

Bus Rapid Transit Services and System: A Remedy to Public Transport Challenges and National Development in Nigeria

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Abstract

Road transport has become a dominant mode in Nigeria with patronage cutting across individual commuters, private, corporate and government organizations serving as coordinating basis for all modes of transport system. Before the intervention of Bus Rapid Transit (BRT) and up till now, there had been a corresponding increase in road accidents, delay, traffic congestion and overstretched road infrastructures. The aim is to look at how the BRT scheme has been able to address transportation challenges in Lagos State. The study adopted an empirical research design approach to investigate BRT services in Lagos State. The study was based on the data drawn from a target population which is Lagos BRT communities. The sampling unit was based on pilot study using the number of BRT fleets in operation and their capacities, where a total number of 539 BRT users form the sample size. The data for the study were obtained from primary sources through administration of questionnaires. The data collected was subjected to descriptive and inferential statistical techniques. The Likert Scale statistical technique was used to find out if the operation of Bus Rapid Transit has no significant difference in reducing transportation challenges in Lagos State. The result shows that BRT has made a significant impact in reducing transportation challenges in terms of safety, comfort, speed, fare structure and waiting time in Lagos State. The study recommends that the BRT scheme should be extended to other parts of the State to ease transportation challenges and encourage sustainable transport development in Nigeria.

Keywords: *Bus Rapid Transit, Commuters, Transportation challenges, National development, Sustainable transport*

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Background to the Study

A large proportion of the working population in most communities of the world travels daily in different forms using one mechanized means of movement or the other to move to work places, recreation centres, shopping malls and other land uses. Goods are also shipped over a long distance to provide those materials which are part of the expected standard of living. Transportation therefore, is an integral part of the functioning of any society and advances in transportation have made possible changes in the way we live and the way societies are organized (Ogundare and Ogunbodede, 2014).

Over the years, urban areas across the world, in both developed and developing countries have become increasingly automobile-dominated and less sustainable. In developing countries in particular, cities have experienced a rapid growth in transport-related challenges, such as pollution, congestion, accidents, public transport decline, environmental degradation, climate change, energy depletion, visual intrusion, and lack of accessibility for the urban poor. In more developed countries, particularly in Northern Europe, Kuhn (2015) observed that some cities have witnessed a trend of reclaiming urban space from the automobile and prohibiting cars from major parts of downtown areas and or confining them in other ways. Today, these places are often considered as leading examples of sustainable urban development, as cities across the world strive to meet urban sustainability standards by improving public transport, encouraging non-motorized modes, creating pedestrian zones, limiting the use of private cars, and otherwise trying to undo the transformation of cities caused by automobile dominance (Dorina and Dominic, 2015).

However, the history of Bus Rapid Transit (BRT) resides in a variety of previous efforts to improve the public transport experience for the customer. According to Cervero (2013), the modern era of BRT development is credited to the opening of Curitiba's system in 1974, and there were several efforts prior to Curitiba that helped to establish the idea. BRT has therefore, benefited greatly from applications of high-quality urban rail systems. In many respects, BRT has borrowed concepts from light rail and metro rail systems in order to provide a quality customer experience but at a lower cost than traditional rail systems.

Bus rapid transit flexibility combines stations, buses, exclusive and segregated bus ways, and intelligent transportation system elements into an integrated transit system with a strong brand that evokes a unique identity (Hidalgo and Carrigan, 2010). According to Diaz *et al.* (2004), BRT provides a higher quality of service than traditional urban bus operations because of reduced travel and waiting time, increased service reliability and an improved user experience. BRT is therefore a high-quality, efficient mass transport mode, providing capacity and speed comparable with urban rail (light and heavy rail). Its insertion in urban transport systems is relatively recent and as a result the need to introduce the concept particularly to urban transport decision makers to better understand its cost, performance and impacts.

Incidentally, Lagos being a mega city in Nigeria has been a victim of transportation problem, where the public transport infrastructures has been inadequate with escalating urban population that has resulted in chaotic, unsustainable, time and money wasting transport

system. Out of the intention to alleviate traffic challenges and creating a functional, livable and sustainable city, the Lagos Bus Rapid Transit was created in 2008. Since the bus rapid transit has been introduced, there is the need to examine the extent to which this scheme has been able to address the urban transportation challenges in Lagos.

