

AN ASSESSMENT OF THE QUALITY OF INTRA-URBAN BUS SERVICES IN THE CITY OF ENUGU, ENUGU STATE, NIGERIA

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Abstract

Despite the vital role that buses are able to play in any urban area, their services are frequently insufficient to meet demand and the services that are provided suffer from low output. This paper assesses the quality of intra-urban bus services that are provided by government agencies and private bus operators in the city of Enugu as perceived by bus commuters.

In the 31 sample centres selected for this study 310 bus commuters were randomly interviewed to illicit information about their lengths of waiting time for the arrival of buses at the bus stops and their lengths of walking distances to the nearest bus stops. Using hourly bus frequency arrival count proforma, the number of buses arriving in each of the 31 sampled centres to carry passengers to different places in the city were collected by the stationed investigators between 6.00am and 6.00pm each day for one week. Descriptive statistic of mean and maps were employed to analyze the data collected. The analysis revealed that the quality of bus service indicators-passengers waiting time, walking distance to the nearest bus stops and bus service frequency varied from one centre to another, indicating variations in the level of bus services in different part of the city. The study recommends that the three Local Government Areas that make up the city in conjunction with the state government should construct new urban link roads and maintain the old ones especially in the peripheries to enhance accessibility; partnership with private bus operators to increase the number of buses in circulation and relocation of some socio-economic facilities from the city centre to the city peripheries to spread demand for and services of buses in the city.

Keywords: quality, bus service, transport

1. INTRODUCTION

Transport is important for the survival of modern society and without it there would be no life in the city (Onokala, 2001). As an essential service in urban centres, transport enables people, firms and other organizations to carry out their activities at sites selected for these purposes in separate locations in the cities. Transport provides a key to the understanding and operation of many other systems at many different scales and is an epitome of the complex relationships between social and political activities and the level of economic development (Buchanan, 1969; Hoyle and Smith, 1992).

In Nigeria, the pace of urbanization has been dramatic showing extraordinarily high rates of 5-10 percent per annum (Egunjobi, 1999; Ogunsanya, 2002). Consequently, there has been rapid expansion

of Nigerian cities' areal extent, which is now tenfold their initial point of growth (Oyesiku, 2002a). A critical aspect of this is that city growth and expansion in Nigeria has been largely uncontrolled (Olawaju, 2004). One of the major functions of the spatial structure of any human settlement is to facilitate the movement of people and goods within the settlement (Mabogunje, 2008).

Public transportation systems provide the most efficient means of moving large number of people especially in density populated urban centres. In addition to the well being of its users, public transport plays a vital role in the productivity of cities which in turn has a direct bearing on the national economies (World Bank, 2001; Lyndon and Todd, 2006). Public transportation by definition connotes the act or the means of conveying large number of people "en masse" as opposed to conveyance in individual vehicles carrying very few people at a time. In other words, public transport or mass transit is a system in which a greater number of people are moved at a time along principal corridors (Ogbazi, 1992, Wikipedia, 2009). Public transport or mass transit comprises mainly of the rail system, light rail system, tram ways and monorails, bus system and where possible water transportation (Wikipedia, 2009).

Today, experiences show a need for a greater variety of public transport modes, but buses are choice of a majority of the communities and are the only means of mobility that can be afforded by the poor in developing countries of the World (Armstrong-Wright, 1993). The choice of any or a combination of the public transportation systems enumerated above could be influenced by population and area/size of the city, their transportation demand and characteristics and land use pattern. Given our level of technological development, the bus system is chosen in this work. The bus system is the transportation system that uses buses that may have a range of passenger capacities and performance characteristics, and may operate on fixed routes with fixed schedules, or may be flexibly routed (Smerk, 1974).

Bus system is the dominant mode of motoried transport in Third World cities such as the city of Enugu. Bus also called Omnibus is any of a class of large self propelled wheeled vehicles that is designed to carry passengers generally on fixed routes. Because of low incomes for the majority inhabitants in the cities of developing countries, buses provide the only mode of transport that they can afford (Armstrong-Wright, 1993). Bus system has the potential of being used as a policy tool to reduce the number of cars on urban roads and so reduce traffic chaos in the city. It has also the potential of extending transportation services to a greater proportion of urban residents who do not have private cars, and cannot afford frequent taxis fares (Andeleeb et al., 2007). These are "captive bus riders. The bus riders seek a convenient ride between their points of origin and destination. They do not wish to walk very far

to their bus stops having arrived at the bus stop; they do not wish to wait very long time (Faulks, 1990). Added to this, they require comfortable ride at a fare which they can afford (Disney, 1998).

In the past three decades, the city of Enugu has been experiencing rapid population and expansion of its environment due to influx of migrants from rural areas to it. The growth was accompanied by a substantial expansion of the city's boundaries and much higher level of industrial, economic and social activities. These have led to the extension of low-income unplanned settlements on the city peripheries (Aribigbola, 2008) and workers from the areas are exerting increasing pressure on already inadequate public transportation facilities. The high cost of car purchasing and maintenance in Nigeria now due to economic meltdown, the spreading of suburbs and transformation of villages into dormitory settlements, have also created residential-to-work transportation problem in the city of Enugu as a result of inefficient mass transit systems especially bus system (Ezema, 2004)

In the view of these problems in the city of Enugu, government agencies as well as independent entrepreneurs have been involved in the provision of intra-urban public passenger transport services to meet the ever-growing demand of mobility in the city. For instance, the Enugu State Government and three Local Government Areas that make up the city of Enugu established different mass transit bus system between 1980 and 1990. to improve and moderate the intra-urban transport services in the city. Unfortunately, between 1999 and 2005, all the government owned mass transit bus systems in the city of Enugu withdrew their intra-urban transport services and concentrated on inter-urban transport services, leaving the provision of intra-urban bus transport services to private independent entrepreneurs and commercial motorcycles popularly known as "Okada". In the consequence, the city of Enugu witnessed increased number of private cars and became notorious for its chaotic traffic that was compounded by thousands of commercial motorcycle operators (Aliogo, 2009).

