VOL. 17 NO. 2
ISSN: 2010-1086
MARCH, 2020

African Scholar Publications & Research International

African Scholar Journal of African Sustainable Development (JASD-2)

Re-Engineering African Socio-Economic Development through Rural Transport Services Optimization

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Abstract

Rural areas are of utmost importance to the socio-economic and industrial growth of any developing economy. The need to re-engineering African development through rural transport services optimization becomes indispensable to checkmate increasing depopulation of rural areas and increase socio-economic sustainability. It is on this basis that this study appraised rural transport services in Oyo State. The paper examined residents' socio-economic profile, trip characterization, routes and vehicles' characteristics used for rural transport services in addition to the quality of transport services towards evolving mechanisms to foster socio-economic development of the state within the national context. 120 copies of questionnaires were administered through systematic random sampling for residents in Oyedeji, Lagun and Akitiko in Lagelu Local Government Area of Oyo State. Both descriptive and inferential (Mean Weighted Value and Regression) statistics were used for data analysis. Findings revealed that over 60% of the residents engaged in agricultural related activities and mostly rely on para-transit means, particularly motorcycles (67%) for mobility. Unfortunately, most of the bituminous rural-urban roads are in poor condition (62.5%). The regression analysis result shows that the performance of rural transport service significantly influences the socio-

economic variable (income) (p=0.000 ≤ 0.05). The study concludes that rural-urban trip pattern is usually restricted to less than 5km daily movement and that, desired attentions are not being accorded to rural transport infrastructural facilities considering the overall quagmire characterized by passenger and freight movements. The study recommended improvements in the quality of both inter rural and rural-urban road networks; and regularization of the use of motorcycle for public movement.

Keywords: *Rural area, commuters, rural transport, transport service and Oyo State*

Introduction

Rural areas are undoubted of utmost important to the socio-economic and industrialgrowth of cities and other large urban settlement. The importance of rural areasto all spheres of the national economy and industrial quests are enormous as the contributions of the rural economy to the overall growth of nations have well been recognized and acknowledged in literature over the years. The rural economy focuses on the optimum harnessing of rural resources for enhancement of the living conditions of the rural dwellers in particular and the entire country as a whole. In harnessing and exploring resource endowment of rural areas, transportation plays an important role in which its inefficiency is highly felt by rural dwellers in particular and the society in general.

According to Fasina, Akanmu, Adesanya and Salisu (2020), transport facilitates interaction and productive activities in both rural and urban settings. The supply and distribution of farm inputs and evacuation of farm produce to various markets as well as access to public facilities are among the notable roles being played by transport system in rural areas; hence, spatial interaction within and between rural areas and their urban counterparts are enhanced by rural transport services. The general poor transportation network and transport services that characterized many rural areas in Nigeria and Africa, in general, are a major constraint to their socio-economic growth and pace of development (Wear, 2009). This had made rural areas to remainisolated from the mainstream of modern

societies with the population continuing to deplete at a high rate. It is widely acknowledged that rural areas engage in primary activities that form the foundation for any economic development (Olayiwola and Adeleye, 2005). However, rural areas in Africa remain cut-off from the mainstream society due to inadequate and less functional transport facilities and services, while agricultural potentials, abundant natural resources and viable rural enterprise that abound in commercial quantities are left fallow and unexplored. According to the Federal government of Nigeria (FGN, 2007), the country is mostly dominated by the rural population in which around 70 per cent of its populace depend on agriculture as their main income.

Precisely, most of the rural roads in Africa communities are in poor and deplorable conditions. This situation is a detriment not to the only local economy but by extension slowing down the trend of development of the national economy. Also, it is disheartening seeing the declining nature of rural transport infrastructure in the country and the African continent. With this, movement of people and evacuation of agricultural produce to market places are at exorbitant costs and inconsistently irregular and inefficient. Moreover, much agricultural produce especially, the fruits, vegetables and other perishables usually lost value and diminish in quality due to the poor quality of transport services. Therefore, this depreciation in the quality of such products results in a reduction of market prices as well as facilitating high rate of loss incurred by both the farmers and those trading in agricultural commodities (Fasina et al., 2020). Such situations discourage farmers and farming as it ushered in a high rate of loss being incurred in the process with accompanying detrimental effects on national growth and productivity. It is based on the backdrop that the need to re-engineer African development through rural transport optimization becomes indispensable to checkmate increasing depopulation of rural areas, increase socio-economic productivity and sustainability of the local communities and the continent at large. Hence, this study appraised rural transport services in Oyo State to evolve mechanisms to foster the socio-economic development of the state within the national context.In achieving this study aim, the following objectives were pursued: examined the socio-economic characteristics of residents; appraised trip characterization of the residents; analyzed the characteristics routes and vehicle

used for rural transport services as well as examine factors that determine the quality of transport services in the study area.

Conceptual Underpinning

The Concept of 'Spatial Interaction Theory and 'Spoke and Hub model' was used for this research work. First, Ullman (1956) propounded the spatial interaction theory while explaining interactions taking place on space. The theory centred on three concepts namely regional complementarity, intervening opportunity and transferability. The spatial variation of resource endowment makes two different regions interact to complement each other. Regional complementarity is created by area differentiation in the availability of resources, goods and services (Okoko, 2018). This results in different areas being able to provide goods and services. Therefore, for movement to take place there must be a demand for a particular product in one region and the other region must be capable to supply that product. This situation best explains the relationship that exists between residents of Lagelu local government area and other urban/rural centres in Ibadan and Nigeria. It is the complementarity of demand for and supply of products and services between the rural area and urban areas that bring about the interactions between the two areas.

However, complementarity generates interaction in the absence of intervening opportunity. This means that interaction could only take place between the two regions provided there is no alternative place for meeting the demand between the two places. An intervening opportunity, therefore, could be regarded as negative as it prevents movement to take place between two points even if they are complimentary. The concepts of intervening opportunity and complementarity to a great extent explain the rationale for interactions between two spatially separated points. Hence, transferability is equally applicable to this study.

