 7^0 55' East of the Greenwich Meridian. The State is bounded in the East by Ebonyi State, in the West by Anambra State, in the North by Benue and Kogi States; and in the South by Imo State (See Fig. 1). The State is presently made up of 17 Local Government Areas (LGAs).

However, the present study covers only 14 out of the 17 LGAs. This is because the remaining 3 LGAs – Enugu East, Enugu North and Enugu South LGAs – are largely urbanized (Enugu State Government, 2006) and as a result, fall out of the scope of this study. The 14 chosen LGAs that make up the study area are Ani-Nri, Awgu, Ezeagu, Igbo-Etiti, Igbo-Eze North, Igbo-Eze South, Isi-Uzo, Nkanu East, Nkanu West, Nsukka, Oji-River, Udenu, Udi and UzoUwani

(See Fig. 1). Generally these LGAs have similar physical and socio-economic characteristics and they are mainly rural LGAs (Enugu State Government, 2006).

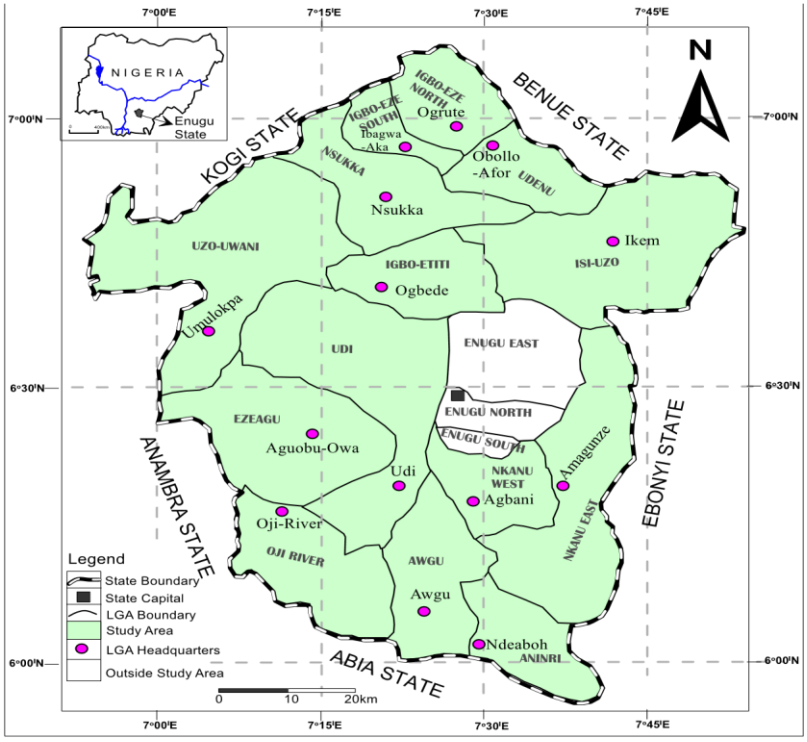

Fig. 1: Enugu State Showing the Study Area

Literature Review

Theoretical Framework

Expectancy Disconfirmation Theory

The expectancy disconfirmation theory was developed by Oliver (1980) who proposed that satisfaction level is a result of the difference between expected and perceived or actual performance. This theory suggests that consumers form satisfaction judgments by evaluating actual product or service. Barsky (1992) elaborates on the expectancy disconfirmation theory as the most acceptable theory used to explain the concept of customer satisfaction. It was developed in the field of marketing and later became popular in other scholarly domains such as information systems and electronic commerce. The Expectancy Disconfirmation theory posits that 'satisfaction is

related to the size and direction of the disconfirmation experience that occurs as a result of comparing service performance against expectations (Mattila, and O'Neill, 2003). Spreng and Page (2003), explain the difference between two concepts, that is, the pre-purchasing standard such as expectations or desires and the actual performance results to disconfirmation.

In Expectation Disconfirmation Theory, consumers look forward to a particular level of service before buying any goods or services. They then form positive or negative views regarding the service or goods bought. The consumers then compare their pre and postpurchase expectations to have an outcome of the overall satisfaction. It may be positive if the level of what they expected before buying the goods or services is lower than the actual service. On the reverse side, a negative disconfirmation occurs when service performance does not match up to the standard of service that was originally expected leading to lower satisfaction.

Positive disconfirmation takes place when the service provided is better that what the consumer expected or desired. Dissatisfaction also referred to as negative disconfirmation, occurs when actual performance has less than expected results. In a nutshell, satisfaction is the result of direct experiences with products or services, and it occurs by comparing perceptions against a standard, such as expectations. In this paper, it will be used as a lens of analysis.

The foundation for satisfaction lies in "mankind's ability to learn" from previous experiences (Peyton, and Kamery, 2003). According to the definition of customer satisfaction, satisfaction is a judgment that a service provides a pleasurable level of consumption-related fulfillment. Measuring satisfaction with travel services would entail travelers' judgments of their satisfaction with the whole or parts of the travel service (Okoth, 2017; Geo, 2018).