Between 2007 and 2008, the state Government embarked on massive rehabilitation and reconstruction of urban roads in the city which has enhanced intra-urban mobility of the residents. In addition, on 13th March 2009, the state government launched coal city shuttle bus transport services with 20 luxury buses with the capacity for 52, passengers sitting and 30 passengers standing to operate intra-urban transport services (Aliogo, 2009; The National, 2009) and on 1st April 2009, the state government banned the use of motorcycle in the provision of intra-urban public transport services along major streets in the city to ensure smooth traffic flow and the safety of the residents in the city (The National, 2009). Laudable as these efforts by the governments and private independent entrepreneurs to provide bus transport services for intra-urban mobility in the city were, not much successes have recorded by them in terms of meeting the needs of intra-urban bus riders in it. This is because the services that

buses provide are frequently insufficient to meet demand and the services that are provided suffer from low output. Thus, the central task of this paper is to assess the quality of intra-urban bus transport services that are provided in different parts of the city of Enugu as perceived by bus commuters.

2. THE LEVEL-OF-SERVICE CONCEPT

Generally it is not easy to exhaustively define the level-of-service (LOS) concept otherwise known as concept of quality of service indicators because different people and different urban regions may put different emphasis on various components of the concept. For instance, on the part of transport consumers (the travelers), the dimension of level-of-service (LOS) considered are travel time, bus frequency, comfort, terminal standards, bus stop facilities, interchanges between routes and services among others (George, 1979; Ume, 1991; Mfinanga and Ochieng, 2006). Travel time usually contains several different elements. For a transit trip, it includes walking into the station or bus stop, waiting time for bus services, traveling time in the transit vehicle and walking time to the destination (Jende Hsu and Surti, 1976; Rabi and McCord, 2006).

The comfort and convenience of public transport system (for example bus system) could be measured in the vehicle in terms of seating comfort and jolting. They could be measured to and from bus stop and at the bus stop in terms of terminal location, shelter provided, and traffic safety (World Bank, 1987; Ume, 1991; Transport Research Board, 2000).

In transportation engineering profession, level-of-service concept is widely used to denote the quality of service derived from the operational characteristics of transportation facilities (Mfinanga and Ochieng, 2006). The concept of level-of-service (LOS) is widely recognized worldwide and popular in traffic and transportation engineering operations as a performance measurement tool (Transport Research Board, 2000; Kadiyali, 2008). It is used in the Highway Capacity Manual (HCM) to represent the quality of service (QOS) and or corresponding satisfaction indices provided by a transportation facility as perceived by the users or customers (Kittelson and Associates Inc, 2003). Quality of service is defined as "the overall measured or perceived performance of transit from the passenger's point of view" (May, 2000). Quality of service measures reflect two important aspect of transit service (1) the degree to which transit service is available to given locations and (2) the comfort and convenience of the service provided to passengers. (Quattro, 2004). Quality of service measures differ from both traditional highway service quality measures, which are more vehicle-oriented than person-oriented, and from the numerous utilization and economic performance measures routinely collected by the transit industry, which tend to reflect the transit operator's variable (components) of level-of-service concept (Quality of

service concept), clearly show the various dimensional approaches of the concept. However, for the purposes of this study, the level-of-service (quality of service indicators) of mass transit bus service provided by government agencies and independent entrepreneurs in the city of Enugu as perceived by bus users by considering these variables (a) waiting time at the bus stops, (b) walking distance to the nearest bus stops and (c) frequency of bus arrival to bus stops. These variables were chosen because they help to determine the quality of service or level-of-service, the bus riders enjoy in the city that enhances their intra-urban mobility and accessibility.

3. THE STUDY AREA AND METHODS

The study area is Enugu, the capital of Enugu State, Nigeria. The city of Enugu is made up of three Local Government Areas (LGAs) Enugu East, North and South LGAs. The city lies approximately between latitudes $6^{\circ} 21'$ and $6^{\circ} 30'N$ and longitudes $7^{\circ} 26'$ and $7^{\circ} 37'E$ of the Equator and Greenwich Meridian respectively. It is bounded in the north by Igbo Etiti and Isi-Uzo LGAs, in the east and south by Nkanu East and West LGAs and in the west and south-west by Udi LGA. "It lies on the plains close to the foot of the east facing escarpment of Enugu-Awgu Cuesta" (Okoye, 1975). It has a total area of 612 square kilometers with a population of 722664 persons according to 2006 census (National Population Commission, 2007).

To collect data for this study, 31 major centres in the city of Enugu were selected (Figure 1) based on the following criteria (i) residential areas with a minimum population of 5000 persons based on the projection of 1991 population figures using 5% annual growth rate (ii) various foci of employment where at least 500 workers are employed estimated from the number of employment houses available in a centre (iii) market centres having at least 200 lock-up stores and (iv) educational centres where schools are located with at least 2000 students enrolment. These activity centres were adopted as major centres because they are traffic-generating points/originating and terminating points of outward and homeward bus commuter trips respectively in Enugu.