Literature Review

Many Nigerian cities are experiencing alarming traffic problems. These problems range from road congestion which has reached crisis levels in cities like Lagos and Ibadan. The public transport system in the smaller but fast growing towns such as Calabar, Owerri, Akure, and Jos is poor or grossly inadequate. These problems are compounded or worsened by the large number of vehicles which are added daily to the existing ones on the narrow streets and the poor conditions of the urban road systems. Ogunsanya (2004), Ogundare (2013), and Ogundare and Ogunbodede (2014), highlighted several transportation problems such as urban traffic congestion, parking problems, and traffic delays which are basically symptoms of a malfunctioning urban traffic system.

In recent years, the growing volume of road traffic and other related problems have perhaps claimed more public attention than any other urban problems in Nigeria, (Ogunbodede, 2008). The reason for this is quite clear. It is the most visible problem that seems to affect everybody in many Nigerian urban centres today. For instance, in Lagos, the fact that one owns a personal means of transport does not confer transportation comfort ability on such a person, because everyone experiences traffic delays and congestion problems on Lagos roads. The problems of urban transportation continue to receive considerable attention in Nigeria (Adegboyega and Aguda, 2010). According to Ogunsanya (2002), transport has been argued to be both a “maker and a breaker” of cities. Even though the provision of urban transport has enabled people to live further and further from their places of work and at the same time increased spatial distribution and diffusion of goods, services, and ideas in the Nigerian urban space, urban transport has equally promoted increased: (a) Competition for urban space;(b) Traffic congestion problems; (c) High transport cost and breaks in family ties; (d) Traffic accidents;(e) Environmental pollution; and (f) Traffic noise. These problems vary from one city to another in Nigeria. For example, while all the problems are more pronounced in Lagos, Ilorin, Ibadan, Kano, and Port Harcourt, the newly created state capitals like Akure, Ado-Ekiti and Osogbo are only beginning to experience some of the problems on specific arteries.

The astronomical increase in the volume of vehicles plying intra-urban roads in recent years, coupled with the fact that urban mass transit which would have reduced the use of personal cars, remained relatively undeveloped. This has accentuated the problems of traffic congestion, traffic delay and traffic noise in most of the urban centres in Nigeria. The high incidence of traffic accidents on Nigerian roads is worrisome. If the number of road accidents in Nigeria as reported by Federal Office of Statistics (1996) were to be dis-aggregated into urban and rural roads, the former account for a greater percentage of most of the accidents in Nigeria.

According to Ogunsanya (2002), urban traffic problems seem to be one of the foremost concerns of the Federal and State Governments in Nigeria. They also appear to be the most intractable. The attempts at their solution have been multifarious and multifaceted. In Lagos for example, in 1973, helicopters were used to assist thousands of traffic wardens to ease traffic problems. Later on many streets were converted to one-way traffic routes while several overhead flyovers were built. The Eko Bridge was built and its complex expanded in order to decongest the Carter Bridge. Despite these attempts, there are days when the traffic in Lagos stands still for several hours.

Since the launching of the Third National Development Plan 1975-80, the Federal Government has embarked upon ambitious plans to improve urban traffic infrastructures in all the major cities in the country. The projects according to Ogunbodede (2004) include the construction of major by-passes and ring road systems, surfacing and widening many thousands of kilometres of streets and commissioning several studies of means of improving urban traffic. Yet the traffic in urban centres grew worse.

There are fundamental private and social costs of urban traffic congestion. When an additional automobile enters a congested street, it reduces the speed of all traffic moving on that street. The implication is that the driver of the additional vehicle moves at a slower speed than before, and so bears part of the cost imposed. Since the speed of all other vehicles has also been reduced, he imposes an external cost on all other motorists. There is no market transaction between motorists, so this cost represents an external technological diseconomy.

However, according to Uyanga (2002) the cost has two components. Because most people have alternative productive or enjoyable uses for their time, there is an opportunity cost to the time spent driving. The reduction in speed imposes a direct time cost equal to the total increment in time for all other drivers resulting from each additional vehicle mile of travel on the streets. The second category of external cost is increased operating cost. Any automobile has a speed at which it operates most economically, usually 50 to 60 kilometres per hour. The lower speed in urban traffic congestion increases operating and maintenance costs of all vehicles on the road. Other direct costs include excessive tension and anxiety, irritation and cut-backs on working periods.

The point made above is that the cost of urban traffic congestion spans some social and psychological elements. However, it is contended that besides developing a national policy for urban traffic infrastructure development, the other aspect of “fighting” urban traffic problems concern traffic analysis in the growing urban centres, experiments with new modes of transportation and developing modes of traffic planning and control in the light of the knowledge of urban traffic behaviour.