Customer satisfaction is a measure of how products and services supplied by a company or

an individual meet or surpass customer expectation. Satisfaction is one of the key factors which influence customer loyalty. The overall passengers' satisfaction with public transportation may be affected by the overall service quality. Frequency, punctuality, cleanliness in the vehicle, proximity, speed, fare, accessibility and safety of transport, information among other factors influence passengers' satisfaction (Pavhina, 2015). Satisfaction refers to the difference between consumer/passenger expectation and actual satisfaction (Shiau and Luo, 2012). Passenger satisfaction with public transport services in both urban and rural areas can be influenced by the service quality attributes (De Oňa, de Oňa, Eboli, and Mazzulla, 2013). Govender (2014) in the study of commuters' perceptions of bus and mini bus taxi services in Johannesburg ascertained that overall the perceived quality of public bus transport services exceeded that of minibus taxis, despite the minibus taxis being the dominant mode of public transport. Service quality dimension of transport service of reliability, extent of service, comfort, safety and affordability influenced the commuters'' perception of bus service quality, whereas only three, namely reliability, affordability and extent of the service, influenced their perception of the minibus taxis. A study carried out in Singapore revealed that there are four vital dimensions that should be considered in public transport service – connections extent of service, livable cities and inclusivity – all which enhances commuters' travelling experience (Land Transport Authority, 2013). International Association of Public Transport (2010) noted that service quality attributes of cheaper fares, travel time was reduced, waiting time at bus stops fell during peak and off-peak hours, improved safety and reliability of the new transport system, reduction of externalities: - Fuel consumption for vehicles improved public transport system in Lagos.

The types and characteristics of urban public transport services may differ from rural

public transport services where route coverage, fare system and fleet depend on the local needs (Rohani, Wijeysesakera, and Karim, 2013); Sham, Samsudim and Rahman, 2013). British Youth Council (2012) noted that only 33.5% of the Nigerian passengers felt that buses in their area were reliable whereas, while (35.8%) disagreed. Evaluating and measuring transport service quality remains challenging and important, since transport service quality comprises abstract and intangible constructs such as comfort and safety (Eboli and Mazulla, 2007); Beirko and Cabral, 2007.

Transportation diversity refers to the variety of mobility and accessibility options available in a particular situation, including various modes, services and destinations (Litman, 2018). A transport system must be diverse in order to serve diverse demands, including the needs of people who cannot, should not or prefer not to drive. Litman (2019) noted that efficient and effective transportation system must be diverse in order to serve diverse demands. For example, it needs active transport (walking and bicycling) for local trips, exercise and enjoyment; public transportation to provide affordable mobility for non-drivers, and automobile travel when it really is the best mode for a particular trip, considering all impacts. Since planning looks toward the future, it should consider the travel options that people are using, and how public resources (money and road space) should be invested to meet those demands especially demands for public transport services.

In Enugu State scanty studies of rural transport were carried out in different parts of the state, concentrating more on the impact of poor conditions of rural transport infrastructure and services on agricultural productivity and marketing without finding out the underlying causes of such poor conditions of rural transport systems (Ikejiofor and Ali 2014; Nnadi, 2013; Ali and Asogwa, 2017 and Oguejiofor, 2017).The poor conditions of rural transport infrastructure and services and bad accessibility and mobility difficulties between the rural regions or between rural and urban areas have been noted(Abugu,

2012; Ali, 2013; Enugu State Government of Nigeria, 2013). From the above studies in the study area, no study had investigated passengers' expectations with service quality in rural public transport services, involving formal and informal ones. Thus this study explored the quality of service elements that impact on the passengers' satisfaction with the services provided with a diversity of the available public transport vehicle options in order to make suggestions to improve rural transport systems to increase rural mobility to meet diverse transport demand of rural dwellers in Enugu State.

Sampling and Data Collection

Data were collected by the use of a questionnaire, field observations, and oral interviews between November and December 2018. The questionnaire used in the study was based on the published studies reviewed for this work, as well as in-depth interviews and extensive brainstorming. Rural commuters (both transit-dependent and choice transit riders) were the target population in this study. This is because they are alike in their use of public transport vehicles but diverse in their other characteristics (profession, age, income, mobility, and the like). Their judgments or opinions were mainly sought because they would be best able to evaluate the existing levels of rural public transport services provided by different public transport modes ─ minibus, pick-up, truck < 7 tons, car taxi, motorcycle and canoe boats − and passengers levels of satisfaction with the services of the modes in the study area. Five (5) transport hubs were spatially distributed and purposively selected from each of the 14LGAs giving a total of 70 transport hubs (ie, 5 transport hubs × 14 LGAs). Five river ports (three from Uzo-Uwani LGA and two from Ezeagu LGA where rural public water transport services are available were selected. This is because transport hubs and river ports are key locations where several routes (spokes) and means of transport converge and diverge which are central to the appraising of rural transport services (Starkey, Awadh, Fernando, Murray, Musonda, Njenga, Newport, Sire, Tapper, and Techinda,2006). Purposive sampling is type of nonprobability sampling

technique which is characterized by the use of judgment and deliberate effort by a researcher to obtain representative samples by including typical areas or groups in the samples (Kerlinger, 1986). The main goal of purposive sampling is to focus on particular characteristics of a population that are of interest, which will best enable the researcher to realize his/her research objectives. In the collection of data, the mode options were grouped into three – 4-wheeled vehicles (minibus, pickup, truck< 7tonnes and taxi car), motorcycles and water vessels. The checklist method was used to generate data on the satisfaction of passenger with the services of public transport mode options. The choice of the checklist was due to its comprehensiveness and potential method to suggest specific measurable indicators, (UNEP, 1995). The checklist was coded with Likert Five Point