A well designed/structured questionnaire was used to collect data on bus users' variables called service indicators such as length of waiting time for the arrival of buses at the bus stops and distance taken by bus users to walk from the points of origin/destination to reach the nearest bus stops for them to catch bus. Ten bus riders/passengers were interviewed randomly in each of the 31 sample centres (310 passengers in all) as they arrived at the bus stops to catch bus. Using hourly bus frequency arrival count profoma, the number of buses arriving in each of the 31 major centres to carry passengers to different places in the city were collected between 6.00am and 6.00pm each day for one week. The

counting of the arrival of buses was done by stationing investigators at the bus stops on routes in each of the major centres. Where a centre is connected by multiple bus routes, different investigators were employed to man each of the routes. Buses arriving from two directions of bus traffic flows to bus stop were counted.

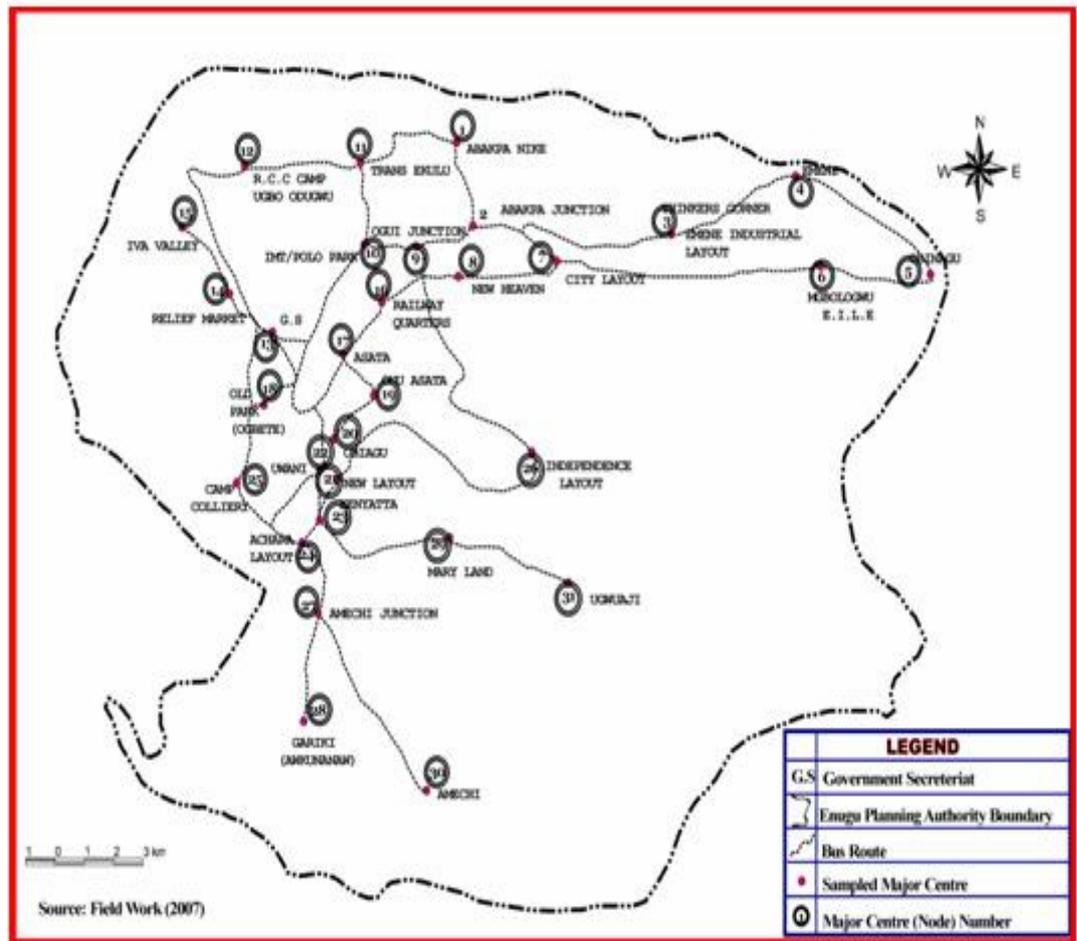


FIGURE 1— LOCATION OF SAMPLED MAJOR CENTRES IN THE CITY OF ENUGU
Source: Fieldwork 2009

The data collected about passenger waiting time and walking distance in each of 31 major centres were analyzed using descriptive statistic of mean and the maps. The bus service frequency index of each of the 31 major centres was determined by calculating the mean of bus service frequencies of buses. This was done by dividing the total bus service frequencies by the total number of hours involved during the recording of bus service frequency data. The total number of hours involved in this analysis is 12 hours (6.00am-6.00pm). Based on the results of the analysis maps were used to map the spatial variations of the three bus service indicators mean passenger waiting time, walking distance and bus service frequency in the area. Later, the three maps showing the spatial variations of the three bus service

indicators were superimposed to find a core area in the city where the quality bus service is the best and other parts of the city where the reverse is the case.

4. FINDINGS AND DISCUSSIONS

Passenger Waiting Time

An important characteristic of a public transport service is the time a passenger has to wait before getting on a vehicle. For this work, waiting time for bus is defined as the time a passenger spent at the bus stop between the passenger's arrival at a bus stop with the intention of catching bus and the time the bus he/she eventually boarded departs from the bus stop.