Transferability refers to the friction of distance which could be measured in time and cost. With this, if the time and cost of transferring to a distance are too much, movement may not occur despite complementarity and in the absence of intervening opportunity. According to Ogunsesan (2015), the real cost of goods includes all the costs associated with movement such as the price of transportation, insurance in transit, pick-up and delivery charges, storage charges and as well as time lost in transit. This means that, if locations A and B

are complimentary and there is no intervening opportunity, then interaction can only take place between the two areas provided the cost of providing transport service is affordable and cost-effective. Transport ensures the spatial interaction from one origin to another (i.e. destination). Conclusively, road networks are the backbone of modern society and its reliability is, thus a decisive factor not only in terms of market outreach and competition but also in terms of continuity of its service.

Second, the Hub and spoke model is widely used in the aviation sector of transportation in which reliability and efficiency are key issues in the establishment and management of freight distribution systems. Optimum locations for the hubs are sought with the possible delivery routes to avoid unnecessary movements, congestion and assure timely delivery. In spoke-hub model, all routes move along the spoke passing through a central hub arranged similarly to a bicycle wheel, and the concept reduces the number of routes and ensures efficient use of scarce transportation resources; and as a result has natural superiority for speedy delivery of packages while package sorting are consolidated at the hub before distribution to various destinations and finally fragmented for onward dispatching to final recipients (Akanmu, 2008 and 2013). The hub is a central point for the collection, sorting, transhipment and distribution of goods for a particular area. This concept describes collection and distribution through a single point.

The hub and spoke concept have also been used in economic geography theory to classify a particular type of industrial district. This concept facilitates traffic movement from point of origin to a central point for onward movement to final destinations. This concept recognizes the existence of central points which are served by several minor points and help to reduce waiting times for passengers and freight. Supporting this view, Musonda and Starkey (2006) observed that once in a while, traders come and buy their crops for cash as well as not normally come with big trucks, because of the poor roads. As a result, the farmers sell their products cheaply to the traders, while traders or farmers consolidate their loads and then hire transport to the market town.

Literature Review

Rural transport is the movement of people and goods by any conceivable means for any conceivable purposes along any conceivable route (Donnges, 2001).

With this, people move themselves and their goods around in rural areas to a variety of subsistence, social and economic purposes. Rural areas are of immense assets to any nation. Transport underpins the economic and employment development strategy of many local communities (Wear, 2009). Okoko (2011) observes the invaluable roles of transport in the development of any geographically organized area. This is as a result of the fact that transport services in an area (rural or urban) determine the extent of socio and economic development of such area. With this, there is a socio-economic impact of rural transport intervention on poverty alleviation (Howe, 2001). According to Olayiwola and Adeleye (2005), rural areas in Nigeria are inhabited by the bulk of the nation's population and serve as the base for the production of food and fibre aside from being major sources of capital formation and the principal market for domestic manufacturers.

In their contributions, Musonda and Starkey (2006) are of the view that transport infrastructure appears to be a significant concern for most rural households as lack of access to social services, markets and agricultural inputs usually affect the sustainability of livelihoods and contribute to poverty. Also, the impassability in the rainy season particularly affects incomes as traders cease to buy produce from the village, while there is dissatisfaction with the government's attitude over rural road maintenance and its impact on mobility and accessibility was repeated throughout the areas surveyed. Therefore, the severity of the road condition and its adverse impact on service provision and income-generating capacities are a major setback to the economic prosperity of rural areas. With this, villagers are convinced that sustained road rehabilitation would lead to increased traffic flow and reduced transport fares because of increased competition and profitability of transporters. Mobility of the rural people, especially in the village spokes, is a good indicator of their income levels.

With the shortage of efficient Rural Transport Services, intermediate mode of transport (IMT) provides an important link between rural and urban/market towns as well as provide a link for the rural population to faster forms of motorized transport provided by the private sector and as such, would greatly alleviate rural transport services. The problems of rural transport and inaccessibility cause isolation which is a major interlocking dimension of poverty (Shai and Thapa, 2009). Thus, construction of roads alone does not

guarantee better accessibility to services as several thousands of kilometres of rural roads are inefficient to provide safe and affordable transport services. Hence, efficient transport services are essential for attaining economic goals and overall development. Thus, profit-oriented transport services and poorly maintained roads are among the major impediments to better mobility and accessibilities of rural areas.

Rural transport services are not constant, but vary greatly, with daily, weekly, monthly and annual fluctuations as periodic markets such as weekly or monthly cause major surges in traffic, as can holidays and festivals (Starkey, 2006). Harvest times stimulate itinerant traders to visit rural areas whereas closed seasons can significantly reduce transport. Some roads are completely impassable during the rainy seasons, bringing motorized traffic to a halt. The fluctuations in traffic affect rural people, who may adjust their travelling, produce sales and family visits accordingly. Also, the fleets of transport service vehicles such as buses, trucks, minibuses and taxis that operate within rural areas are extremely small.

According to Starkey (2006), most vehicles are very old (often more than twenty years) and have been bought when they were already well used. Therefore, the amount of capital invested in rural transport vehicles is very low and ranges from one to ten dollars per head of population. Hence, rural transport services appear to have low profitability as individuals operate within the informal sector. Thus, there are few, or no, private transport firms operating in the formal sector.Accessibility is very vital to rural dwellers (Jaji, 2011) as it provides the ease with which members can reach land use activities with transport ease. Thus, there is a significant relationship between accessibility and level of productivity of rural dwellers and the society at large. In their contribution, Aderamo and Magaji (2010) are of the view that poor transportation in the rural areas has resulted in low productivity, low income and consistent fall in the standard of living of rural residents including a high rate of poverty.