Response Continuum

Scale where passenger strong positive satisfaction was rated 5, positive passenger satisfaction 4, undecided passenger satisfaction 3, negative passenger satisfaction 2, and strong negative passenger satisfaction 1**.** The checklist was administered to 700 passengers of public 4 wheeled vehicles and motorcycles from 70 spatially distributed and purposively selected rural public transport hubs from 14 LGAs under study (ie 10 passengers per transport hub). The 10 passengers were administered with checklist as follows− two passengers each of bus, pickup, truck < 7 tons, car taxi, motorcycle from each LGA. Furthermore 50 canoe passengers from five river ports (three from Uzo-Uwani LGA and two from Ezeagu LGA where rural public water transport services are available were selected (ie 10 canoe passengers per river port were administered with checklist). Respondents were asked to rate their general satisfaction with public water transport services provided by mode options and attributes of public water vehicle transport services that influence their satisfaction (Table 1)

Table 1: List of Rural Public Transport Service Quality Attributes Measures

Variable Code	Variable description
GS	General satisfaction of the rural vehicle public transport services
Q1	High frequency of service
Q2	Transport price is affordable
Q3	Short passenger waiting time at RPRTS stop
Q4	Vehicles are well maintained
Q5	Short passenger access distance to RPRTS stop
Q6	Service predictability
Q7	Short travel time in the vehicle
Q8	Enough space available for passenger
Q9	Road safety
Q10	Security on board
Q11	Behaviours of drivers and conductors are okay

Method of Data Analysis

Analysis of passengers' General Satisfaction (GS) (dependent variable) and specific service quality attributes (independent variables) of a diversity of rural public transport mode services was based on the frequency values obtained from the checklist. This enabled us to obtain the mean scores, standard deviations and variances of the frequency counts of the response values whose sum total is 15for each public transport service attribute. By dividing the total ratings of each variable gives us a mean of 3. Thus any mean above 3 indicates passenger satisfaction and below 3, indicates passenger dissatisfaction with service quality attributes and general satisfaction of rural public transport mode options. A mean of exactly 3 shows undecided on satisfaction level. Principal component analysis with the varimax orthogonal rotation method was used to remove auto-correlation in the data and extract the underlying dimensions of service quality attributes influencing passenger satisfaction with the diversity of public transport modes. Principal Component Regression (Sufian, 2005) was employed to measure the strength of the underlying dimensions identified.

Results and Discussion

Passengers' Satisfaction with RPRTS provided with 4-wheeled vehicles (bus, pickup, truck <7tonnes and car taxi).

The analysis of passengers' perception of the general satisfaction and the specific service quality attributes that affect their satisfaction with rural public road transport services provided with 4-wheeled vehicles in rural Enugu State using mean, standard deviation and variance is presented in Table 2. It is observed from table 1 that the general satisfaction of rural public road transport services provided with 4-wheeled vehicles is poorly perceived by the passengers in the study area with a means score of 2.6, standard deviation of 0.4 and variance of 02. The passengers tended to be dissatisfied with the most specific service attributes of rural public road transportation service provided with 4-wheeled vehicles in Enugu State as shown by the fact that 9 of the 11 specific service attributes have mean scores below 3.0 (means<3.0) (table 2). The specific service attributes of rural public road transport provided with 4-wheeled vehicles which were highly dissatisfied by passengers (means< 3.0) are high frequency of service, affordable price, short waiting time at RPRTS stop, vehicle maintenance, short access distance to rural public road transport service stops, high service predictability, travel time in the vehicles, enough space available per passenger and road safety. Variables that relatively received the highest scores are security on board with a mean score of 3.5 (mean>3.0) and behaviours of drivers and conductors are okay with a means score of 3.1 (means >3.0). In a nutshell, out of the eleven (11) service quality attributes of RPRTS provided with 4wheeled vehicles in the area, nine (9) were dis-satisfactorily perceived by the passengers while two variables – Q10 and Q11 were satisfactorily perceived by the passengers in the area.

Table 2. Mean Passenger Satisfaction Responses with the rural public road transport services provided with 4-wheeled Vehicles (bus, pickup, truck <7tonnes and taxi car) (N = 700).