TABLE 1- MEAN PASSENGER WAITING TIME FOR BUS IN MAJOR CENTRES IN ENUGU

Centre Number	Name of Major Centre	Mean Passenger Waiting Time (in Minutes)
1	Abakpa Nike	15.53
2	Abakpa Junction	10.16
3	Thinkers Corner	21.44
4	Emene	16.49
5	Obinagu	29.12
6	Mkpologu/E.I.L.E	26.63
7	City Layout	9.91
8	New Heaven	10.10
9	Ogui Junction	10.11
10	IMT/Polo Park	12.30
11	Trans Ekulu	20.74
12	R.C.C. Camp/Ugbo-Odogwu	25.50
13	Government Secretariat	10.15
14	Relief Market	12.53
15	Iva Valley	21.28
16	Railway Quarters/Artisan Market	12.87
17	Asata	12.06
18	Old Park (Ogbete)	9.84
19	Onu Asata	15.67
20	Obiagu	13.50
21	New Layout	12.05
22	Uwani	22.58
23	Kenyatta	19.60
24	Achara Layout	12.80
25	Camp Colliery	15.39
26	Independence Layout	14.50
27	Amechi Junction	13.50
28	Gariki (Awkunanaw)	14.03
29	Mary Land	30.16
30	Amechi	26.30
31	Ugwuaji	30.31

The average passenger waiting time, the world over as devised by the World Bank, ranges from 5-10 minutes indicating high quality of bus services and the maximum time passengers are expected to wait for the arrival of buses at bus stops, ranges from 11-20 minutes indicating moderate quality of services.

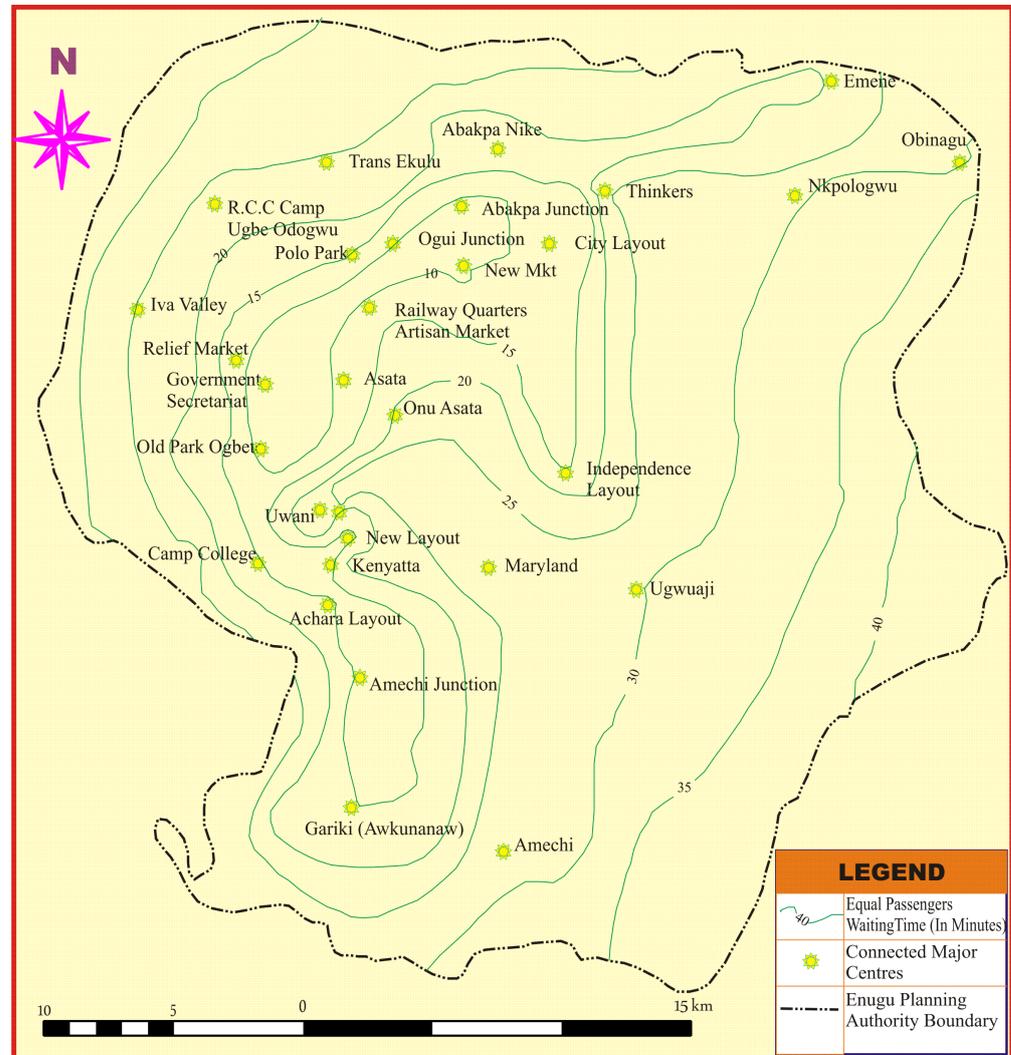


FIGURE 2 - ENUGU SHOWING AREAS OF EQUAL PASSENGERS WAITING TIME
Source: fieldwork, 2009

When the passengers waiting time is above 20 minutes, it indicates poor quality of bus services (World Bank, 1987). Table 1 shows the mean passenger waiting time for bus in each of the major centres in the city of Enugu. Figure 2 shows the lines of equal mean passenger waiting time in the city. It is important to observe that 10-minute line of equal mean passenger waiting time encloses an area with the lowest mean passenger waiting time for bus in the city, indicating high quality of bus services in the area. The area comprises these centres; Old Park (9.84 minutes), City Layout (9.91 minutes), Government Secretariat (10.15 minutes); New Heaven (10.10 minutes) Ogui Junction (10.11 minutes) and Abakpa

Junction (10.16 minutes). These major centres enjoy shortest passenger waiting time in the study area because they are located within the city centre area and as a result, they experience high frequency of buses.