Most rural roads in Nigeria, due to their poor condition imposed significant costs to the national economy especially, to the agricultural activities. This is due to increased vehicle operating costs and travel times (FGN, 2007). Thus, government strategy to improve accessibility and mobility of rural people is mostly restricted to the extension of rural roads which have little impact on the

people and economy. Hence, low traffic volumes, periodic variations, and seasonality in the demand are among the attributes of rural transport and its services.

Silva (2013) recognized lack of access to transport as one of the major barriers that prevent pregnant women experiencing obstetric complications of receiving specialized care and that appropriate interventions at different levels must be carried out to tackle the problem and contribute to an effective referral system. She concluded that the involvement of the private sector and the use of an established transport system to implement a low-cost emergency transport scheme can contribute to greater availability of transport in rural areas. However, other socio-economic emergencies such as evacuation and movement of rural perishables are excluded in the study.

Materials and Methods

The study covers Lagelu Local Government Area of Oyo State, Nigeria with emphasis on rural transport services in the rural settlements of Oyedeji, Lagun and Akitiko in the area in LageluLocal Government Area (LLGA). LLGA is situated in Oyo State with its headquarters located at Iyana-Offa, on latitude 7^0 25' North and longitude $3^0$5' East (Ajayi et al, 2012). Geographically, the study area is bounded in the North by Osun state and partly by Akinyele Local Government, in the South by Egbeda Local Government, in the East by Iwo Local Government and in the West by Akinyele Local Government Area. With a population of 147,957 at the 2006 census (NPC, 2007),

This research work was carried out through the use of both primary and secondary sources of data collections.To identify accessibilities and mobility challenges in the study area, road inventory survey was conducted and encompasses the physical examinations of the roads concerning their existing conditions, width, length, nature, conditions of bridges, culverts, surfacing, drainages and the rate of their maintenance to determine their conditions for transporting people and agricultural freight in the areas.

Also, traffic count was carried in the area to ascertain the volume of traffic flow on the major routes and to assist in obtaining the practical capacity of roads in the area. This involved the demarcation of the cordon in the area and enumerators assigned to specific portion to record the type and number of vehicles passing the cordon area. Two different sets of questionnaire were

administered to the residents and the transport service operators in the area. The first set of the questionnaire was administered to the rural populace to seek information on their travel pattern, modal patronage and challenges being faced in their daily movement concerning rural transport services.The second set of the questionnaire was administered to the transport service providers/operators to elicit data on their nature and pattern of services, tariff and maintenance of vehicles as well as challenges being faced.

Based on the National Population Commission census (2006), the three villages namely Oyedeji, Lagun and Akitipo's population projected to 2019 revealed 1,856, 4,082 and 1,351 people (male and female) respectively. These population figures formed the sampling frame for the rural residents in the three areas under study. To make the sample proportional, two (2) per cent of the total population of the rural residents in the study area was selected through the simple systematic random sampling technique. This accounted for 38, 82 and 27 copies of questionnaire administered in Oyedeji, Lagun and Akitipo communities respectively. Meanwhile, out of the total of 147 administered, only 120 copies (38, 55 and 27 in Oyedeji, Lagun and Akitipo villages respectively) were retrieved and used for analysis. In other words, the postulated hypothesis(performance of rural transport service does not influence the socioeconomic characteristic (average income) of respondents in the study area) was tested inferentially using regression analysis aside fromdescriptive analytical techniques used for the data analysis.

Data Analysis and Discussion

This chapter presents the analysis and interpretation of data collected from both commuters and operators of transport service in the three selected areas namely Oyedeji, Lagun and Akitiko in Lagelu Local Government Area of Oyo State. The analyzed data is, therefore, the structure under different readings. For the commuters, the discussion is structured under personal data, trip-making and road characteristics, while that of operators was structured as personal data, nature of vehicle used for operation, road infrastructure and patronage of transport service.

Socio-Economic Characteristics of Respondents

This section discussed the socio-economic characteristics of commuters in Oyedeji, Lagun and Akitiko areas of Lagelu Local Government of Oyo State.

The variables discussed include gender classification, age, highest educational qualification, marital status occupation and their income. The analysis showed that less than two-third (59.2 per cent) of commuters are male while the remaining that are more than one-quarter (40.8 per cent) are female. This showed that male respondents were more available than their female counterpart in the study area during the data collection exercise. Also, it is observed in Table 1 that one-quarter of commuters each are 34-44 years (30.8 per cent) while almost one-third (32.5 per cent) is 55-46 years, and those who are 65years and above are slightly less than one-tenth (8.3 per cent). Also, respondents who are 24-34year accounted for 5.8 per cent while the remaining 3.3 per cent are those below 24years among the sampled commuters in the study area. This showed that significant proportions of respondents are within the working population since only 8.3 per cent is 65years and above representing the ageing population in the study area.

Table 1: Age classification of committers

Age (in years)	*Frequency*	*Per cent*
Below 24	4	3.3
24 – 34	7	5.8
35 – 44	30	25.0
45 – 54	30	25.0
55 – 64	39	32.5
65 and above	10	8.3
Total	120	100.00

The highest educational qualification of commuters showing in Table 2 showed that less than one-tenth (5.8 per cent) have no formal educational qualification, while more than one-quarter (30.8 per cent) has Primary School Leaving Certificate. Commuters with Senior School Certificate in the study area are slightly more than half of the respondents (50.8 per cent) sampled while those with higher educational certificate accounted for one-eighth (12.5 per cent) of commuters sampled. This showed that respondents are academically literate and educated; and their views worth reliving on as true reflections of rural transport service in the area under study.