Variable description	Mean	Standard deviation	Variance

General Satisfaction of 4-wheeld vehicle service			
High frequency of service			
Transport price is affordable			
Short passenger waiting time at RPRTS stop			
Vehicles are well maintained			
Short access distance to RPRTS stop			
High service predictability			
Short travel time in the vehicle			
Enough space available per passenger			
Road safety			
Security on board			
Behaviours of drivers and conductors are okay			

The conclusion from the analysis is that generally the passengers are not satisfied with the rural public transport services provided by 4-wheeled vehicle operators in rural Enugu State. Principal Component Analysis (PCA) was employed to collapse the 11 specific service quality attributes of rural public road transport services provided with 4 -wheeled vehicles into few orthogonal factors that could define broader areas of planning and action by the stakeholders in the provision of road public transport services in the area. The results of the analysis of the varimax rotated components matrix are depicted in Table 3 which succeeded in reducing the 11 variables to 3 components. The three components together explain 97.55% of the total explained variance. Component 1 has an eigenvalue of 6.722 and accounts for 61.1% of the total explained variance. The component has high positive loadings on Q1 (High frequency of service), Q2 (Transport price is affordable), Q3 (Short passenger waiting time at RPTS stop, Q6 (High service predictability), and Q5 (Short passenger access distance to rural public road transport service stops. Component 1 is generally describing functionality of service quality attributes affecting passengers' satisfaction in getting access to use rural public road transport services provided with 4-wheeled vehicles to get to their destinations in the area. Thus, component

I is identified **as accessibility to rural public road transport services.** Component 11 has high positive loadings on Q8 (Enough space available per passenger), Q4 (Vehicles are well maintained) and Q11 (Behaviours of drivers and conductors are okay). These variables are describing conditions in the vehicles that affect passengers' satisfaction in the use of the vehicles to transport themselves to their destinations in the area. Component II is then identified as **comfort in vehicles.** It has an eigenvalue of 2.284 which accounts for 20.59% of the total explained variance. Component III has a high positive loading on Q9 (Road safety) and a high negative loading on Q10 (security on board). It is generally describing the security of passengers and their luggage on board. Thus, the component shall be identified as **safety and security**

Table 3: Principal Component Analysis of Service Quality Attributes of RPTS provided with 4-wheeled Vehicles in Rural Enugu State.

Variable description	Components		
	1	2	3
High frequency of service	0.949*	-0.040	0.312
Transport price is affordable	0.929*	0.070	0.326
Short passenger waiting time for vehicle at RPTS stop	0.944*	0.060	0.322
Vehicles are well maintained	0.037	0.976*	0.203
Short passenger access distance to the nearest RPTS stop/hub	0.893*	0.023	0.443
High service predictability	0.826*	0.496	-0.009
Short passenger travel time in the vehicle	0.667	0.667	-0.134
Enough space available per passenger	0.045	0.984*	0.133
Road safety	0.191	0.554	0.788*
Security on board	-0.383	0.037	-0.916*
Behaviour of drivers and conductors are okay	-0.197	0.968*	-0.127
EIGEN VALUE	6.722	2.284	1.745
% EXPLAINED	61.105	20.583	15.860
CUMULATIVE %	61.105	81.689	97.550

*** Significant loadings +/- 0.70 at 95% confidence level**

The results of the general satisfaction were regressed on the three (3) dimensions – accessibility, comfort and safety and security– of service quality attributes of RPRTS provided with 4-wheeled vehicles that affect passengers' satisfaction to assess their consequences on the general satisfaction. The results are showed in Table

Table 4: The Regression model for 4-wheeledVehicles.

Independent variables	Unstandardized coefficient		Standardized coefficient	T	Sign (PValue)
	B	Std. Error	Beta		
(constant)	0.612	0.302		1.342	0.054
Accessibility to RPRTS Vehicles	0.378	0.124	0.425	2.924	0.031
Comfort in the vehicle	0.216	0.119	0.329	2.526	0.048
Safety and security	0.106	0.096	0.107	1.023	0.206

Multiple Coefficient=0.852; Coefficient of Multiple Determination (R^2) = 0.726; Standard Error of Estimate=7.821;Durbin -Watson Statistic =2.11; ρ< .05, Dependable variable: General Satisfaction Source: Fieldwork 2018

So, the satisfaction model of RPRTS provided with 4-wheeled vehicles is defined thus:

General satisfaction =0.61+0.43 (accessibility) + 0.39 (comfort) + 0.11 (safety and security) …….(2)

Equation 2 shows that the slope of the regression line is appreciably greater than zero and it indicates that general satisfaction of the passengers inclines to be increased as the three dimensions are increased. The equation also shows that the general satisfaction of rural public road transport services provided with 4-wheeled vehicle by passengers in the area will be 0.61% when all the 11 service quality attributes are at zero. The Multiple Correlation Coefficient of 0.852 produced by the regression means that the Coefficient Multiple Determination (R^2) is 0.726. In other words, the sum of individual contributions of all the 3 dimensions explained 72.6% of the variation in passengers' satisfaction of rural public road transport services provided with 4-wheeled vehicles. The Durbin-Watson Statistic which

was performed achieved a value of 2.11(Table 4). This falls within Durbin-Watson test range of between 1.5 and 2.5. The value for Rural Enugu State thus indicates that our data are truly independent which reflects a substantial absence of multicollinearity. Furthermore, the standardized regression coefficient Beta (β) values indicate that the dimension – "accessibility" has the greatest impact on passenger general satisfaction of RPRTS provided with 4-wheeled vehicles in the area. Accessibility dimension is followed by "comfort factor" (β = 0.392, p = 0.048), and "safety and security factor" (β = .106, ρ = 0.206). These results show that the shareholders in the provision of rural public road transport services using 4wheeled vehicles must pay the greatest attention to accessibility aspects of RPRTS in rural Enugu State, followed by comfort of passengers in the vehicles and lastly the safety and security aspects of passengers which does not contribute significantly as its p-value is greater than .05.

