PERFORMANCE EVALUATION OF MINI-BUSES TRANSPORT SYSTEM IN THE CITY OF OSOGBO, NIGERIA

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Abstract
A study of mini buses transport operations on selected routes in Osogbo City, Nigeria was carried out in this paper with the objectives of determining the mode of transport often used by the residents on the main roads and examining the trip pattern of residents in the study area. Primary data used for the study were derived from direct interview and administration of questionnaires to the drivers and passengers. The extracted data was analyzed by SPSS (Statistical Package for Social Science). Relative importance indices (RII) and severity indices (SI) ranking methods were adopted to determine the safety, comfort, efficiency and effectiveness of the mini buses. The results showed that the majority of the bus users are between the ages of 26-35years, they were mainly civil servants and the major trip purpose is home to work. The results also indicate that majority of the drivers are primary school certificate holders, have 15 years and above of driving experience, the highest trip made per day by the drivers is between 21 and 40, fuel consumption per day is between 21 and 30 litres and the average income of the driver per day is between ₦3000 and ₦4000. In measuring the effectiveness and efficiency of mini buses "accessibility of vehicle" and "buses availability" ranked 1st and 2nd with RII values of 0.879 and 0.861.

Keywords: Trip pattern, relative importance indices, severity indices, efficiency.

1. Introduction

Transportation is a process that involves the movement of commuters, goods and services from a given point of origin to a specific destination (Okoko, 2006). Transportation determines the regional patterns of development, economic viability, environmental impacts and maintenance of socially acceptable levels of quality of life. It is a means to access business activities, education, employment and recreational opportunities, thus contributing to policy effectiveness and enhancement of security through reduced isolation as well as providing job opportunities (World Bank, 2002).

An efficient transport system is an axle wheel on which the economic activities of any nation revolve. Transport is needed to provide access to sources of existing and potential raw materials. It facilitates the collection and distribution of agricultural and industrial products and it encourages efficient allocation and utilization of some economic resources. It equally promotes the smooth administration of any country. It can therefore be regarded as the life wire of a nation's economic development.

In addition to being an expression of an individual's free will, mobility takes place with a view to reaching and satisfying such individual's socio-economic, cultural and political needs in different places (Adetunji, 2010). For instance, trips to work, schools, postal services, recreational centres, health centres, relatives, shops/markets and banks are undertaken in order to procure services, which are available in specific locations. The frequency, pattern and complexity of such trips are usually influenced and constrained by physical, demographic, cultural and socioeconomic factors (Boarnet and Crane, 2001; Ironmonger and Norman, 2007; Ipingbemi, 2010).

It is paradoxical that in developing cities where vehicle ownership is low, dependence on public transport is high whereas the financial condition and performance of all forms of government-organized public transport, either state or privately owned, are in decline. This situation has forced people and the market to develop creative solutions to address daily travel needs. A search for these alternatives has led to rapid growth in non-conventional means of public transport, initially provided by minibuses and shared taxi/vans, and more recently by commercial motorcycles. According to Olubomehin (2012), the transit modes have become the dominant form of public transport but they also present clear disadvantages from a general public welfare perspective in terms of the negative externalities generated (noise, safety, pollution). Government intervention has often had perverse impacts, compounding the problem by distorting market structures through policies that promote rent seeking that favour the interests of a select, small group.

Therefore, when there are inadequate facilities and mechanisms capable of facilitating efficient and effective transportation, there is hardly any human settlement that can function effectively. As a result of this inadequacy, mobility and accessibility of the people are crippled, which is one of the major problems facing the world cities today. The situation is not different in Osogbo, Osun State Capital, Nigeria, a growing city with challenges of effective transportation system which require urgent attention, hence the need for this study.

Urban transportation problems have negative consequences on the socio-economic development of a nation. For example traffic congestion, which is one of the major problems plaguing urban transportation system in most metropolis across the globe (Yildirim, 2001), has serious effect on economic and social activities both at the micro and macro level. Urban transportation systems in most developing countries face major challenges. The existing road transport infrastructure capacity in most cities in the developing economies has reached critical level and is unable to meet the huge demand from the increasing number of vehicles. The challenges have been attributed to continuous growth in urban population, private vehicle ownership, ineffective traffic management system and the ineffectiveness of public transport services which are the causes of traffic congestion with dire consequences on social and economic activities (World Bank, 2011).