Also, the classifications of occupation shown in Table 2 revealed that more than one-third (45.8 per cent) engaged in a primary occupation which is characterized by the cultivation of land and other agriculturally related engagements. Also, far less than one-tenth (5.0per cent) engaged in a secondary occupation which is defined by the transformation of raw materials into a semi and finished goods i.e. agro-allied production. Respondents who engaged in tertiary production such as the rendering of service like barbing hairdressing, driving and riding of commercial motorcycles accounted for one-eighth (12.5 per cent) while more than one-third (36.7%) have other unspecified occupations.

Table 2: Highest educational qualification and occupation

Qualification	*Frequency*	*Per cent*	*Occupation*	*Frequency*	*per cent*
No formal education	7	5.8	Primary	55	45.8
Primary school certificate	37	30.8	Secondary	6	5.0
Senior School Certificate	61	50.8	Tertiary	15	12.5
Higher Education Certificate	15	12.5	Unclassified	44	36.7
Total	120	100.00	Total	120	100.00

The analyzed data of commuters' income showing in figure 1 that less than one-tenth (5.8 per cent) have below N20,000 as average monthly income, while slightly more than a quarter (26.7per cent) earns N20,000–N35,000 averagely and on monthly basis. Also, slightly less than a quarter (23.3 per cent) have average monthly income N35,000–N44,000, while another more than a quarter (27.5 per cent) earn N45,000–N54,000 monthly and the remaining 16.7 per cent have average monthly income of N55,000 and above. This showed that the majority of the commuters have an average monthly income that exceeds the N18,000 National Minimum wage in the study area.

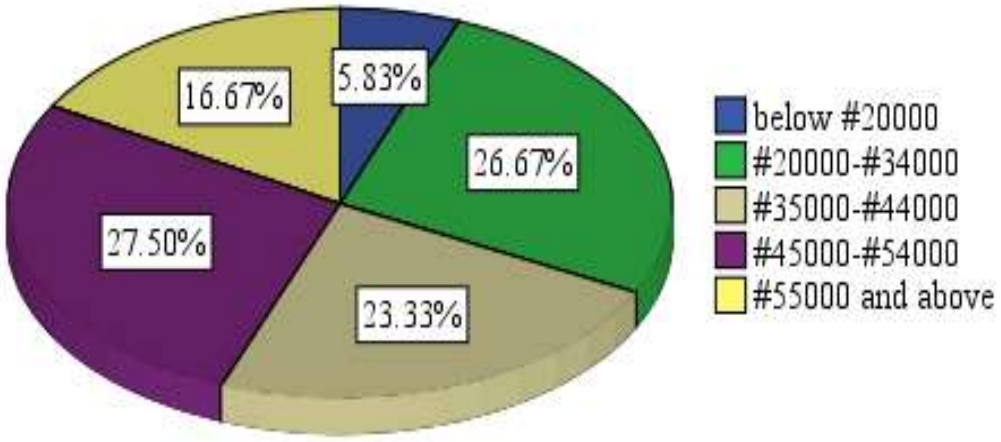

Figure 1: Average Monthly Income of Commuters

Data analysed on the marital status of commuters as showing in Table 3 revealed that nearly three-quarter (89.2 per cent) are married, while almost one-tenth (9.2 per cent) are single. The remaining 1.7 per cent of the respondents are divorced. Hence, commuters patronizing transport service in the study area has a different marital status which is capable of influencing transport service patronage. Also, Table 4 showed that more than a quarter (29.2 per cent) of commuters has a household size of 1-3 persons while more than half (55.8 per cent) have a household size of 4-6 persons. Also, more than one-eighth (14.2 per cent) of respondents has a household size of 7-9 persons and the remaining 8.0 per cent have a household size of 10 persons and above. This shows that the majority of commuters have a household size of more than 3 persons retesting possible demand factor for transport service in the area.

Table 3: Marital Status and household size of Commuters

Status	*Frequency*	*Per cent*	*Size*	*Frequency*	*Per cent*
Single	11	9.2	1-3	35	29.2
Married	107	89.2	4-6	67	55.8
Divorced	2	1.7	7-9	17	14.2
-	-	-	Above 9	1	8.0
Total	120	100.00	Total	120	100.00

Trip Making andCharacterization

Section 4.2 presents the results of analyzed data on trip making and characterization of commuters in the study area. The variables explained in this section include vehicle ownership, means of transport mostly patronized by the commuter,rationales/reasons for modal choice patronage,trip distance and among others. Accordingly, Figure 2 shows that more than half of commuters (56.7per cent) have no personal vehicle, while one-third (33.3 per cent) has a motorcycle and slightly less than one-tenth (8.3 per cent) has a car in the study area. Also, the respondent who owns bicycle and bus accounts for 0.8 per cent each among the sample population. This showed that a significant proportion of commuters who do not have personal vehicles could rely on public transport operations in meeting their mobility needs within the study area and beyond.