Other major centres comprising IMT/Polo Park, Relief Market, Abakpa Nike, Emene, Railway Quarters, Artisan Market, Asata, Onu Asata, Obinagu, New layout Kenyetta, Achara layout, Camp Colliery, Independence Layout, Amechi Junction and Gariki Awkunanaw, experience mean waiting times ranging from 11 to 20 minutes and they are located in the area of the city that lies between 10-minute line and 20 minutes line of equal mean passenger waiting time for bus (Figure 2).

This indicates moderate quality of bus services in the major centres. All the major centres, located from 20 minute line of equal mean passenger waiting time towards the peripheries of the city, suffer from long waiting time for bus. This long waiting time increases as one moves towards the peripheries. Major centres involve in this group include Thinkers Corner (21.44 minutes), Iva Valley (21.88 minutes), Uwani (22.58 minutes), RCC Camp/ Ugbo-Odogwu (25.5 minutes), Amechi (26.30 minutes), Mary Land (30.16 minutes) and Ugwuaji (30.31 minutes). Factors contributing to the long waiting times for bus in these centres, as observed during the fieldwork, include low bus service frequency, low connectivity of bus routes, few economic and social activities going on there and low population and as a result, few bus operators are prepared to carry passengers to such centres.

Passenger Walking Distance

Passenger distance from origin or destination to the nearest bus stop is one of the important elements that determine the quality of mass transit bus service in any given urban area. It is one of the determinants of bus commuter's travel time. Walking distance of a bus passenger can be defined as the distance a passenger walks before reaching the nearest bus stop from the point of origin or destination to catch bus for a ride. The extent by which bus passengers walk before reaching the nearest bus stops to them depends on the spacing between adjacent transit bus routes and the spacing between adjacent bus stops (Jende Hsu and Surti, 1976). If the total bus services in a place is spread, passenger walking distance should be short and if the bus services are concentrated in few routes that means long walks by the bus passengers (Faulks, 1990). The world-wide average bus passenger walking distance ranges from 300-500 metres for dense urban areas and between 500-1000 metres for low dense urban area (World Bank, 1987).

The results of the analysis of the bus passenger average walking distances in all the major centres are displaced in Table 2 and Figure 3 depicts the spatial variations of the mean passenger walking distance

in the city of Enugu. From Table 2 and Figure 3, it is worthy to observe that major centres with the smallest mean passenger walking distances in the city include New Heaven (253 metres), Ogui Junction 271 metres), Relief Market (281.80 metres), Asata (290.82 metres), City layout 292.59 metres), Camp Colliery (296 metres), Government Secretariat (297.24 metres) and Old Park 300.64 metres). This group of centres is enclosed by 300-metre line of equal mean passenger walking distance (Figure 3). The bus commuters in these above named centres reach the bus stops nearest to them easily because of the short distances involved.

TABLE 2 - BUS PASSENGER MEAN WALKING DISTANCE IN MAJOR CENTRES IN ENUGU

Centre Number	Name of Major Centre	Mean Walking Distance Of Bus Passengers (in metres)
1	Abakpa Nike	501.27
2	Abakpa Junction	343.74
3	Thinkers Corner	606.20
4	Emene	605.20
5	Obinagu	664.73
6	Mkpologu/E.I.L.E	519
7	City Layout	292.59
8	New Heaven	253
9	Ogui Junction	271.24
10	IMT/Polo Park	475.43
11	Trans Ekulu	528.78
12	R.C.C. Camp/Ugbo-Odogwu	591.21
13	Government Secretariat	297.24
14	Relief Market	281.8
15	Iva Valley	563.75
16	Railway Quarters/Artisan Market	311.4
17	Asata	290.82
18	Old Park (Ogbete)	300.64
19	Onu Asata	533.3
20	Obiagu	669.75
21	New Layout	367.55
22	Uwani	326.72
23	Kenyatta	630.78
24	Achara Layout	454.75
25	Camp Colliery	296
26	Independence Layout	436.68
27	Amechi Junction	513.21
28	Gariki (Awkunanaw)	661
29	Mary Land	673.5
30	Amechi	620.66
31	Ugwuaji	600.4

Source: Fieldwork, 2009.