Lee (2001) reported that the vehicle ownership rate is estimated to increase from about one vehicle for every four persons in the year 2000 to about two vehicles for every five persons in 2020. It is imperative, therefore that effective urban transportation be developed to accommodate the increasingly high rate of vehicle ownership in order to improve upon the effectiveness of the transportation system in cities. In the study area there is no known public mass transit system; this has compounded the problem of mobility. The increased pressure on road transportation has brought about other constraints to mobility and accessibility of people.

Most of the scholars who have worked on urban transport problems in Nigeria have identified congestion as the most serious. Congestion occurs when transport demand exceeds transport supply at a specific point in time and in a specific section of the transport systems. Associated with the traffic congestion are problems of parking demand which far outweighs the available supply in most Nigerian cities.

Osogbo has been growing very rapidly as a result of influx of civil servants, industrial workers and businessmen to the city because it is the capital of Osun State. Due to the rapid growth coupled with physical constraints (among which are drainage and topography) to urban development has led to haphazard development of land uses. The problems associated with land use, road network, mode of movement and socio-economic characteristics of residents have led to unaffordable high cost of travel, longer travel times, inconveniences and strains to urban residents in Osogbo metropolis. The presence of these mini-buses known as 'Korope' has increased travel time of passengers due to"move and stop" movement pattern, causing traffic congestion and increase in the rate of accidents on the major street of the study area and to recommend potential solution..

Consequently, this study aims at evaluating the performance of mini-buses during transit operations in Osogbo metropolis. It also seeks to determine modes of movement often used by the residents of the study area, examine the trip pattern of residents in the study area; collect and analyse data of minibuses along four selected routes during morning and evening peak periods under conditions of mixed traffic operations and analyse the data for indices which are used to assess the performance of the mini buses.

2. Background Literature

Developing countries are experiencing simultaneous growth of population, income and private vehicle ownership, which significantly affects urban transport environment and poses challenges to policymakers and urban transport professionals. Experience shows that the performance of urban transport service delivery in many developing countries is low; policy makers have incomplete information to make decisions and managers and professionals rarely have a clear picture of their operational performance, best practices elsewhere or the desired level of their service provision, which is the case of urban transport services in Nigeria.

Urban transport in Nigeria is largely an unregulated market and inadequate both in quality and quantitative terms. Urban transport technology in use in Nigeria is a combination of transit modes, consisting of shared taxis, minibuses, motorcycles and tricycles. Only in the cities of Lagos and Abuja are conventional buses in use, but even in both cities the use of transit modes of transport is obviously dominant. As a matter of fact, Nigeria remains the only country in the world where densely populated cities with over six million people do not have an organized urban transport system based on a combination of conventional buses and rail. Urbanization has been one of the dominant contemporary processes as a growing share of the global population lives in cities. Considering this trend, urban transportation issues are of foremost importance to support the passengers and freight mobility requirements of large urban agglomerations. Transportation in urban areas is highly complex because of the modes involved, the multitude of origins and destinations, and the amount and variety of traffic. Urban transit is an important dimension of mobility, notably in high-density areas (Rodrigue, 2013).

Urban transport needs of all social groups are seldom met, especially in cities of developing countries such as Nigeria whose urban transportation system is far from ideal. This is partly due to a lack of understanding of such needs, a lack of data on the transport trends of different population groups or simple lack of knowledge about the importance of understanding these needs and acting upon them. Densely populated cities in Nigeria such as Lagos and Kano do not have an organized urban transport system. According to various studies that have been carried out on urban transport problems in Nigeria, traffic congestion has been identified as one of the most prevalent problems (Aderamo, 2012; Ogwude, 2011).

Transit provides a variety of services including door-to-door movement by flexible for hire services (i.e. taxis, motorcycles) in the city of Osogbo and intermediate line-haul fixed-route services by minibuses covering the entire region. Most Para-transit systems are provided by the private sector and operated on public streets in mixed traffic. Para-transit services usually fall between private transport and conventional public transport.

Transit provides numerous significant benefits to urban transportation development in many cities of developing countries. They are as follows:

• Mobility: The major role of transit is to provide much-needed and much-valued mobility, especially for the poor and travellers who do not own or have access to private automobiles. These people depend entirely on public transport for reaching jobs, markets, schools and other destinations.

