Passengers' Satisfaction, Driver and Bus Scheduling: The Case of Lagos Metropolis Bus Rapid Transit (BRT) Scheme

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ABSTRACT

The significant of public transport of cities in many developing countries lies in the fundamental fact that mobility and accessibility are essential for economic growth and of necessity to provide efficient and effective movement for goods and services. The failure of the public transportation system however and indeed overall transportation system in the cities has led to further marginalisation of the greater majority of the people in these cities and consequently, economic deprivation.

The empirical study on which this paper is based was aimed at evaluating the level of passengers' satisfaction of the BRT scheme introduced by mid 2008. About four thousand (4,000) passengers and eighty (80) drivers of the buses in the scheme were interviewed through a self administered questionnaire. Ten (10) major criteria that could determined the passengers' and drivers' satisfaction were identified and measured including: speed, comfort ability, reliability, promptness of buses, availability, relationship with the drivers, ease of waiting time and safety during the trips. With over 100 buses and about 500 drivers along three (3) dominant routes in the city, drivers and buses scheduling are still manually done. This has implications for the route planning, drivers and buses scheduling of the BRT public transport planning and operations.

The findings show that though overall about 62% of the passengers were either satisfied or fully satisfied in all these criteria, there is wide variation in the level of satisfaction among the routes. While the buses arrive and depart on schedule on some routes, buses are inadequate and drivers not sufficient in others on some days. Using multivariate analytical methods, the major determinants of continuous use of the BRT scheme are: reliable and stable cheaper fares, comfort, reliability, and availability of the bus services. However, long time of waiting at the bus stops resulting from buses and drivers scheduling challenges seems to be among the critical success issues in the use of the scheme. There is a growing widespread use of and popularity of Lagos BRT as the current study shows that 35% of the car-owing population also use the scheme due in part to reduced travel time, reliability, safety and comparative cheaper cost to go by the buses. The paper concludes on the note that while the study is a base-line one, the critical success factors of the scheme are based on the buses running faster in a highly congested city, reliability and availability of buses on time and as scheduled, the fares are stable over time and new buses that were deployed on the road provided comfort for the commuters.

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1. INTRODUCTION

The importance of public transport in cities of many developing countries lies in the fundamental fact that mobility and accessibility are essential for economic growth and of necessary to provide efficient and effective and effective movement for goods and services. However, the failure of the public transportation system in the cities has led to further marginalization of the greater majority of the people in these cities and consequently, economic deprivation. This predicates on the public transportation scene in many of these cities that is characterized by overcrowding and the use of already overused and rickety vehicles imported from other parts of the world, Incessant traffic Congestion due to continuous deteriorating condition of roads that inadvertently slow down traffic, increasing vehicular and pedestrian accidents and their associated increase in the cost of human capital growth and loss of man-hours for several weeks ((Adeniji, 2000; Badejo, 2008; Oyesiku 2002). The rating of transportation negativities in major cities of the world, the adverse effects of road traffic congestion was rated at 54.5%, while ineffectual public transportation system, air and noise pollution were rated 54.8% and 59.4% respectively. However, road traffic congestion is expected to be worst at 61.3% than public transportation and air pollution in the nearest future (Auclaire, 2000).

World Bank (2001) also noted the increasing pressure on urban transport systems in most developing countries, a consequence of increase in motor vehicle ownership and use which is growing at a faster rate than population, with vehicle ownership annual growth rates of between 15% or 20% in most developing countries. Ironically, these growths in traffic have continually exceeded the capability of authorities in developing countries to increase road space, hence the consequential impediments to the efficient working of the urban economics in most cities in developing countries. The travel speeds in cities are decreasing and the travel environment for pedestrians and people-powered vehicles are deteriorating in developing countries, due to the inefficiency of the entire road transport system. Of the sixteen developing country cities with populations of more than 4 million studied, five major cities in this group (Bucharest, Jakarta, Kinshasa, Lagos and Manila) experienced an average one-way journey to work of about one and quarter hours or more (UNCHS Global Urban Indicators Database, 1998).

The city of Lagos, a renowned world fast growing city, has over the years been experiencing intractable road traffic challenges that have impacted negatively on the socio-economic growth and development of the city including longer transit time between locations, and waiting time at bus stops, high cost of transportation, excessive energy consumption and its attendant effects of air and noise pollution.