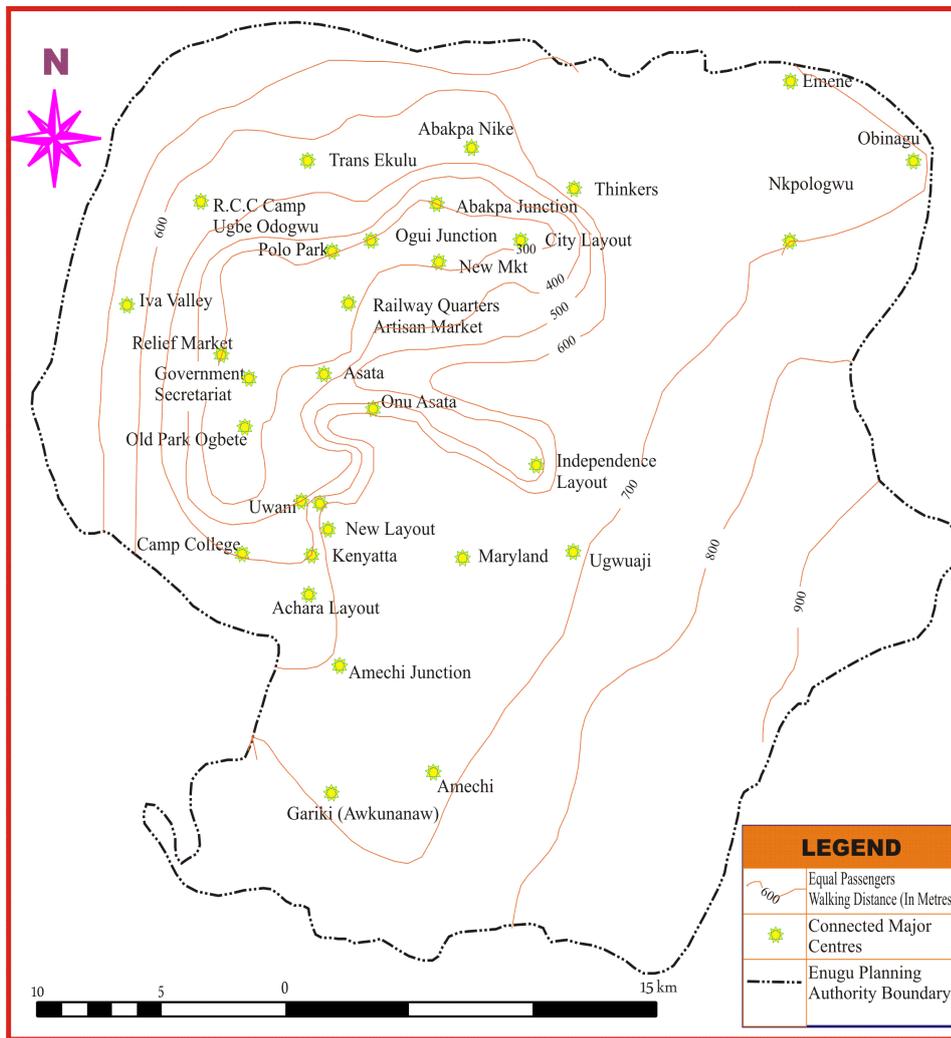


FIGURE 3 - ENUGU SHOWING AREAS OF EQUAL PASSENGER WALKING DISTANCE
Source: fieldwork, 2009

Between 300 metre line and 600-metre line of mean passenger walking distances, lie the major centres having fairly high passenger walking distance in the city of Enugu. These centres include Abakpa Nike, Iva Valley, Onuasata, Amechi Junction, Mkpologwu/E.I.L.E. R.C.C. Camp/Ugbo-Odogwu and Trans Ekulu. It is also observed from Figure 3 that the centres experiencing the longest mean passenger walking distances in the city include Mary Land (673.5 metres) Obiagu (669.75 metres), Obinagu (664.73 metres), Gariki- Awkunanaw (661 metres), Kenyetta (630.70 metres) Amechi (620.66 metres) Thinkers Corner (606.20 metres) Emene 605.30 metres) and Ugwuaji 600.40 metres). They found in the area of the city lying between 600 metre line and 700 metre line of equal mean passenger walking distances. Most of the bus commuters in the area trek long distances before getting to the nearest bus stops to them to catch bus. One major factor responsible for this, as was observed during the fieldwork, is inadequate bus routes traversing such centres.

5. BUS SERVICE FREQUENCY

Another source of variation in the level of quality of bus services is the frequency of buses (Jones, 1984). The regularity of buses in a place for services enhances personal accessibility of bus commuters to the services of the buses and vice versa. Bus service frequency as it is used in this work, means the number of buses that arrive in the major centres with the intention of carrying passenger for intra-urban movements. The extent by which bus passengers wait at bus stops to ride bus is significantly affected by the regularity or irregularity of bus arrivals at bus stops. Table 3 gives the calculated mean bus service frequency (MBSF) for the 31 major centres in the city of Enugu.

TABLE 3 - MEAN BUS SERVICE FREQUENCY (MBSF) IN MAJOR CENTRES IN ENUGU

Centre Number	Name of Major Centre	Mean bus service frequency (MBSF) No. of Buses arrived per hour
1	Abakpa Nike	112.5
2	Abakpa Junction	114
3	Thinkers Corner	81.6
4	Emene	86.8
5	Obinagu	24.8
6	Mkpologu/E.I.L.E	23.9
7	City Layout	91.6
8	New Heaven	18
9	Ogui Junction	128.2
10	IMT/Polo Park	107.3
11	Trans Ekulu	68.5
12	R.C.C. Camp/Ugbo-Odogwu	53.1
13	Government Secretariat	103
14	Relief Market	148.8
15	Iva Valley	10.8
16	Railway Quarters/Artisan Market	14.9
17	Asata	99.2
18	Old Park (Ogbete)	240.6
19	Onu Asata	55
20	Obiagu	61.4
21	New Layout	22.4
22	Uwani	60.9
23	Kenyatta	20.6
24	Achara Layout	72.8
25	Camp Colliery	14.7
26	Independence Layout	22.3
27	Amechi Junction	69.6
28	Gariki (Awkunanaw)	78.8
29	Mary Land	1.6
30	Amechi	3.4
31	Ugwuaji	1.3