• Source of employment: transit is a source of urban employment for both young and old because it offers job opportunities for skilled and unskilled men, many of whom have migrated from rural areas (Cervero, 2000; Vuchic, 2007). It has been reported that the transit sector employs about 15%–30% of the total workforce in many developing countries, particularly in poor cities (Tanaboriboon and Agad, 1990; Tanaboriboon and Madrona, 1990). Not only drivers are employed, but this sector also provides jobs for vehicle maintenance and production units.

• Complementarity: transit plays an important role in high density urban areas in providing feeder connection between the neighbourhoods and trunk routes. Due to under-investment in parts of the transport infrastructures, there is difficulty in providing systematic feeder operations to normal urban transport services. Moreover, transit services show their compensatory role for declining intermediate line-haul public transport by offering more frequent services and guaranteed seats.

The urban transportation problem arises principally because of high concentration of population, economic activities, and educational and social facilities in relatively small areas, particularly with poor land use planning. These activities generate demand for transport services far in excess of supply of such services (Bolade, 1993). Arising from this, the Federal Urban Mass Transit Agency (FUMTA) was established in 1988 as Government response to the mobility crisis arising from the gross inadequacy of the various modes of public transportation in virtually all the urban centres in the country.

With the adoption of Structural Adjustment Programme in 1986, the cost of procuring vehicles, spare parts and fuel rose astronomically, to the extent that many car owners abandoned their cars and the demand for public transportation increased (World Bank, 1990). On the part of the transport operators, there was an equally rapid decline in the acquisition of new buses and the few buses that were available could not cope with the demand problem.

The rail system could not help much because the Nigerian Railway Corporation (NRC) was ill equipped for urban mass transportation. Ferry services in the riverine areas could not help because it only existed in Lagos and Port Harcourt. It is sad to note that none of the major cities had an effective traffic management system, thus, the Task Force on Urban Mass Transit was therefore established in January 1988 to ameliorate the frustrations and hardships being experienced by workers and communities in all the major cities. This was backed up by a proposed budget of N700 million for implementation of various urban mass transit projects. The report of the task force, which was presented on March 4, 1988, contained recommendation on programs and projects designed to relieve the situation and institutional machinery for implementation.

A Mass Transit Implementation committee was formed on late March, 1988 under the chairmanship of the then Minister of Transport. The committee was dissolved in September 1988 and a sole Administrator was appointed in 1989 to continue with the implementation process under the Federal Urban Mass Transit Programme. The 1988 Federal Government intervention further drew inspirations from such federally organized nations like Federal Republic of Germany and the United State of America. In these later countries, the development of strategic urban heavy transit system such as the metro lines, bus ways, and public transport improvement measures in the bigger metropolis are often financed with Federal grants (Bolade, 1993).

3. Methodology and Materials

Four routes in the city of Osogbo were selected for this study and grouped under four zones namely; Zone 1 which is kobongbogboe to Old garage Area, Zone 2 which is Powerline area to Oja-Oba area, Zone 3 Olaiya junction to Abere, Zone 4 is Old garage to Dada Estate. The primary data were obtained through questionnaires and were complemented with oral interviews of bus mini buses driver. The secondary sources of data included data obtained from Ministry of Transportation, Ministry of works survey department where Street Maps were obtained, Manual count and Mathematical calculation. Average of the total counts and percent of respondents were determined on each route.

The questionnaires were administered on the basis of 50 copies to the drivers on each of the selected route, while 100 copies to passengers on each route selected, this number was selected to ensure a reliable generalization. Respondents were asked to rate each proposition as it applies to the situation in their route with respect to the bus operating system and road condition. Information from the commercial drivers in the area assesses their level of satisfaction or difficulties concerning the condition of roads. The selected Routes were named as Route A (Kobongbogboe to Old garage Area), Route B (Powerline area to Oja-Oba area), Route C (Olaiya junction to Abere), Route D (Old garage to Dada Estate).