Passengers' Satisfaction with Rural Public Road Transport Services Provided with Motorcycles

Table 5 illustrates an analysis of passengers' specific services quality attributes that affect their satisfaction with rural public road transport services provided with motorcycles in rural area Enugu State by means, standard deviation and variance. The table 5, depicts that the general satisfaction (GS) of rural public road transport services provided with motorcycle has been satisfactorily perceived by the passengers in rural Enugu State with a mean score of 3.4 (means >3.0), a standard deviation of 0.3 and a variance of 0.2. Most of the specific service quality attributes of rural public road transport services provided with motorcycles have mean scores above 3.0 and were satisfactorily perceived by the passengers (table 5). Service quality attributes that were highly satisfied by the passengers are highly frequency of service,

vehicles are well maintained, short passenger waiting time at RPRTS stops, high service predictability, short travel time on the vehicle, enough space available per In summary, out of the 11 service quality attributes of rural public road transport services provided with motorcycles in the study area, 7 of them were satisfactorily perceived by passengers. The conclusion from the analysis is that motorcycle taxi passengers generally are satisfied with RPRTS provided with motorcycles in rural Enugu State.

Table 5: **Mean Satisfaction Responses on General Satisfaction and the Quality of Service Attributes of Motorcycles (N0 = 700)**

Variable description	Mean	Standard deviation	Variance
General satisfaction of motorcycle service	3.4	0.3	0.2
High frequency of service	4.1	0.4	0.1
Transport price is affordable	2.7	0.4	0.2
Short passenger waiting time at RPTS stop	3.9	0.5	0.3
Vehicles are well maintained	3.6	0.4	0.3
Short passenger access distance to RPTS stop	3.2	0.2	0.1
High service predictability	3.6	0.5	0.2
Short travel time on the vehicle	4.0	0.4	0.3
Enough space available per passenger	3.7	0.4	0.2
Road safety	2.6	0.3	0.2
Security on board	2.7	0.3	0.2
Operators behave well	2.8	0.4	0.2

The results of the analysis of the varimax rotated components matrix is showed in Table 6 which resulted in 2 dimensions which together explained 89.84% of the total explained variance. Component 1 has an eigenvalue of 7.361 and accounts for 61.34% of the total explained variance. The component has high positive loadings on M1 (High frequency of service), M2 (Transport price is affordable), M3 (Short passenger waiting time at rural public road transport service stops), M5 (Short passenger access distance to RPRTS stop), M6 (High service predictability) and M7 (short travel time in the vehicle). These variables are describing

access elements involve in making use of RPRTS provided with motorcycles in the area. Thus, component I is identified as **accessibility to motorcycle taxi services**. Component II has high positive loadings on M4 (Vehicles are well maintained), M9 (road safety), M10 (security on board) and M11 (operators behave well). This component is describing the safety and security of passengers and their luggage on board on their journey.

It is thus identified as **safety and security**.

Table 6: Results of the Varimax Rotated Principal Components Matrix of Service Quality Attributes of Motorcycle Taxi in Rural Enugu State

Variable Description	Components	
	1	2
High frequency of service	0.961*	-0.109
Transport price is affordable	0.985*	-0.146
Short passenger waiting time at RPTS stop	0.884*	-0.230
Vehicles are well maintained	-0.207	0.969*
Short passenger access distance to RPTS stop	0.973*	-0.221
High service predictability	0.871*	-0.164
Short travel time on the vehicle	0.905*	-0.120
Enough space available per passenger	0.669	-0.366
Road safety	-0.302	0.949*
Security on board	-0.204	0.970*
Operators' behave well	-0.159	0.971*
Eigenvalue	7.361	3.420
% explained	61.343	28.501
Cumulative %	61.343	89.844

***Significant loadings exceeding +/- 0.70, at 95% confidence level**

The general satisfaction scores were regressed on the two (2) dimensions─ "accessibility", safety and security" ─ of motorcycle taxi service quality attributes that affect passengers' satisfaction in the area, so as to assess their consequences on general satisfaction. The results are presented in Table 7.