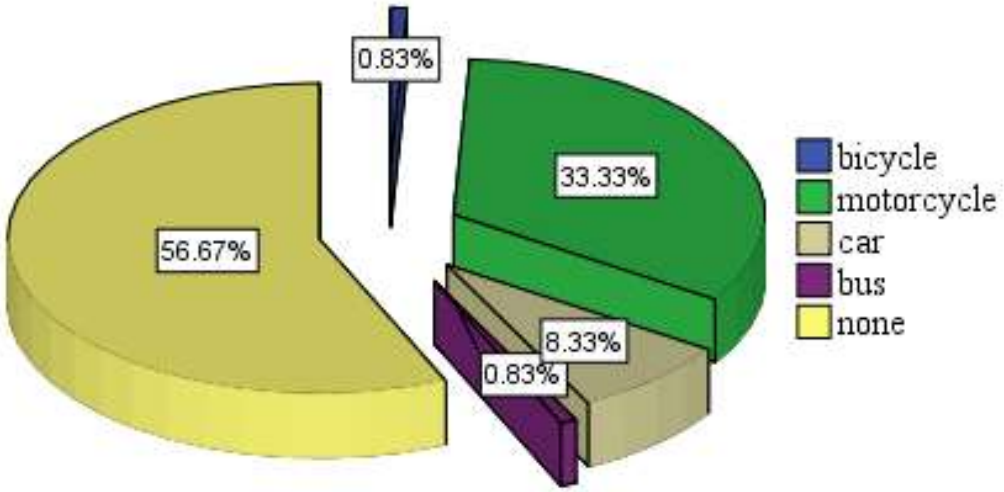

Figure 2: Vehicle Ownership of Respondents

Table 4 showed various means of transport service patronized by the sampled respondents and the rationales for such patronage. On the patronized means of transport, slightly more than half of the respondents (63.3 per cent) patronized motorcycle while slightly less than one-third patronized Taxi/cab. However, the remaining percentage were shared among other modes including bicycle (1.7 per cent), foot-mobile (6.7 per cent), car (3.3 per cent), adapted van (4.2 per cent) and Bus/truck (8.3 per cent). In the same vein, availability of modal choice accounted for slightly less than two-third (58.3 per cent) of total responses analysed while the speed of the vehicle accounted for one-fourth (25 per cent)

of the rationales for patronizing specific means of rural transport service among the respondents. In other words, the remaining percentage were shared among affordability of mode (2.5 per cent), vehicle capacity (less than one per cent), safety (8.4 per cent) and convenience (5.0 per cent). Therefore, while motorcycle and taxi dominant modal choice for rural commuting, availability of mode and vehicle speed accounted for the most dominant reasons for modal choice and patronage in the study area.

Table 4: Means of Transport Patronized and Rationales' for the patronage

Means of Transport patronized			*The rationale for the patronage*		
Means	Frequency	Per cent	Reasons	Frequency	Per cent
Foot-mobile	8	6.7	Availability	70	58.3
Bicycle	2	1.7	Affordability	3	2.5
Motorcycle	76	63.3	Speed	30	25.0
Taxi/cab	15	12.5	Capacity	1	0.8
Personal car	4	3.3	Safety	10	8.4
Adapted van	5	4.2	Convenience	6	5.0
Bus/truck	10	8.3	Total	120	100.0
Total	120	100.0			

Further investigations was conducted on the assessment of modal choice and level of patronage by residentsin the study area using Mean Weighted Value-based points Likert's scale. Table 5revealed the results of the Relative Index of the Mean Weighted Value. The five-point Liker's scale was analysed with the values assigned to the variables that consist Not Available (NA=1), Not Patronized (NP =2), Fairly Patronized (FP=3), Patronized (P=4) and Very Patronized (VP=5). With the Mean Index Value (MIV) of 3.073, it is observed that foot-mobile/walking is still very common and most popular among the commuters for a short-distance trip as it has RIM of 4.05 which is far exceeding the average mean index value of 3.073.

Aside from walking, the use of motorcycle and bus ranked second and third among the variables used, signifying the relevance of the duo to the mobility of

commuters in the study area with RIM of 3.925 and 3.558 respectively. Also, the patronage of taxi and adapted van are the next in the ranking with mean values of 3.458 and 2.967 respectively, while the use of a personal private car is behind as it is ranked 6th in the series. Surprisingly, bicycle usage is even ranked least in the area by the commuters despite the rural nature of the three settlements that characterized the study area.

Table 5: Relative Index of Patronage of Transport Means

Means	*NA*	*NP*	*FP*	*P*	*VP*	*TWV*	*RIM*	*MIV*	*Rank*
Trekking	0	2	27	372	85	486	4.05		1
Bicycle	41	156	0	4	0	210	1.675		8
Motorcycle	1	16	108	116	230	471	3.925		2
Taxi	1	0	204	180	30	415	3.458		4
Adapted van	3	70	165	68	50	356	2.967	3.073	5
Tricycle	4	220	12	8	0	244	2.033		7
Personal car	8	28	246	48	20	350	2.917		6
Bus	0	4	174	204	45	427	3.558		3

The average daily distance covered by rural commuters is presented in Table 6 in which seven patterns of movement were considered. On the distance between home and working place, it was observed that more than one-third (49.2 per cent) covered 6-10 km while one-quarter (25.0 per cent) covered 11-15cm, and one-eighth (12.5 per cent) covered 1-5km daily. Also, more than three-quarter (95.8 per cent) covered 1-5km daily on home to friends as well as to religious places among the commuters sampled.However, on home to market distance, a quarter (25.0 per cent) covered 6–10km, while more than one-third (36.7per cent) covered 11–15km and more than one-quarter (28.3 per cent) covered 16-20km, and only 7.5 per cent of the commuters surveyed have home to market trip distance to be 1-5km. Also, more than two-third (71.7 per cent) has 16-20km home to hospital distance, while the majority (92.5per cent) do not have access to post office on the study area. Lastly, home to farm distance covered 6-10km for 49.2 per cent commuters while more than one-third (20.2per cent) have a distance of 1-5km. It is deduced from this analysis that the sample population covered the least distance when visiting relatives and friends as well as a religious centre than places of work, market and hospital among others.