Information was gathered on the effect of the road transportation on their daily activities, their socio-economic characteristics and their transit pattern. The questionnaires were administered through the help of ten self-trained survey assistants. Traffic count was also carried out on working day and weekend (i.e. Monday, Wednesday and Saturday) in selected routes to determine the performance of mini buses routes and rank them. In order to determine the characteristics of the respondents, respondents were asked to classify themselves according to the following: Taxi-Driver, Passenger along the routes which include Trader, Student, Civil servant and Apprentice. The questionnaires were administered to respondents (both drivers and commuters).

3.1 Description of the study area

Osogbo the capital of Osun lies on coordinates 7°46′ North and4°34′East with an area of 47km^2. Osogbo city seats the Headquarters of both Osogbo Local Government Area (situated at Oke Baale Area of the city) and Olorunda Local Government Area (situated at Igbonna Area of the city). According to the 2006 Population and Housing Commission census, the city has a population of 156,694 people. Osogbo shares boundary with Ikirun, Ilesa, Ede, Egbedore and Iragbiji and is easily accessible from any part of the state because of its central nature. It is about 48km from Ife, 32km from Ilesa, 46km from Iwo, 48km from Ikire and 46km from Ila-Orangun.

Osogbo is a commercial and industrial centre. Industrialization started in 1907, when the British Cotton Growing Association sited an industry for growing and ginning of cotton. The Nigerian Tobacco Company (NTC) built its first factory in Osogbo. In this same year, a major turning point for the city which helped in its industrial and commercial development occurred. The railway tracks were constructed linking it to other parts of Northern Nigeria. This attracted people from far and near. Osogbo is famous for the annual Osun-Osogbo festival which attracts

tourists from different part of the world. Osogbo is the state capital city of Osun state. Figure 1 shows the road network of the study area.