Research Hypothesis

H₀: *There were no significant challenges facing public transportation before the intervention of BRT in Lagos State.*

Study Area

Lagos State, the study area was created in 1967 when Nigeria was restructured into a Federation of twelve states. Lagos as a trading port has a recorded history dating back to the Portuguese explorers of the 16th century. Located in the south western part of Nigeria, Lagos State occupies 3,345 square kilometers. It shares boundaries with Ogun State both in the North and East and is bounded on the west by the Republic of Benin. In the South it stretches for 180 kilometers along the coast of the Atlantic Ocean (Fig.1). It is the smallest State in the Federation, and occupies an area of which 22% or 787sq. km consists of lagoons and creeks. The land on the northern fringe of the state has soils which do not rise very much above sea level (Uka, 2017; LASG, 2017).



Figure 1: Lagos state Showing BRT Route

Source: Author field work

Methodology

The methodology adopted in this study is geared towards the ultimate realization of the aim of the study. A pilot study was conducted in the area to explore information about BRT infrastructures and services, characteristics of commuters, nature of transportation, traffic situation and safety, means of getting to BRT bus stops and the basic BRT corridors. The study was purposively based on the data drawn from a target population which is Lagos BRT users. The sampling unit was therefore based on pilot study and published tables of Israel (2013) and Olowosegun, Olorunfemi, Akinshinwa and Okoko (2014), using the number of BRT fleets in operation and their capacities. With the use of 245 buses in the fleet at peak periods and an average capacity of 44 passengers, a total number of 10,780 passengers form the sample frame. Taking a Precision Level of 5 percent of the total number where confidence level is 95 percent,

this gives a sample size of 539 respondents. With the assistance of ticket operators at the terminal bus stops 539 questionnaires were distributed to commuters on a first come first served basis. The three peak hours, that is the morning, afternoon and evening peaks were taken into consideration where 200 questionnaires were distributed each at morning and evening peaks and 139 questionnaires distributed at afternoon peak hour making a total of 539 questionnaires in all. The data collected were analyzed using both descriptive and inferential statistics. The results were shown using tables, graphs and charts. The Chi-square statistical method was used to examine if BRT has a significant difference in reducing transportation challenges in Lagos State.

Data Presentation and Analysis

The data generated from the study were presented and analyzed according to the socio-economic characteristics and hypothesis that guided the study.

Gender Distribution of Respondents

The data collected on the sex of the respondents shows that 55.3% were males and 44.7% females. The study revealed that there are more males that patronize and use BRT in Lagos State than females as shown in Figure 2.

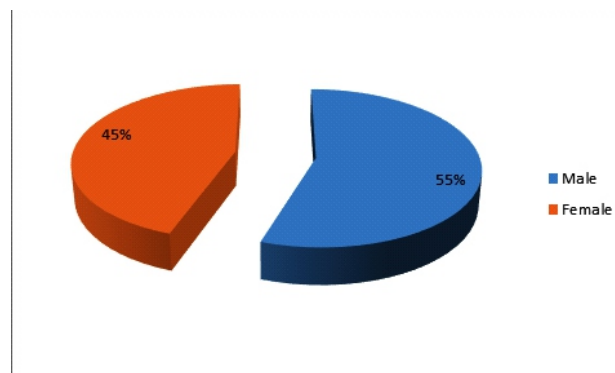


Figure 2: Gender Distribution of Respondents

Employment Status of BRT Commuters

The survey of respondents' employment status was revealed in Table 2 and Figure 3. Both depict the employment status of people who use BRT. Majority of those who use BRT are employed people. They probably use BRT because of the perceived advantages of the scheme. Of the total 539 commuters that were sampled, 26.2% are civil/public servants while 45.1% were privately or self-employed. Only 17.8% claimed to be student/apprentice and 10.9% unemployed or retired.