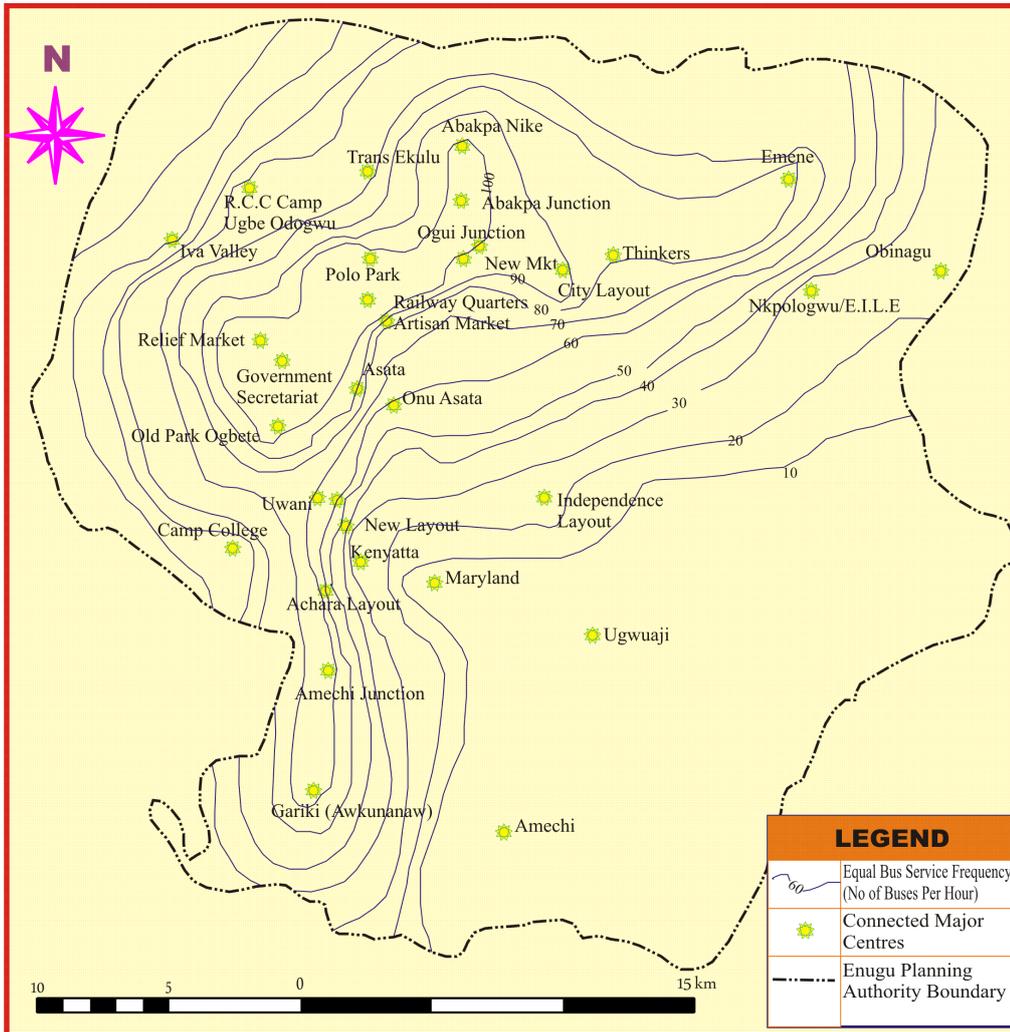


FIGURE 4 – ENUGU SHOWING AREAS OF EQUAL BUS SERVICE FREQUENCY
Source: Fieldwork, 2009

The mean bus service frequency (number of buses arrived at a centre per hour) calculated for each centre, varied from one centre to another as demonstrated in Figure 4. From Figure 4, it is interesting to observe that the bus service frequency (MBSF) decreases from the centre of the city towards the peripheries of the city. The 100-line of equal bus service frequency encircles the centres with the highest mean bus service frequencies in Enugu, comprising Old Park (MBSF =148.80), Ogui Junction (MBSF =128.2), Abakpa Junction (MBSF= 114), Abakpa Nike (MBSF 112.5), IMT/Polo Park (MBSF = 107.3) and Government Secretariat (MBSF =103). Between 100-line and 60-line of equal mean bus service frequencies, lie centres that enjoy moderate bus service frequency such as city layout, Emene, New Heaven among others. Moving away from 60 line of equal mean bus service frequencies, towards the peripheries, are found centres experiencing very low bus service frequencies, such centres include

Ugwuaji (MBSF= 1.3), Maryland (MBSF= 1.6), Amechi (MBSF =3.1), Iva Valley (MBSF= 10.8) and Camp Colliery (MBSF= 14.7).

6. THE CORE AREA

A central area in the city of Enugu is the area with the shortest waiting time for bus, shortest walking distance to the nearest bus stops and highest bus service frequency as illustrated by Figure 5 which is the superimposed maps of Figures 2, 3 and 4. From Figure 5, it is observed that the central area lies within the Old-Park Ogbete Government Secretariat Ogui-Junction Abakpa Junction axis. This is the area in the city of Enugu where bus commuters enjoy the best bus services.