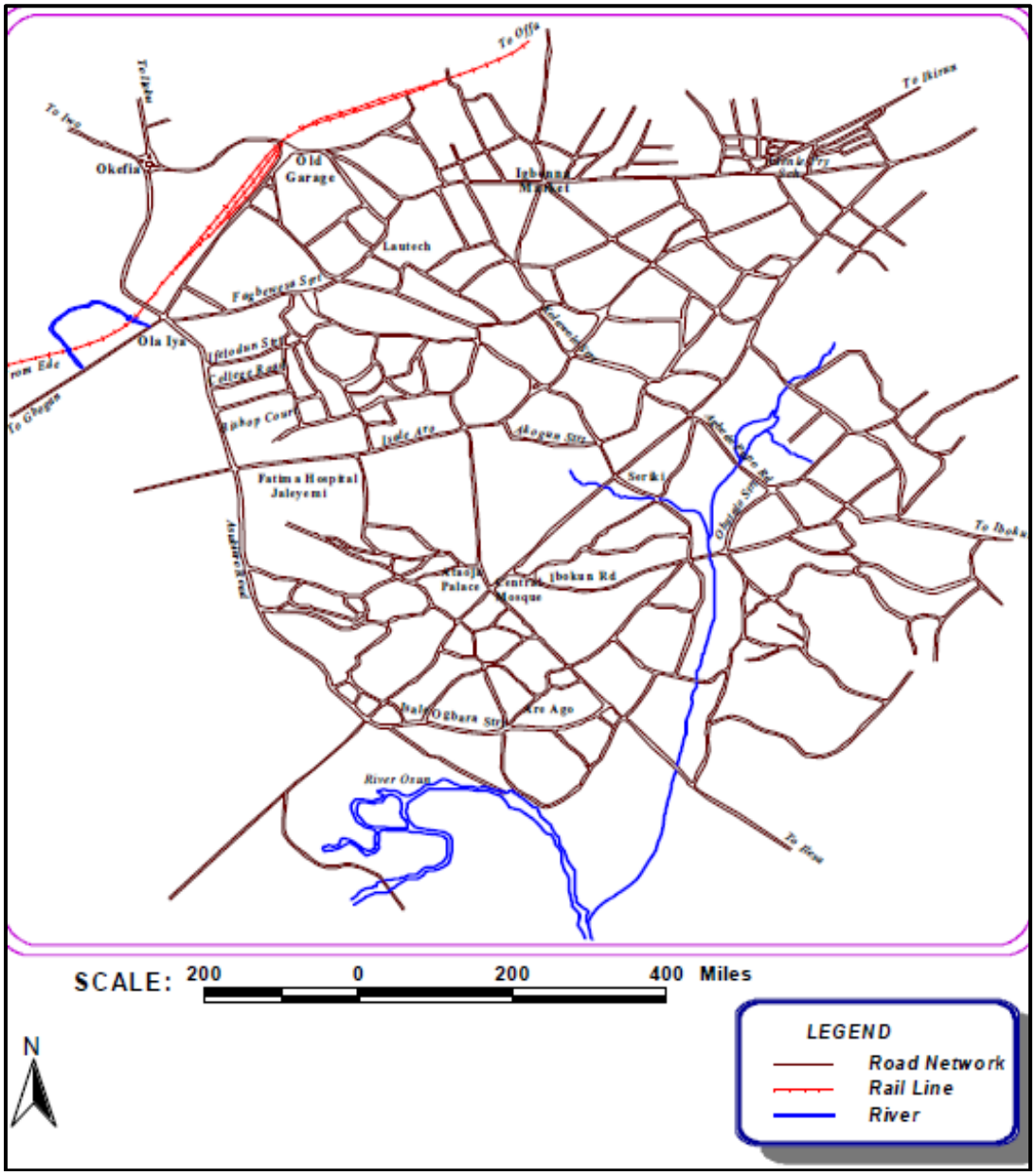

Figure 1: Road network of the study area, Osogbo. (Source: Adedotun, 2015).

3.1.1 Description of the Mini-buses

Each mini-bus measures about 3.5m in length, 1.5m in width and 1.8m in height. Plate 1 shows a picture of what a typical mini-bus looks like.

Plate 1: A typical mini-bus

3.2 Regression model

Models were developed for the data using multiple regression equations as shown in equation 1.

$$Y = \beta_{\circ} + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \varepsilon \quad (1)$$

where:

Y - Dependent variable
$\beta_{\circ}$ -the coefficient of the dependent variable
β_n -the coefficients of the independent factors
X_n -the independent factors
n -number of resources
ε -the Error term.

3.3 Relative Importance Index (RII)

Ranking method was adopted to determine the safety, comfort, efficiency and effectiveness of mini buses along the selected routes. From the ranking assigned to each of the criteria, it was able to identify the most critical one. The RII has been used in many domains to evaluate the comparative importance of a single item to others. The equation below was used to compute the relative importance index for all the criteria. Five-point scale (1 for very satisfied, 2 for satisfied, 3-Neutral, 4-Not satisfied, 5-very unsatisfied) was adopted and transformed to relative importance indices (RII) for each criteria as follows:

$$RII = \frac{\sum W}{A \times N} \quad (2)$$

where W is the weight assigned to each criterion (ranging from 1-5); A is 5 (the highest weight) and N is the total number of respondents. The higher the value of RII indicates the more important of the criteria.

3.4 Severity Index (SI)

The severity index is given by equation 3:

$$\text{Severity Index (SI)} = \text{R.I.I} \times 100\% \quad (3)$$

The severity index was categorized into five levels as follows: 0-49% was categorized as non-severe; 50-69% was categorized as fairly severe; 70-74% was categorized as moderately severe and 80-100% was categorized as most severe.

The most severe independent factors for each dependent variable under investigation were selected as most important factors.

4. Results and Discussion

Data obtained was processed and analyzed using SPSS statistical analysis software. Descriptive statistical tools such as tables and simple percentages were used to represent the data to evaluate the routes performance. Multiple linear regression models were used to predict the occurrence of trips using socioeconomic data (sex, education, income and occupation). Table 1 shows the summary of the characteristics of the respondents.

Table 1: Summary of Characteristics of Respondents

	Category	**Classification**	**Frequency**	**Percent (%)**
1.	Routes	Kobongbogboe to Power-line	99	25.1
		Power-line to Oja-oba	98	24.9
		Olaiya junction to Abere	98	24.9
		Okefia to Dada estate	99	25.1
		Total	394	100
2.	Sex	Male	236	59.9
		Female	158	40.1
		Total	394	100

3.	Age	18-25yr	107	27.2
		26-35yr	131	33.2
		36-50yr	93	23.6
		51-60yr	46	11.7
		Above 60yr	17	4.3
		Total	394	100
4.	Number in household	1	28	7.1
		2	30	7.6
		3	65	16.5
		4	102	25.9
		5	71	18.0
		6	57	14.5
		7 and above	41	10.4
		Total	394	100
5.	Occupation	Bus driver	11	2.8
		Trade	87	22.1
		Civil servant	178	45.2
		Public servant	29	7.4
		Artisan	77	19.5
		Others	12	3.0
		Total	394	100
6.	Ownership of a car	Yes	51	12.9
		No	343	87.1