Table 1: Employment Status of BRT Commuters

| S/N | Employment Status | Frequency of Commuters | % of Total |
|-----|-----------------------|------------------------|--------------|
| 1. | Civil/Public Servants | 141 | 26.2 |
| 2. | Private/Self Employed | 243 | 45.1 |
| 3. | Student/Apprentice | 96 | 17.8 |
| 4. | Unemployed/Retired | 59 | 10.9 |
| | Total | 539 | 100.0 |

Source: Author's Field Survey, 2018

Furthermore, the employment status revealed two statuses of commuters of BRT, that is employed and unemployed commuters. From Figure 3, 71.3% are employed while 28.7% are unemployed. This fact supports 82.4% of the commuters that claimed to be diploma or degree holders in Figure 2. The assertion also supports the pattern of movement during peak hours. Out of the 539 respondents sampled, 263 of them representing 48.8% claim to have a car of their own. This indicates that some people who have cars also patronize the BRT for some reasons which stems from reliability, free of congestion, speed, comfortability and ease of use. Of those who use the BRT, majority of them (84.2%) agree that BRT is faster than using their own cars or other public commercial buses. This is probably due to the fact that BRT have dedicated lanes along the corridors.

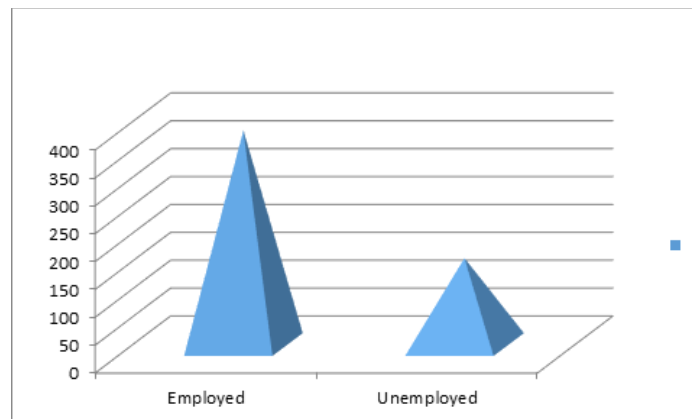


Figure3: Pyramid bar Chart Showing Employment Status of BRT Commuters.

Purpose of using BRT

Further analysis as shown in Table 3 classify journey purpose of BRT commuters by time of the day into morning, afternoon (inter), and evening peak periods. 54.5% of commuters that journey in the morning using BRT claimed that the purpose of using it is to go to work, 21.4% in the morning peak period use BRT for business while 6% use it for shopping and 13.2% claimed they use BRT for educational purposes. However, 4.9% of the respondents that respond to others claimed that they use BRT for religious, leisure, visit, or recreational purposes in the morning rush hour. Likewise the situation is almost the same in the evening peak period where 51.6% commute for work purpose, 25.3% commute for business and 10.4%

commute for shopping. Only 7.2% commute for educational purpose in the evening peak period while 5.5% commute for leisure, religious and recreational purposes. In the afternoon, inter-peak period there is a sharp increase of commuters to 24.6% for shopping purpose while journey to work reduced drastically to 32%. This is so because workers are supposed to be in their duty posts apart from workers who are on shifting duties. However, majority of BRT commuters commute for working purposes and this is evidence during the morning rush hour when people journey to work and also during the evening period when they close from work.

Table 2: Journey Purpose of BRT Commuters by Time of Day

| S/N | Purpose | Morning Peak | Inter Peak | Evening Peak |
|-----|-----------|--------------|------------|--------------|
| 1. | Work | 99 (54.5%) | 56 (32.0%) | 94 (51.6%) |
| 2. | Business | 39 (21.4%) | 45 (25.7%) | 46 (25.3%) |
| 3. | Shopping | 11 (6.0%) | 43 (24.6%) | 19 (10.4%) |
| 4. | Education | 24 (13.2%) | 18 (10.3%) | 13 (7.2%) |
| 5. | Others | 9 (4.9%) | 13 (7.4%) | 10 (5.5%) |

Source: Author's Field Survey, 2018

In the same vein Figure 4 also shows a daily mean pictorial representation of journey purpose of commuters using BRT in Lagos State. Generally, on the average, 46% of the commuters use BRT for work purposes and 24.1% use it for business while 13.7% use BRT for shopping purposes. Only 10.2% of the commuters use BRT for educational purposes while 6% use it for other various purposes as highlighted in the previous sections.