Table 6: Average Daily Distance Covered by Commuters

Places	*1-5km*		*6-10km*		*11-15km*		*16-20km*		*21km & above*		*None*	
	Freq	*%*	*Freq*	*%*	*Freq*	*%*	*Freq*	*%*	*Freq*	*%*		
Work	15	12.5	59	49.2	30	25.0	13	10.8	3	2.5	0	0
Friends	115	95.8	3	2.5	1	0.8	1	0.8	0	0	0	0
Religion	117	97.5	3	2.5	0	0	0	0	0	0	0	0
Market	9	7.5	30	25.0	44	36.7	34	28.3	3	2.5	0	0
Hospital	1	0.8	2	1.7	1.7	14.2	86	71.7	14	11.9	0	0
Post office	0	0	0	0	0	0	5	4.2	4	3.3	11.1	92.5
Farm	35	20.2	59	49.2	11	9.2	2	1.7	1	0.8	12	10.0

The four major factors that influence the trip distribution of commuters in the study area were presented in Figure 3 specifically, almost are quarter (25.8percent) of respondents identified deplorable road condition while more than one-eighth (19.2 per cent) identified the nature of the terrain in the area. Also, more than half (51.7 per cent) of respondents identified the location of the destination, while 0.8 per cent attributed trip duration to the poor condition of the vehicle. However, other factors accounted for 2.5 per cent of factors influence trip duration in the study area. Based on the above, it is quite clear that poor road condition, terrain to cover and location of destination are the major factors that influence trip duration in the study area.

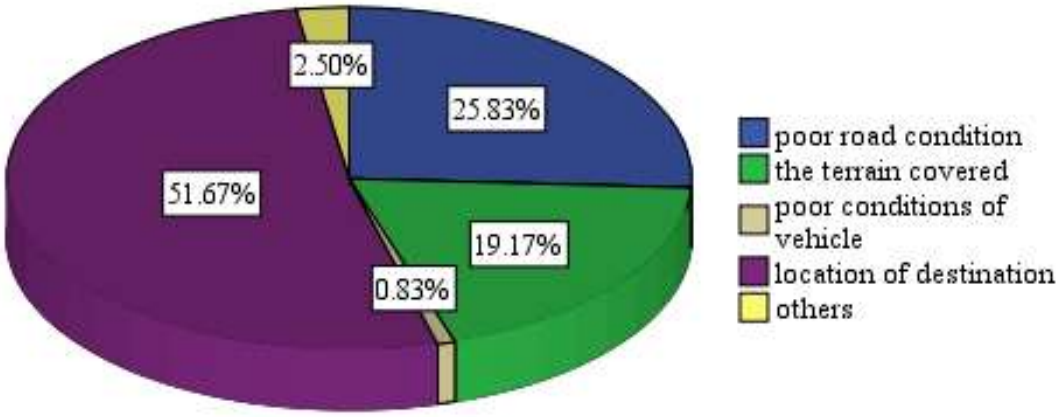

Figure 3: Factors Affecting Trip Duration

Characteristics of Routes and Vehicle Used For Rural Transport Services

This sub-section addresses the characteristics of roads and vehicles used for rural transport service in the study area. Also, the nature of the road, the physical condition of the road, period road rehabilitation,road condition based indicators, nature of vehicle operation and overall vehicle condition, as well as vehicle condition based indicators, were well examined in this sub-section.

On the nature of the road, Table 7 shows that less than one-tenth (17.5per cent) of respondents assessed the road to be earth-surfaced, while almost three-quarter (88.3 per cent) assessed it to be bituminous, and the remaining 4.2 per cent adjudged it to be graded road. Also, 2.5 per cent of respondent assessed the physical condition of the road to be very good while 5.0 per cent sees it to be in good condition. However, half of the commuters (62.5 per cent) see the road to be in poor condition, while more than one-quarter (30.0 per cent) assessed the condition of the road to be poor. In this regard, both the nature and poor physical condition of roads in the study area influence the trip making function of commuters; hence, affected the socio-economic productivity.

Table 7: Nature and physical condition of roads

Nature of roads			*The physical condition of roads*		
Nature	Frequency	Per cent	Condition	Frequency	Per cent
Earth – road	9	7.5	Very Good	3	2.5
Bituminous road	10.6	88.3	Good	6	5.0
Graded road	5	4.2	Fair	75	62.5
Other specify	-	-	Poor	36	30.0
Total	120	100.0	Total	120	100.0

Commuters' view on the period of last rehabilitated of roads in their local community was presented in Table 8. Accordingly, 0.8 per cent do not know when the roads were last rehabilitated, while less than one-tenth (5.8per cert) identified 2011-2015. However, the vast majority of commuters (88.3per cent)

identified 2006–2010 as the period of last rehabilitation of roads. Based on this analysis, road rehabilitation has not been a continuous and consistent exercise in the area most especially since 2011.

Table 8: Period of Road Rehabilitation

Period	*Frequency*	*Per cent*
Before 1995	3	2.5
1995-2010	106	88.3
2011-20915	7	5.8
Unknown	1	0.8
Total	120	100.0

Similarly, the results of the analysis of the survey conducted on the conditions of roads in the study area shown in Table 9 has 2.76 as mean index value for the nine indicators used. In this respect, it is observed that the road has relatively good speed breakers installed/mounted on them consistently at strategic spots, while the physical appearance of the roads are also good ranking second to speed breaker with index value of 3.325, and width capacity is equally sufficient with index value of 3.2417 and is closely followed by surface condition which is ranked fourth with index value of 2.7667. However, other indicators which include road alignment, road shoulder, road furniture and erosion control system and in deplorable condition with index values which are far lower than the mean index value of the analysis.

Table 9: Road condition-based indicators

Route condition-based indicators

Indicators	VG	G	F	P	VP	TWV	RIM	MIV	RK
Physical appearance	11	20	93	260	15	399	3.325		2
Surface condition	12	60	156	104	0	332	2.7667		4
Width capacity	17	118	126	8	0	269	3.2417		3
Speed breaker /bump	2	64	36	260	45	407	3.3917	2.76	1

Erosion control system	82	76	0	0	0	158	1.3167	8
Traffic signs/symbol	86	68	0	0	0	154	1.2833	9
Road furniture	77	86	0	0	0	163	1.3585	7
Road shoulder	60	96	21	0	25	202	1.6833	6
Road alignment	39	50	30	84	0	253	2.1083	5

The nature of vehicle operation in rural transport services is presented in Table 10. The result shows that more than one third (46.7 per cent) accounted for freight service operation, passenger service only accounts for more than a quarter (38.5 per cent) while the remaining percentage(21.5 per cent) accounted for both passenger and freight service operation. Hence, it can be deduced from the result that freight services accounted for the most vehicle operational servicein the study area. In the same vein, majority 63.7 per cent of respondents observed that most of the vehicle used for rural transport services are rickety vehicle, 25 per cent of the vehicles are insecure, 11.7 per cent are fairly roadworthy while none of the vehicles is adequately roadworthy. Invariable, it can be deduced that most of the vehicle used for rural transport services are rickety and not roadworthy.