		Total	394	100
7.	Academic qualification	FSLC	27	6.9
		SSCE	164	41.6
		OND	41	10.4
		HND	72	18.3
		BSC	69	17.5
		M.Sc	10	2.5
		Others	11	2.8
		Total	394	100
8.	Trip purpose	Home to education	66	16.8
		Home to work	299	75.9
		Home to social/recreation	20	5.1
		Non-home to based trip	9	2.3
		Total	394	100
9.	How often do you use the bus	Daily	366	92.9
		Weekly	18	4.6
		Monthly	7	1.8
		Others	3	.8
		Total	394	100
10.	Alternative modesof travelling	Car	56	14.2
		Motor-cycle	319	81.0
		Tricycle	6	1.5
		Others	13	3.3

		Total	394	100
11.	Walking distance before getting mini bus	1-2km	19	4.8
		100m-1km	189	48.0
		50-100m	165	41.9
		0-50m	21	5.3
		Total	394	100

4.1 Regression analysis of characteristics of respondents

In order to determine the relationship between the characteristics of respondents and the comfort, safety, effectiveness and efficiency of the mini buses in Osogbo Metropolis, the characteristics were regressed against the comfort and safety factors as well as against the effectiveness and efficiency factors as shown in table 2.

Table 2 Regression Equations based on the factors considered

S/N	Regression Equation	Equation	R^2
1	**Ride Comfort**= $0.965 - 0.012(\text{Sex}) - 0.291(\text{Age}) + 0.145(\text{Number in household}) + 0.531(\text{Occupation}) + 0.333(\text{Ownership of a car}) - 0.100(\text{Academic qualification}) + 0.499(\text{Trip purpose}) - 0.446(\text{How often do you use the bus}) - 0.102(\text{Alternative mode of travelling}) + 0.329(\text{Walking distance before getting mini bus})$	4	0.902
2	**How directly this route goes to your destination** = $0.358 - 0.270(\text{Sex}) + 0.250(\text{Age}) + 0.066(\text{Number in household}) + 0.053(\text{Occupation}) + 0.963(\text{Ownership of a car}) + 0.004\big((\text{Academic qualification})\big) + 0.475(\text{Trip purpose}) - 0.789(\text{How often do you use the bus}) - 0.318(\text{Alternative mode of travelling}) + 0.759(\text{Walking distance before getting mini bus})$	5	0.899
3	**Driver Behaviour** = $0.021 + -0.362(\text{Sex}) + 0.165(\text{Age}) + 0.153(\text{Number in household}) + 0.159(\text{Occupation}) + 0.836(\text{Ownership of a car}) - 0.194\big((\text{Academic qualification})\big) + 0.228(\text{Trip purpose}) - 0.483(\text{How often do you use the bus}) - 0.174(\text{Alternative mode of travelling}) + 0.578(\text{Walking distance before getting mini bus})$	6	0.905
4	**Safety of passengers on board** = $0.527 - 0.474(\text{Sex}) + 0.124(\text{Age}) + 0.085(\text{Number in household}) + 0.002(\text{Occupation}) + 1.046(\text{Ownership of a car}) + 0.172(\text{Academic qualification}) + 0.715(\text{Trip purpose}) - 0.988(\text{How often do you use the bus}) - 0.288\ (\text{Alternative mode of travelling}) + 0.593\ (\text{Walking distance before getting mini bus})$	7	0.884
5	**Road system satisfaction**= $0.905 - 0.139(\text{Sex}) + 0.010(\text{Age}) + 0.277(\text{Number in household}) + 0.322(\text{Occupation}) + 0.039(\text{Ownership of a car}) + 0.063(\text{Academic qualification}) + 0.669(\text{Trip purpose}) - 0.807(\text{How often do you use the bus}) - 0.108\ (\text{Alternative mode of travelling}) + 0.159\ (\text{Walking distance before getting mini bus})$	8	0.917
6	**Vehicle Condition** $=0.738 + 0.485(\text{sex}) - 0.186(\text{Age}) + 0.068(\text{Number in household}) + 0.405(\text{Occupation}) + 0.064(\text{Ownership of a car}) - 0.153(\text{Academic qualification}) - 0.003(\text{Trip purpose}) + 0.565(\text{How often do you use the bus}) - 0.182\ (\text{Alternative mode of travelling}) + 0.351\ (\text{Walking distance before getting mini bus})$	9	0.839
7	**Buses safety** = $1.509 - 0.083(\text{Sex}) - 0.133(\text{Age}) + 0.149(\text{Number in household}) + 0.511(\text{Occupation})$	10	0.907