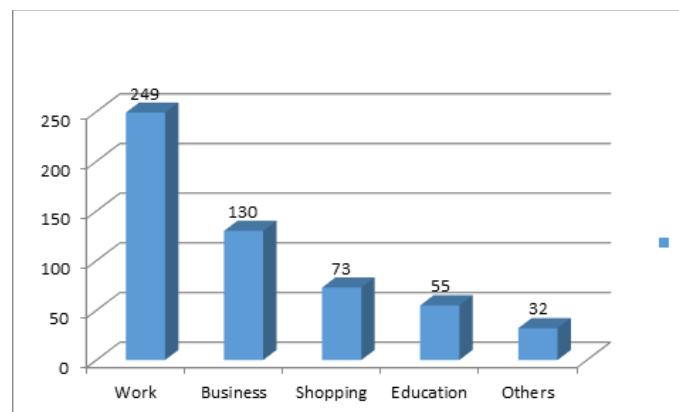


Figure 4: Mean Daily Journey Purpose of BRT Commuters

Challenges of public transportation before intervention of BRT in Lagos State

Road transportation has become a dominant mode in Nigeria with patronage cutting across individual commuters, private, corporate and government organizations serving as coordinating basis for all modes of transport system. The restrictive nature of the waterways, coupled with the near collapse of the rail system, and the high cost of air travels have further exerted a lot of pressure on the road, as over 75 percent of the total movements in Nigeria are made by road (Orekoya, 2010).

Further, lack of professionalism by transport owners and the absence of proper regulation over time resulted in the poor management of the transport sub sector of Lagos State. Before the intervention of BRT and up till now in some parts of the State, there had been a corresponding increase in road traffic crashes or accidents, delay and traffic congestion as well as overstretched road infrastructures. Coupled with these, passengers have persistently experienced unprecedented upsurge in cases of harassments, kidnapping, murder, robbery, assaults, injuries, loss of life and properties. Also, public transportation in Lagos State is confronted with inadequate public buses leading to rush for the few available ones, rickety and dirty type of commercial buses, unorganized public transportation, long waiting time at bus stops, and journey time unnecessarily prolonged (Mobereola, 2009; Asenime, 2013; Olowosegun *et al.* 2014; Atoyebi *et al.* 2015, Okagbue *et al.* 2015).

However, within the last decade, a new challenge in public transportation emerged with the introduction of Bus Rapid Transit (BRT) as the best most cost effective option with guaranteed maximum impact (see Plates 1 and 2). According to Mobereola (2009), the BRT is a bus based mass transit system that delivers fast, comfortable, reliable, safer, and cost effective urban mobility. It provides an affordable, safe and efficient urban transportation system that supports the overall development and competitiveness of the urban area.

Despite all the above advantages, there are some challenges at the point of implementation of the BRT system, such include lack of support by some of the operators in the public transport industry towards the project or not wanting to change to the new operations, time factor in the construction of the corridors, as well as educating the current users and the potential users. Mobereola (2009) stated that the central challenges in implementing the BRT system in Lagos were accommodating the high levels of demand in the face of a dilapidated infrastructure of limited capacity, ensuring that operations were sustainable by means of the appropriate delivery structures, establishing the appropriate regulations and ensuring compliance, and winning the support of the people of Lagos.



Plate 1: Transport situation before BRT in Lagos State

Source: Author's Field Survey, 2018



Plate 2: Transport situation after BRT in Lagos State

Source: Author's Field Survey, 2018

The general assessment of the quality of public transport services by BRT users in the study area shows that many of them are not comfortable with the service delivery of public transport. The study revealed that 78.5% of BRT users expressed their dissatisfaction about the maintenance culture of public transport services in the city. While the remaining 11.5% of the commuters claimed that they are satisfied with public transport services, they see the probable inadequacies in their services as a reflection of the global economic recession which affects every aspect of the economy.

Test of Hypothesis

Table 3 indicated the summary of the respondents' responses to the existing public transportation challenges before intervention of BRT in Lagos State as well as the calculated Mean Weight Value (MWV) and the Gross Mean Weight Value (GMWV) on the respondents' notions. As a rule (Likert Scale) the variable with MWV above the cut-off point GMWV3.10 was accepted while variable with MWV below the cut-off point was rejected, (see Table 3).