Table 7: The Regression Model of Motorcycle Taxi

	Unstandardized coefficient		Standardize d coefficient	T	Sig. (p-value)
	B	Std Error	Beta (β)		
(Constant)	0.463	0.288		1.812	0.008
Accessibility to motorcycle services	0.316	0.208	0.386	3.763	0.003
Safety and security	0.269	0.164	0.207	2.021	0.043

Multiple Coefficient (R) =0.887; Coefficient of Multiple Determination (R^2) 0.787; $\rho < .05$; Standard Error of Estimate = 5.168; Durbin-Watson Statistic = 2.121. Dependent variable: General Satisfaction.
Source: Fieldwork 2018

So, the satisfaction model of RPTS provided with motorcycle taxi is defined thus:

Overall satisfaction = 0.46+0.39(Accessibility) + 0.21(safety and security) …..……(3)

From equation (3), it is observed that the slope of the regression line is greater than zero, meaning that overall satisfaction of the passengers tends to increase as accessibility, safety and security and factors are increased. The equation also shows that the overall satisfaction of motorcycle taxi services by the passengers in the area will be 0.46% when all the eleven (11) service quality attributes of motorcycle taxi are at zero. The level of variation for passengers' satisfaction with rural public road transport services provided with motorcycles has been computed to be 78.7%. This indicates that 78.7% of the variation in the overall passengers' satisfaction with rural public road transport services provided with motorcycles in the study area are explained by the 2 variables operating together. The Durbin-Watson Statistic which was performed achieved a value of 2.12 (Table 7). This value falls within DurbinWatson test range of between 1.5 and 2.5. The value for the study area thus shows that our data are truly independent which reflects a substantial absence of multicollinearity.

Again, the standardized regression coefficient Beta (β) values indicate that the underlying

factor – "accessibility" β=0.39, ρ=0.003 has the greatest influence on passengers' satisfaction of motorcycle taxi services in rural Enugu State. It is followed by "safety and security factor" β = 0.21, ρ = 0.043). These results show that the shareholders in the provision of motorcycle taxi services in the area must pay the greater attention to accessibility aspects of the services, followed by safety and security of passengers and their luggage on board on their journey.

Passengers' Satisfaction with Rural Public Water Transport Services (RPWTS)

Table 8 depicts the passengers' perception of the overall satisfaction with RPRTS in the study area provided with canoe boats compared by means, standard deviation and variance.

It is observed from Table 8 that the passengers' overall satisfaction with rural public water transport services (RPWTS) was perceived to be poor with a mean score of 2.7 (means<3.0), a standard deviation of 1.3 and a variance of 1.7. Most of the specific service quality attributes of rural public water transport services provided with canoe boats in Enugu State were not satisfactorily perceived by the passengers as their means scores are less than 3.0 (Table 8).

Table 8: Mean Satisfaction Responses on General Satisfaction and the Quality of Service Attributes of Rural Public Water Transport Services Provided with Canoe Boats (No = 50)

Variable Description	Mean	Standard deviation	Variance
General satisfaction of canoe boat service	2.70	1.3	1.7
High frequency of service	3.20	1.3	1.8
Transport price is affordable	3.16	1.4	1.9
Short passenger waiting time at river port	2.5	1.3	1.8
Canoe boats are well maintained	2.96	1.3	1.7
Short passenger access distance to RPWTS stop	2.46	1.3	1.6
High service predictability	2.74	1.3	1.7
Short travel time in the canoe boat	1.74	0.8	0.6
Enough space per passenger	2.56	1.3	1.6
Waterway safety	2.24	1.2	1.5
Security on board	2.76	1.3	1.7

Operators behave well	3.18	1.4	1.9

Source: Fieldwork, 2018.

The specific service quality attributes that did not meet the passengers' satisfaction are short passenger waiting time at river ports, canoe boats are well maintained, short passenger access distance to RPWTS stop, high service predictability, short travel time in the canoe boats, enough space per passenger, waterway safety and security on board. In summary, out of the 11 service quality attributes of RPRTS provided with canoe boat taxi in the study area, only 3 of them were satisfactorily perceived by passengers. The conclusion from the analysis is that canoe boat taxi passengers generally are not satisfied with RPRTS provided with canoe boat taxi in rural Enugu State. Principal Component Analysis succeeded in reducing the eleven (11) variables to 3 dimensions (See Table 9). The three dimensions together explained 92.74% of the total explained variance **Component 1** has high negative loadings on C1(High frequency of service) and C2 (Transport price is affordable) and has high positive loadings on C3 (short passenger waiting time at river port), C5 (short passenger access distance to RPWTS stop), C7 (short travel time in canoe boat), C6 (High service predictability) and C9 (Security on board).

Component I is generally describing the service quality attributes affecting passengers' satisfactory in getting access to the use of RPWTS to get to their destinations and the condition of being protected from or not exposed to danger. The component has an eigenvalue of 5.596 and accounts for 46.63% of the total explained variance. Component I is thus identified as **Accessibility and Security**. **Component II** has high positive loading on C4 (Canoe boats are well maintained) and C10 (Waterway safety). It has eigenvalue of 3.448 and accounts 28.73% of the total explained variance. Component II is generally describing the state of the conditions of canoe boat and the state of being safe along the waterways. Component II is then identified as **Maintenance**

and Safety. **Component III** has high positive loadings on C8 (Enough space per passenger) and CII (Operators behave well). It has an Eigen value of 2.085 and accounts for 17.34% of the total explained variance. The component III is describing the condition of passenger in canoe boat and behavior of operators towards the passengers in the canoe boat.