	$+0.199(\text{Ownership of a car}) - 0.094(\text{Academic qualification}) + 0.370(\text{Trip purpose}) - 0.380(\text{How often do you use the bus}) - 0.114\ (\text{Alternative mode of travelling}) + 0.189\ (\text{Walking distance before getting mini bus})$		
8	**How often the buses run on this route** $= 0.898 - 0.075(\text{Sex}) + 0.326(\text{Age}) + 0.189(\text{Number in household}) + 0.072(\text{Occupation}) + 0.399(\text{Ownership of a car}) - 0.277(\text{Academic qualification}) + 0.165(\text{Trip purpose}) - 0.519(\text{How often do you use the bus}) - 0.308\ (\text{Alternative mode of travelling}) + 1.013\ (\text{Walking distance before getting mini bus})$	11	0.914
9	**Vehicles Accessibility** $= 1.226 - 0.420(\text{Sex}) + 0.068(\text{Age}) + 0.280(\text{Number in household}) + 0.085(\text{Occupation}) + 0.483(\text{Ownership of a car}) - 0.228(\text{Academic qualification}) + 0.786(\text{Trip purpose}) - 0.951(\text{How often do you use the bus}) - 0.147\ (\text{Alternative mode of travelling}) + 0.715\ (\text{Walking distance before getting mini bus})$	12	0.860
10	**Journey Cost** $= 1.412 - 0.738(\text{Sex}) + 0.057(\text{Age}) + 0.412(\text{Number in household}) + 0.303(\text{Occupation}) + 0.440(\text{Ownership of a car}) + 0.048(\text{Academic qualification}) - 0.123(\text{Trip purpose}) - 0.167(\text{How often do you use the bus}) - 0.225(\text{Alternative mode of travelling}) + 0.178(\text{Walking distance before getting mini bus})$	13	0.925
11	**Waiting time** $= 0.950 - 0.404(\text{Sex}) - 0.052(\text{Age}) + 0.096(\text{Number in household}) + 0.150(\text{Occupation}) + 0.789(\text{Ownership of a car}) + 0.598(\text{Academic qualification}) + 0.002(\text{Trip purpose}) - 0.270(\text{How often do you use the bus}) - 0.348\ (\text{Alternative mode of travelling}) + 0.029\ (\text{Walking distance before getting mini bus})$	14	0.947
12	**Travel time** $= 2.379 - 0.584(\text{Sex}) + 0.164(\text{Age}) - 0.011(\text{Number in household}) + 0.128(\text{Occupation}) + 0.173(\text{Ownership of a car}) + 0.522(\text{Academic qualification}) + 0.044(\text{Trip purpose}) - 0.234(\text{How often do you use the bus}) - 0.430(\text{Alternative mode of travelling}) + 0.167(\text{Walking distance before getting mini bus})$	15	0.896
13	**Bus Speed** $= 0.195 + 0.066(\text{Sex}) + 0.066(\text{Age}) + 0.069(\text{Number in household}) + 0.164(\text{Occupation}) + 0.824(\text{Ownership of a car}) + 0.264(\text{Academic qualification}) - 0.055(\text{Trip purpose}) - 0.046(\text{How often do you use the bus}) - 0.261(\text{Alternative mode of travelling}) + 0.216(\text{Walking distance before getting mini bus})$	16	0.935
14	**Buses Availability**	17	0.854

	$=2.172 - 0.295(\text{Sex}) + 0.143(\text{Age}) - 0.031(\text{Number in household}) - 0.058(\text{Occupation}) + 0.332(\text{Ownership of a car}) + 0.296(\text{Academic qualification}) + 0.847(\text{Trip purpose}) - 1.044(\text{How often do you use the bus}) - 0.278\ (\text{Alternative mode of travelling}) + 0.416\ (\text{Walking distance before getting mini bus})$		

4.1 Analysis of the Relative Importance Index (R.I.I) and Severity Index (S.I.) ranking results

The first set of R.I.I. and S.I. were obtained in relation to the comfort and safety factors as shown in table 3 using equations 2 and 3 respectively.