Table 3: Existing Public Transportation Challenges before Intervention of BRT in Lagos

| S/N | Statement Items | Responses | | | | Total | Likert Conversion | | | | Total | Mean Weight Value | Decision |
|-------------|--|-----------|-----|-----|-----|-------|-------------------|-----|-----|-----|-------------|-------------------|----------|
| | | SA | A | D | SD | | 4 | 3 | 2 | 1 | | | |
| 1 | Poor driving habits of commercial drivers | 281 | 187 | 34 | 37 | 539 | 1124 | 561 | 68 | 37 | 1790 | 3.32 | Accepted |
| 2 | Poor road network and absence of road signals | 126 | 164 | 148 | 101 | 539 | 504 | 492 | 296 | 101 | 1393 | 2.58 | Rejected |
| 3 | Poor traffic control management | 245 | 176 | 73 | 45 | 539 | 980 | 528 | 146 | 45 | 1699 | 3.15 | Accepted |
| 4 | Poor drainage to drain excess water during rains | 299 | 186 | 38 | 16 | 539 | 1196 | 558 | 76 | 16 | 1846 | 3.42 | Accepted |
| 5 | Presence of too many heavy vehicles | 219 | 194 | 77 | 49 | 539 | 876 | 582 | 154 | 49 | 1661 | 3.08 | Rejected |
| 6 | Poorly designed junctions/roundabout | 114 | 131 | 172 | 122 | 539 | 456 | 393 | 344 | 122 | 1315 | 2.44 | Rejected |
| 7 | Lack of pedestrian services | 315 | 154 | 23 | 47 | 539 | 1260 | 462 | 46 | 47 | 1815 | 3.37 | Accepted |
| 8 | Use of old vehicles cum low maintenance | 209 | 216 | 48 | 66 | 539 | 836 | 648 | 96 | 66 | 1646 | 3.05 | Rejected |
| 9 | Poor road surfacing and pavement | 207 | 147 | 101 | 84 | 539 | 828 | 441 | 202 | 84 | 1555 | 2.89 | Rejected |
| 10 | Too many traffic on the road | 251 | 186 | 55 | 47 | 539 | 1004 | 558 | 110 | 47 | 1719 | 3.19 | Accepted |
| 11 | Poor quality of public buses | 216 | 207 | 75 | 41 | 539 | 864 | 621 | 150 | 41 | 1676 | 3.11 | Accepted |
| 12 | Long Journeys | 315 | 154 | 23 | 47 | 539 | 1260 | 462 | 46 | 47 | 1815 | 3.37 | Accepted |
| 13 | Long waiting time at bus stops | 219 | 215 | 69 | 36 | 539 | 876 | 645 | 138 | 36 | 1695 | 3.14 | Accepted |
| 14 | Excessive total travel time | 215 | 151 | 105 | 68 | 539 | 860 | 453 | 210 | 68 | 1591 | 2.95 | Rejected |
| 15 | High pollution level | 299 | 184 | 32 | 24 | 539 | 1196 | 552 | 64 | 24 | 1836 | 3.41 | Accepted |
| GMWV | | | | | | | | | | | 3.10 | | |

Source: Author's Field Survey, 2018

Thus, factors such as poor drainage to drain away excess water during rains has a MWV of (3.42); lack of pedestrian services (3.37); poor traffic control management (3.15) too many traffic on the road (3.19); long waiting time at bus stops (3.14); and long Journeys (3.37). Added to the foregoing is the poor driving habits of commercial drivers with a MWV of (3.32); poor quality of public buses (3.11); and high pollution level (3.41) were accepted. Other factors such as poor road network and absence of road signals (2.58), presence of too many heavy vehicles (3.08), poorly designed junctions/roundabouts (2.44), poor road surfacing and pavement(2.89) and excessive total travel time (2.95) were rejected because their MWV is less than 3.10 the cut-off point. Thus, they do not affect public transportation in Lagos State. In

other words, the analysis reveals that H_0 which states that 'there were no challenges facing public transportation in Lagos State' was rejected, while the alternate hypothesis H_1 which states that 'there were challenges facing public transportation in Lagos State' was accepted.

Conclusion

The future for bus rapid transit is bright. Rapid motorization and ever-worsening traffic conditions in many rapidly emerging economies and fast-growing cities make investments in high-capacity, high-performance transit systems more imperative than ever. Mounting concerns over the long-term environmental and fiscal impacts of car-dependent sprawl combined with global initiatives to dramatically curb carbon emissions further favour a world of expanded transit services.

The study therefore recommends that the government of Lagos State should embark on separate BRT route construction to ease pressure from the existing roads where the BRT lanes were carved out. Also, acquisition of more BRT buses and expansion of the routes covered should be embarked on as well as periodic assessment of the BRT drivers, buses, stops and safety facilities be carried out to ensure that the drivers comply with the safety rules and procedures. The BRT model should be introduced in other major cities as this will ameliorate immensely the problem of transportation in Nigeria. The comfort, safety and speed that the BRT offer will enhance performance at work places thereby increasing productivity and economic growth as well as the standard of living of the citizenry.

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