Table 10: Nature of vehicle operation and overall vehicle condition

Nature of vehicle operation	*Frequency*	*Per cent*	*Overall condition of the vehicle*	*Frequency*	*Per cent*
Passenger	40	33.3	Adequately Roadworthy	0	0
Freight	56	46.7	Fairly Roadworthy	14	11.7
Both	24	20.0	Rickety vehicle	76	63.3
Total	120	100.0	Insecure vehicle	30	25.0
			Total	120	100

The conditions of vehicle servicing rural settlements under study are given in Table 11 of which the ten indicators used for the analysis have a 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, vehicles servicing rural areas appeared to be mostly not worthy of being used for transporting passengers since many of them are not in good operating and physical conditions.

Table 11: Vehicle condition-based indicators

Vehicle condition-based indicators

Indicators	VG	G	F	P	VP	TWV	RIM	MIV	RK
Physical appearance	3	78	216	12	15	234	2.7		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	2.55	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

Quality of Transport Services in the Study Area

Residents were asked to evaluate the rural transport service using relevant parameters presented in Table 12. The four-point Liker's scale was used for data collection with the rating values assigned to the variables as Very Poor (VP=1),

Poor (P =2), Fair (F=3) and Good (G=4) and Mean Weighted Value was used to analyzed the collected data. With the mean index value of 2.455, it is observed that safety risk (2.662), vehicle operations/service (2.592), road linkage (2.558) and trip duration (2.525) were rated above the MIV and accounted first, second, third and fourth among other parameters in the study area. However, it can be argued that commuters satisfied with the above-listed parameters and equally dissatisfied with road conditions (2.383), waiting time and service providers in the study area as these recorded lower values of RIM compare to the MIV.

Table 12: Rural transport services parameters

Variable assessed	*VP*	*P*	*F*	*G*	*TWV*	*RIM*	*MIV*	*Rank*
Service provider	31	102	93	4	260	2.167		7
Waiting time	22	106	108	24	275	2.292		6
Trip duration	22	80	111	60	303	2.525	2.455	4
Road conditions	41	50	69	116	286	2.383		5
Road linkage	36	38	96	112	307	2.558		3
Vehicle Operations	35	56	63	92	311	2.592		2
Safety risk	43	40	36	96	320	2.662		1

Note: VP= Very Poor; P= Poor; F= Fair; G= Good; TWV=Total Weight Value; MIV, Mean Value Index

Furthermore, the quality of transport service in the study area and their response werepresented in Table 13 using Mean Weighted Value analysis. Like in Table 5, the five-point Liker's scale was analyzed with the values assigned to the variables that consist Very Poor (VP=1), Poor (P =2), Fair (F=3), Good (G=4) and Very Good (G=5). The variables assessed are seating arrangement, comfort, suitability safely reliability, adequacy and efficiency which all have a mean index value of 1.908. The results revealed that the seating arrangement aligns with the nature of settlements studied i.e. rural, and this has the highest Relative Index Mean of 2.725.

Also, the vehicles (2.356) used by operators were adjudged to be suitable for the service in the study area by sampled computers, while commuters enjoyed

a reasonable level of comfort (2.217) in the operation. However, there is a poor level of reliability in service provision (1.758) in addition to poor safety (1.558) and inadequacy (1.558) of transport service in the study area. Lastly, the efficiency of service received by the commuters is even far below the MIV as it ranked least with RIM value of 1.192.

Table 13: Commuters Relative Index of Quality of Transport Service

Variables	*VP*	*P*	*F*	*G*	*VG*	*YWV*	*RIM*	*AIV*	*Rank*
Seating	1	70	240	16	0	327	2.725		1
Comfort	12	140	114	0	0	266	2.217		3
Suitability	21	114	66	76	5	282	2.350		2
Safety	55	126	6	0	0	187	1.558	1.908	5
Reliability	43	128	36	4	0	211	1.758		4
Adequacy	55	126	6	0	0	187	1.558		5
Efficiency	101	34	3	0	5	143	1.192		6

Factors influencing the quality of transport services in the study area were analyzed and presented in Table 14 using Mean Weighted Value analysis. Table 14 revealed the relative index often factors that influence the quality of transport service in the study area in which the market location and period ranked most with an index value of 4.677. This is closely followed by vehicle availability and condition (4.431) as well as period/seasonality of traffic (4.4). The economic activities (4.292) and festivity (3.892) are equally worth mentioning while adjoining settlement and village pattern ranked least among the factors influencing patronage of transport service in the study area.