Table 3: R.I.I. and S.I. of Respondent's characteristics in relation to comfort and safety factors

S/N	Factors	R.I.I.	S.I.	Rank
1	Ride Comfort	0.804	80.4	4
2	How directly this route goes to your destination	0.827	82.7	2
3	How courteous the bus operator was during your trip	0.808	80.8	3
4	Passengers safety	0.842	84.2	1
5	Road system satisfaction	0.737	73.7	6
6	Vehicle condition	0.674	67.4	7
7	Buses safety	0.802	80.2	5

Table 3 shows that the safety of the passengers on board ranked the highest in the assessment of passengers comfort and safety using mini buses with relative importance index (RII) of 0.842; this was followed by how direct the route is to the destination of passengers with RII of 0.827. The third (3^{rd}) with 0.808 is how courteous the driver was during trip. Ride comfort with RII of 0.804 was ranked fourth (4^{th}), while how satisfied are you with road system and vehicle condition were ranked sixth (6^{th}) and seventh (7^{th}) with RII 0.737 and 0.674 respectively.

Table 4: R.I.I. and S.I. of Respondent's characteristics in relation to effectiveness and efficiency factors

S/N	Factors	R.I.I.	S.I.	Rank
1	How often the buses run on this route	0.823	82.3	3
2	Vehicles Accessibility	0.879	87.9	1
3	Journey Cost	0.763	76.3	4
4	Waiting time	0.727	72.7	6
5	Travel time	0.740	74.0	5
6	Buses speed	0.705	70.5	7
7	Buses availability	0.861	86.1	2

Table 4 shows that vehicles accessibility ranked first (1^{st}) with RII of 0.879, Availability of the buses obtaining a RII of 0.861 was ranked second (2^{nd}), How often the buses run on this route ranked third (3^{rd}) with RII of 0.823, cost of journey ranked 4^{th} with RII of 0.763. Waiting time and speed of the buses were ranked sixth (6^{th}) and seventh (7^{th}) with RII 0.727 and 0.705 respectively.

Conclusion

Analyses of the characteristics of passengers revealed that most the residents depend on mini buses for their daily movement, the majority of the bus users are between the ages of 26 and 35 years, average household number was four persons, they are mainly civil servants, alternative mode of transportation of the residents is motorcycles, the major trip purpose of the residents is home to work and the walking distance before getting to a bus stop is between 100m and 1km.
Regression models were used to evaluate the level of performance of the minibuses and Relative Important Index (RII) and Severity Index (SI) were also used to rank the criterion. There is a significant relationship between the characteristics of the respondents and waiting time for the mini buses with R^2 and adjusted R^2 of 0.947 and 0.945 respectively which indicate that the passengers spend less time when waiting for the buses. RII ranking result of comfort and safety of mini buses passenger safety, directness of the route and behaviour of driver ranked as the first three factors with RII values of 0.842, 0.827 and 0.808 respectively. In measuring the effectiveness and efficiency of mini buses accessibility of vehicle and buses availability were ranked 1^{st} and 2^{nd} with RII value of 0.879 and 0.861.

Recommendations

The following are hereby recommended:
1. Government at all levels should increase the efficiency of existing transport operations through improved planning and management.
2. State and local governments must offer support service infrastructure in the study area such as bus stations and terminals to enhance effective and efficient intra-urban mobility.
3. Mini bus drivers should be trained to drive properly and encouraged to comply with road regulations to reduce the rate of road crashes.
4. Road unworthy minibuses should be prohibited from operations and appropriate systems of control of vehicle have to be applied by the relevant management authorities and private operators themselves.
5. The suitability of urban roads for minibus operators in mixed traffic conditions along the major passenger transportation routes and their routine and periodic maintenance have to be considered in a reasonable and affordable way to preserve the physical environment from undesired damages and most importantly to avoid excessive expenditures in future.

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