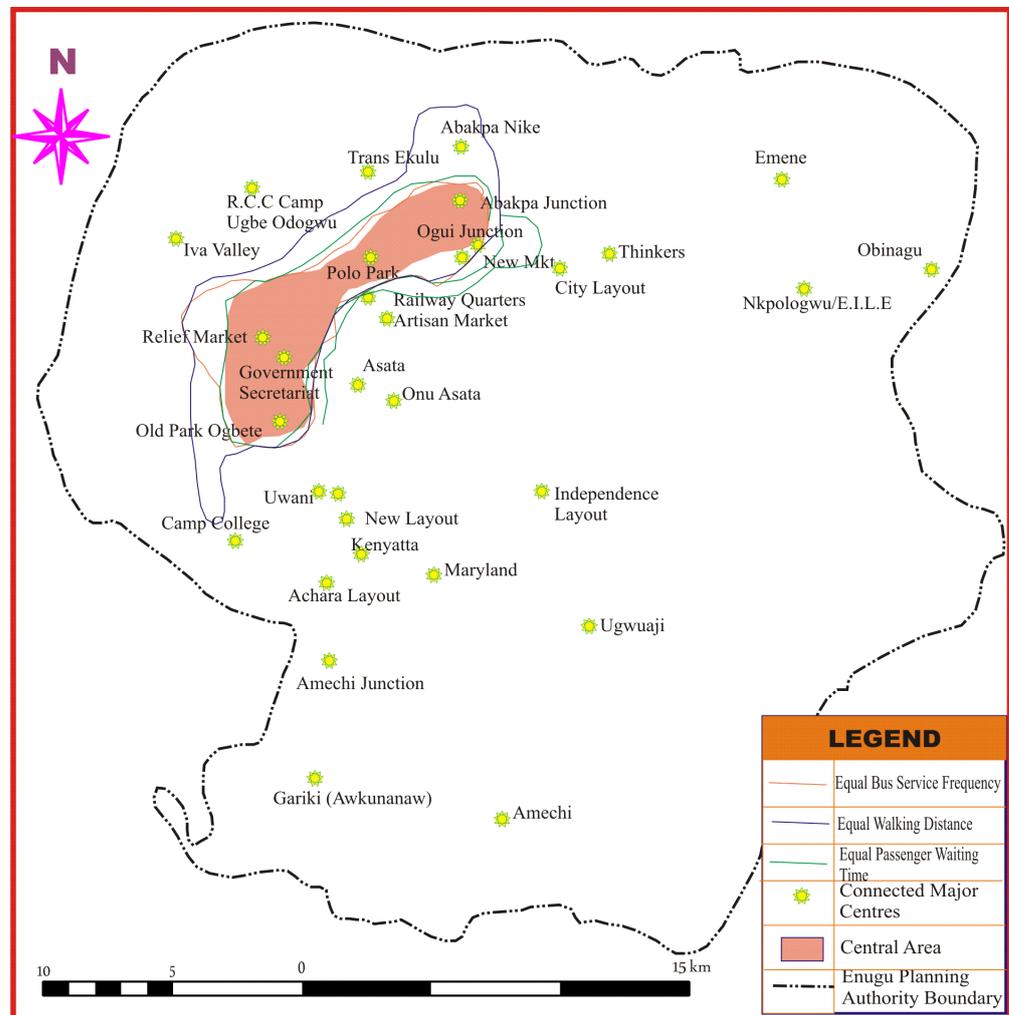


FIGURE 5 – SUPERIMPOSED MAP SHOWING A CENTRAL AREA ENJOYING HIGHEST BUS SERVICE QUALITY
Source: fieldwork, 2009

Many factors were found to be responsible for the existence of the central area (Figure 5) during the Fieldwork. The central area is the Central Business District (CBD) of the city which is the business commercial core of the city characterized by the greatest concentration of business offices housed in both massive and tall buildings, government and judicial offices, airline booking offices, private and public motor parks, wholesale and retail stores and petty traders' shops. The area is also housing the Enugu State Government Secretariat, Enugu North Local Government Headquarters, churches, hospitals and the Ogbete main Market. The central area has the highest density of roads in the city. It was also observed that the commercial houses in area are interspersed with residential houses.

As a result of the high concentration of economic and social activities in the area, it is then the terminating points of a large number of bus commuter trips from the rest of the city most of the day and the originating point of numerous commuter trips homewards, especially between 3.30 pm and 7.30 pm.

7. CONCLUSIONS

In this work, attempt was made to find out the quality of service of mass transit bus in the 31 sampled major centres by considering three components of the level-of-service (LOS) bus services frequency, passenger waiting time and walking distance. It was found that these components varied from one centre to another, indicating variations in the quality of service of level-of-service of mass transit bus in different parts of the city of Enugu. A central area was also identified where bus commuters enjoy the shortest waiting time for bus, shortest walking distance to the nearest bus stops and the highest bus service frequency, indication an area with the highest quality of bus services in the city. This is because the central area is characterized by the highest concentration of business establishments interspersed with residential houses, good linkage of roads, government offices and major markets. Moving away from the central area towards the city peripheries, the quality of bus services was found to be decreasing progressively due to poor linkage of urban roads and low economic and social activities.

Based on these findings, the following recommendations are made:-

- The governments should construct more urban link roads especially in the newly developing areas and maintain the existing ones to increases accessibility.
- Central area of the city should be decongested by relocating some facilities such as markets, motor parks, government offices and the like to the city peripheries to increase economic and social activities there which will generate more demand for bus services and thus, encourage bus operators to ply the routes in such areas.

- The three local government areas that make up the city should join the state government in provision of buses for intra-urban transport services so as to increase bus service frequency, reduce passenger waiting time and walking distances in the city especially at the peripheries.
- Where governments cannot provide the facilities for intra-urban bus transit bus services themselves, then, they should subsidize those enterprises who have proved, beyond reasonable doubt that they can provide bus services. This will encourage private bus enterprise operators to ply more routes in the city as may be directed by the governments.

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