Table 14: Relative index of the factors influencing the quality of rural transport service

Variable	*NI*	*S*	*M*	*H*	*VH*	*TWV*	*RIM*	*MIV*	*RK*
Vehicleavailability and condition	0	0	15	180	165	228	4.431		2
Economic activities	5	2	3	84	185	279	4.292		4
Traffic seasonality	4	0	06	76	200	286	4.40		3
Festivity	13	4	3	48	185	253	2.892		5
Transport fare	9	16	102	48	10	185	2.846	3.623	8

Schooling period	19	12	27	88	45	191	2.938		7
Village pattern	15	22	75	48	10	170	2.615		10
Market location and period	0	2	3	64	235	304	4.677		1
Urban demand	12	16	21	76	95	220	3.385		6
Adjoin settlement	7	20	120	32	0	179	2.734		9

Residents were also asked about the challenges of transport service in the study area and the relative index of their responses is presented in Table 15. Using the 5 points Liker's Scale with values that consist of No Influence (NI=1), Scanty Influence (S=2), Moderate Influence (M=3), High Influence (H=4) and Very High Influence (VH=5). Of the seven factors identified and with the mean index value of 3.317, it is observed that falling trees are the predominate challenge confronting transport operators in the study area. By this, falling trees have the highest relative index mean of 4.816 far exceeding the MIV and is closely followed by deplorable conditions of road in the study area with Relative index mean of 4.438. Aside from those two factors, vehicle spare parts (3.985) and road extortion (3.477) are other factors impeding transport service and operations in the study area, while low demand, road crash and robbery were less prominent in the study area considering their lower relative index mean.

Table 15: Challenges of transport operations and services in rural settings

Factors	*NI*	*SI*	*MI*	*I*	*VHI*	*TWV*	*RIM*	*MIV*	*RK*
Deplorable road	1	6	24	56	195	282	4.438		2
Spare pans	0	2	24	188	45	259	3.995		3
Extortions	1	16	66	108	35	226	3.477		4
Robbery	22	76	9	8	0	115	1.769	3.317	7
Low demand	4	32	84	68	0	188	2.892		5
Road crash	24	60	30	4	0	188	1.815		6
Falling trees	0	0	0	8	0	315	4.846		1

Result of Hypothesis Testing

Further investigation was conducted to test the hypothetical statement and established the relationship between the socio-economic characteristics

(average income) and rural transport services (performance indicators)in the study area using regression analysis to explain the effect of each predictor on the dependent variable. It also provides the effect of variation of the independent variables on the dependent variable as presented in Table 16. The dependent variable socioeconomic characteristics (average income), while independent variables consist of the six predictor variables identified as waiting time at parks, average trip duration, road conditions, road linkage, vehicle operations and safety risk.The estimated correlation coefficient, 'r', is estimated to be 0.776 reflecting the strong positive correlation between the dependent and independent variables, whilethe coefficient of determination, r^2 is 0.602 meaning that the predictor factors mentioned accounted for 60% explained variation. That is the independent variables together explain 60% of the total variation in the socio-economic characteristics (average income) of respondents, while the remaining 40% error term indicated there were other important explanatory variables not captured in this study. Meanwhile, the summary of the regression analysis through the ANOVA F-ratio value revealed 58.601 with the p-value indicating 0.000 < 0.05 table significant value. Based on the result, the null hypothesis was rejected while the alternative hypothesis was accepted.

Table 16: Regression result of the relationship between socio-economic characteristics (average income) and rural transport services performance

s/n	*Performance variables (predictors)*	*Beta*	*T*	*Sig.*
1	**waiting time at parks**	**0.289**	**6.274**	**.000**
2	**average trip duration**	**0.136**	**1.931**	**.045**
3	**road conditions**	**0.235**	**3.547**	**.000**
4	**road linkage**	**0.253**	**3.986**	**.000**
5	**vehicle operations**	**0.260**	**4.339**	**.000**
6	**Safety**	**0.242**	**3.878**	**.001**

Conclusion and Recommendations

This study had examined rural transport service in Oyo state using Lagun, Oyedeji and Akitiko in Lagelu Local Government Area as a reference point. The stakeholders i.e. commuters and transporters, involved in transport service and operations in the study area were consulted and various issues relating to

mobility and accessibility in the area covered. It was able to identify socio-economic attributes of residents as well as their pattern of movement and constraints to mobility in the area. Also, the socio-economic attributes of transport operators were observed couple with the nature and pattern of transport operations and the patronage of transport service in the study area.

The study observed the high rate of use of para-transit means of transport for rural mobility in the area as well as the use of an adapted van, while bicycles are becoming less patronized as it is being substituted for by motorcycles.The study like that of Adedeji (2016) concludes that rural movement is usually restricted to less than 5km daily movement by the vast majority of residents and that desired attention is not being accorded to both rural transport service and rural transport infrastructure considering the deplorable condition of roads and vehicles used for movement in the study area.

Therefore, refocusing African development has to start with giving attention to rural settlements and their commuting requirements vis-vis rural transport services. To have an improved rural transport service that shall meet the mobility requirements of commuters and revamp African development in general and the study area in particular, the following recommendations put forward to include;

First, there is a need to improve the quality of both intra-and-inter rural roads' in the study area. In this regard, the standard of roads has to be upgraded most especially from earth-surfaced to bituminous roads. The improvement inroads in the study area should include constant maintenance of the drainage facility and bushy environment which usually obstruct visibility and reduce road capacity during the rainy season. Second, the uses of motorcycle for public movement in the study area need to be strongly minimized for safety reasons. By this, alternative means such as tricycle should be explored. Tricycle is more stable, comfortable and relatively safe than the motorcycle in the study area. This will equally improve the affordability of the service while retaining the convenience and comfort of both the operators and passengers. Also, concerning freight movement and evacuation in the study area, the use of adapted van should be improved upon.

Also, it is high time that government, most especially Oyo State and Local Government Council should regulate rural transport operations and services in the state. By this, the safety of operators and commuters would be enhanced as both the entry and exit of operators shall be strongly monitored and harmonized with necessary supervision and monitoring. Hence, this shall improve the quality of service in terms of seating arrangement, comfort, suitability, safety, reliability and efficiency being received by commuters in the study area.

Last, constant public enlightenment and training programme should be organized for transport operators in the study area. This will improve the operational performance and reaction to varying issues regarding commuters and their services. In this regard, both the local government council and the transport unions most especially, the National Union of Road Transport Workers should be in the vanguard of this training and retraining exercise towards enhancing service quality and their operations in the study area.

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