Component III is thus identified as **Comfort and Care.**

Table 9: Rotated Component Matrix of Boat Canoe Service Quality Attributes

Variable Description	Components		
	1	2	3
High frequency of service	-0.848*	0.289	0.434
Transport price is affordable	-0.772*	0.284	-0.479
Short passenger waiting time at river port	0.759*	0.245	0.159
Canoe boats are well maintained	0.014	0.967*	0.134
Short passenger access distance to RPWTS stop	0.923*	0.384	0.008
High service predictability	0.776*	0.445	0.379
Short travel time in the canoe boat	0.978*	0.143	-0.137
Enough space per passenger	0.772*	0.396	0.124
Waterway safety	0.829*	0.234	-0.072
Security on board	0.551	0.961*	-0.076
Operators behave well	-0.245	-0.069	0.964*
Eigen Value	5.596	3.448	2.085
% Explained	46.630	28.730	17.377
Cumulative %	46.630	75.360	92.737

*** Significant loading +-0.70**

The general satisfaction scores were further regressed on the three (3) dimensions of "**Accessibility and Security", "Maintenance and Safety" and "Comfort and Care**" of Rural Public Water Transport Services that affect the passenger satisfaction in Rural Enugu State to **assess** their **impacts on entire** satisfaction. The results of the analysis are **depicted** in Table 10.

Table 10: The Principal Component Regression Model for RPWTS in Rural Enugu State

Independent variables	**Unstandardized coefficient**		**Standardized coefficient**	**F-statistic**	**t-statistic (pvalue)**
	B	Std Error	Beta		

Constant	0.783	0.302		2.123	0.042
Accessibility and security	0.311	0.401	0.328	3.426	0.038
Maintenance and safety	0.156	0.321	0.140	1.883	0.046
Comfort and care	0.148	0.218	0.089	0.838	0.105

Multiple correlation (R) = 0.822 Coefficient of Multiple Determination (R^2) = 0.676 Standard Error of the Estimate = 5.868; Durbin-Watson Statistic = 1.896; Dependable variable:

General Satisfaction

The satisfaction model of RPWTS provided with canoe boats is shown in equation 7,

Overall Satisfaction (OS) = 0.78+0.33 (Accessibility and Security) + 0.14

(Maintenance and Safety) +0.09 (Comfort and Care) - - - - (4)

It can be seen from equation 4 that the slope of the regression line is significantly greater than zero. This means that the general satisfaction of canoe boat passengers tends to be increased as the three underlying dimension are increased. This equation also shows that the overall satisfaction with RPWTS by passengers in the study area will be 0.78% when all the eleven service quality attributes are at zero. Also from Table, the P-values for "Accessibility and

Security", and "Maintenance and Safety" and are less than 0.05, indicating that the two dimensions contribute significantly to the prediction of passengers' satisfaction level for RPWTS in the study area It is important to note that P-value for "Comfort and Care" is more than 0.05, depicting that the dimension does not contribute significantly to the prediction of passengers' satisfaction with level for RPWTS in the area. The Multiple Correlation Coefficient of 0.822 produced by the regression means that the Coefficient Multiple Determination (R^2) is 0.676. In other words, the sum of the individual contribution of all the 3 dimensions explained 67.6% of the variation in passengers' satisfaction with RPWTS in the area. The Durbin-Watson Statistic which was performed achieved a value of 1.896 (Table 10). This value falls within Durbin-Watson Statistic test range of between 1.5 and 2.5. The value for the study area thus

indicates that our dat a are truly independent which reflects a substantial absence of multicollinearity.

Furthermore, the standardized regression coefficient

Beta (β) values also indicate that the underlying dimension "Accessibility and Security" (β =0.33; ρs=0.038) has the greatest effect on passengers' overall satisfaction with RPWTS in the area.

It is followed by "Maintenance Safety" (β = 0.180, ρ = 0.046) and "Comfort and Care" (β =0.089, ρ =0.105). The results show that shareholders in the provision of Rural Public Water Transport Services in the area must pay attention to accessibility aspects as well as passengers' security; safety aspects of passengers and goods as well as the maintenance of their canoe boats; and lastly to comfort and care aspects to enhance the satisfaction level of their passengers.

IMPLICATIONS FOR RURAL MOBILITY

This study profiled a number/diversity of public transport modes currently available to rural public transport passengers in Enugu State. The study also identified the factors that determine the passenger satisfaction with the quality of services provided with the diversity of public transport modes in rural Enugu State. The study further revealed that passengers were not satisfied with the public transport services provided with 4-wheeled vehicles and canoe boats but that they were relatively satisfied with the public transport services provided with motorcycles. The identified determinants (the factors) of passenger satisfaction with the diversity of public transport modes services are: accessibility to public transport services, comfort and care in the vehicles and safety and security. The above findings have implications for mobility of people and goods in rural Enugu state. Firstly, the availability of diversity of public transport modes implies that captive public transport passengers (all things being equal) can choose the best mode with the most effective option to access goods, activities and destinations that are important to them such as employment, medical, markets

and educational centres and the likes. It will also enhance the personal and economic opportunities available to people who are physically and economically disadvantaged. Our models in this study identified poor accessibility to public transport services provided with 4-wheeled vehicles and Canoe boats. The implication of this is that many passengers do not really make effective use of available public transport service options provided by such vehicles. This is because passengers perceived that public transport price is not affordable and that public transport routes are very far away from them especially those people living in remote rural areas of the state. As a result, many captive public transport passengers dissipate energy and time to use the services of the public transport modes to reach their important destinations. Passenger satisfaction with public motorcycle transport services gives implications on the change of travel characteristics such as travel distance, frequency and travel convenience indicated by ease of obtaining service, high flexibility and high speed of motorcycle. All these features of motorcycle affect people's trip characters in rural Enugu state in terms of travel distance, frequency and ease of travel which are all mobility indicators that greatly enhanced people's mobility.

Apparently, the safety and security levels provided by a diversity of public transport mode options in rural Enugu State are some of the major elements that leave much to be desired, thereby reducing users perceived value and satisfaction with services provided by the public vehicle operators in the area. The implications of the situation are that (i) the operators of the public transport modes do not pay adequate attention to passenger safety and security in the vehicles. This is because the surveyed passengers perceived that majority of the diversity of public transport mode operators are indulged in excessive overloading and improper packing of goods, creating inconveniences to passengers and reduction of safety and security on the roads and also on rural waterways and (ii) the users of different public

transport modes to move themselves and their goods are limited by stress of fear of robbery, rapping, killings, kidnapping and road clashes. For instance, in Uzo-Uwani and Ezeagu LGAs where rural public water transport services are available in Enugu state, some people do not patronize water transport services because of the fear of the poor conditions of canoe boats and possible attacks on the passenger along the waterways. The present conflicts between Fulani Herdsmen and communities across the country leading to killings, kidnapping, and rapping have increased public transport insecurity in rural Enugu State. Our models also identified poor comfort and care of passengers in the diversity of public transport modes (4-wheeled vehicles and canoe boats) which implies that rural public transport mode operators do not pay adequate care for passengers and their comfort in the vehicles in terms of provision of comfortable seats, adequate legroom and window for airflows. The poor comfort and care situation do not encourage people (especially the choice public transport riders) to use the services provided by a variety of public transport mode options in rural Enugu state. Passengers' poor accessibility to the services of 4wheeled public transport mode options implies that most people in rural Enugu state do not find proper and affordable means of transport for their goods. For instance, lack/ inadequate transport services available to farmers in different parts of the study area make the transportation of agricultural products difficult and cumbersome (Nnadi, 2013; Asogwa, 2014). This situation makes the farmers to sell their agricultural products to middlemen in the farm or at the farm gate and such practices impact on lower price of agricultural products and famers do not have better bargaining power in determining that price. For smaller amount or less volume of goods, motorcycle is used to transport them. The use of motorcycle as goods transport performs poor behaviour of overloading baggage or improper packing, which creates inconvenience and reduces safety on road.

CONCLUSIONS AND RECOMMENDATIONS

This study has revealed the available diversity of public transport mode options (minibus, pickup, truck<7 tonnes, taxi car, motorcycle and canoe boat) that are used to provide transport services to rural dwellers in Enugu State. The study also revealed that the users/passengers were not satisfied with the services provided with minibus, pickup, truck <7 tonnes, taxi car and canoe boats, but that the riders were comparatively pleased with the services provided using motorcycles. The input of this research into the literature is the identification of accessibility, safety and security, riders' comfort and care as the major factors that determine passenger satisfactions with the quality of services provided by a diversity of public transport modes operators in rural Enugu State. The study thus provides directions for a diversity of rural public transport modes operators and transport planners in Enugu State and the areas for improvement to meet the passenger satisfaction of the diversity of transport services provided by different modes in rural Enugu State. From the results of the analyses discussed above, we proffer these suggestions**.** Both state and local governments should improve accessibility and serviceability of rural transport infrastructure to encourage operators of different public transport modes to provide services to majority rural areas especially to deep and remote rural areas in the study area. Government−community participation in the provision of rural public transport services should be embarked upon to enhance the efficiency and availability of public transport services to majority of rural dwellers in the State. Available navigable rural waterways in Uzo-Uwani and Ezeagu LGAs should be dredged and water weeds cleared by governments to improved water transport services and make them accessible to rural people to enhance their mobility especially those that are living in the areas not accessible by roads.

Safety and security workers should monitor the operators of rural public transport modes to ensure that the operators maintain their vehicles

and avoid overloading to enhance safety and security and comfort riders on roads. The operators, passengers, safety and security workers (Both government and community security operatives) should work at tandem to achieve optimal public transport safety and security across rural Enugu State. This is because security issue is a collective responsibility. The issue of cattle herdsmen's threats to security in Nigeria should be seriously and urgently tackled to enhance security of operators and passengers in rural Enugu State. Implementing these proffered solutions above will increase the rural mobility of people and their goods through the use of diversity of public transport modes available in the area.

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