Arising from these challenges of the road traffic and public transportation scene in Lagos is the clamour for direct government intervention in city system that could guarantee fast and reliable public transport, travelling time and safety. As it is done in different part of the developed world, metropolitan city of Lagos government embarked on the Bus Rapid Transit

(BRT) that used dedicated free segregated lines. This was expected to have a long lasting impact on the degenerated road public transport system in the city of over twelve million people. Previous studies at the global level focused on total demand, peak loads, commercial speeds, capital costs and fares, but there is scanty literature on passengers' satisfaction and the challenges of buses scheduling in an environment of low level of information and communication technology use with respect to the use of the BRT scheme. BRT is considered a scheme that would reduce congestion, improve air quickly, and provide mobility option, particularly for underserved populations. But deciding what type of service to provide can be difficult. Heavy and light rail are popular options, but they are expensive. Traditional bus service is flexible and inexpensive, but often has a negative public image. Fortunately, this is a third option. New technology combines the most popular features of rail with the flexibility and cost advantages of roadway transit. This technology, known as BRT, has been successfully implemented in South Africa and Europe and is now gaining popularity in North America (Lieberman 2005 cited in Caltrans 2005; Vincent 2002; and APTA 2003).

BRT thus seems to be the best option for many developing world cities and therefore critical to understand the potential problem facing the scheme as they occur in sub-Saharan cities. The success of BRT in Lagos is becoming apparent but little is known about its problems in relation to passengers' satisfaction and buses scheduling as they occur and highlighted in the paper.

2. METHODOLOGY

Monitoring of passengers perception and satisfaction is generating interest to transport planners in Africa and therefore often undertaken as elements in the management of public services, transport infrastructure inclusive, and specifically as a basis for improving service quality. The impetus has come from the drive to make transport infrastructure scheme, for instance BRT, more responsive to their users / passengers and to treat them like 'customers' that have rights to a say in the service rather than passive recipients who are expected to 'take what they are give (Cronin and Taylor, 1994).

Perhaps, passengers' satisfaction analysis is better monitored and evaluated when the critical elements of rapid bus transit system such as drivers' and buses' scheduling are determined. This is the overall goal of the empirical study on which this paper is based.

The study examined buses scheduling within the framework of evaluating the level of passengers' satisfaction of the BRT scheme introduced about a year ago. About four thousand (4000) passengers and forty (400) drivers of the buses in the scheme were interviewed randomly, using a self administered questionnaire that incorporated observer participant method. Ten (10) major criteria that could determine the passengers' and drivers' satisfaction were identified and measured in Likert scale. These include travel time (speed), comfort ability, reliability, promptness of buses, availability, relationship with the drivers, ease of waiting time and safety during the trips. With over 200 buses and about 500 drivers on three (3) dominant routes in the city. The study also examined the determinants of the drivers' and buses' scheduling in the scheme. The findings have implications for the route planning, drivers and buses scheduling of the BRT public transport planning and operations.

A comparison of passengers' perception and / or satisfaction that incorporate Bus scheduling, based on service quality was done, using fourteen variables on a five point Likert Scale,

ranging from fully satisfied to fully satisfied. The questionnaire was designed in such a way that the same sets of variables that include speed, comfortability, reliability, promptness of buses, relationship with the drivers, case of wanting drive experience of drivers, competence of drivers and safety during the trips were measured among the passengers of BRT scheme. These data were subsequently analyzed using basic statistical techniques: basic correlation coefficient and its multivariate counterparts were employed to determine the extent and the direction and relationship between and among sets of variables that influence buses and drivers scheduling.

3. STUDY AREA

Lagos is the largest metropolitan area in Nigeria with an estimated during the daytime population of 12 million people in 2009 (Oyesiku and Gbadamosi, 2008). The state is located in the South Western part of Nigeria (see Fig. 1) with a coverage area of 3,350km^2. Basically the state lies on low lands, with about 17,500 hectares of built-up area of which residential areas occupy the single largest proportion followed by commercial and industrial land uses (Olayiwola, et al, 2005). The population characteristics of the city are heterogeneous with most people of the nation being represented. Lagos, occupies a pre-eminent position based on all urban indicators, most especially demography with a density that is much higher than other cities in Nigeria; while Nigeria's population density is 100 persons per square kilometre, that of Lagos is about 2,400 persons/ km² with annual population growth rate of between 5.0 to 5.5%. Despite the relocation of the Federal Capital to Abuja, Lagos State remains, undoubtedly, the economic nerve centre of the country as it harbours almost all the headquarters of the multinational companies in the country.

In terms of transportation, Lagos area has rail line that links the commercial southern part of the city with the dormitory settlement of the north. It is the same single carriage rail line that links the city with other parts of the country, though rail transportation itself in on decline throughout the country. Thus, the road transport dominates more than 90 percent of all intra - urban movement within the state and in the country (Oni, 2004). There are about 2,600 km of roads in Lagos, which are frequently congested with over one million vehicles on a daily basis. Lagos has about the highest national vehicular density of over 222 vehicles/km against country average of 11/km (Taiwo, 2005 cited in Odeleye and Oni, 2007), particularly on the major identified corridors with predominant heavy vehicular traffic (Fig 1). Deductively therefore, all these socio-economic factors, necessitate efficient and effective public transport systems, that will not only reduce pollution, congestion and level of private automobile, but mass movement of the inhabitants. However, the persistent mobility crisis in Lagos has become a threat to urban livelihoods and possibly a notable social and economic challenge.

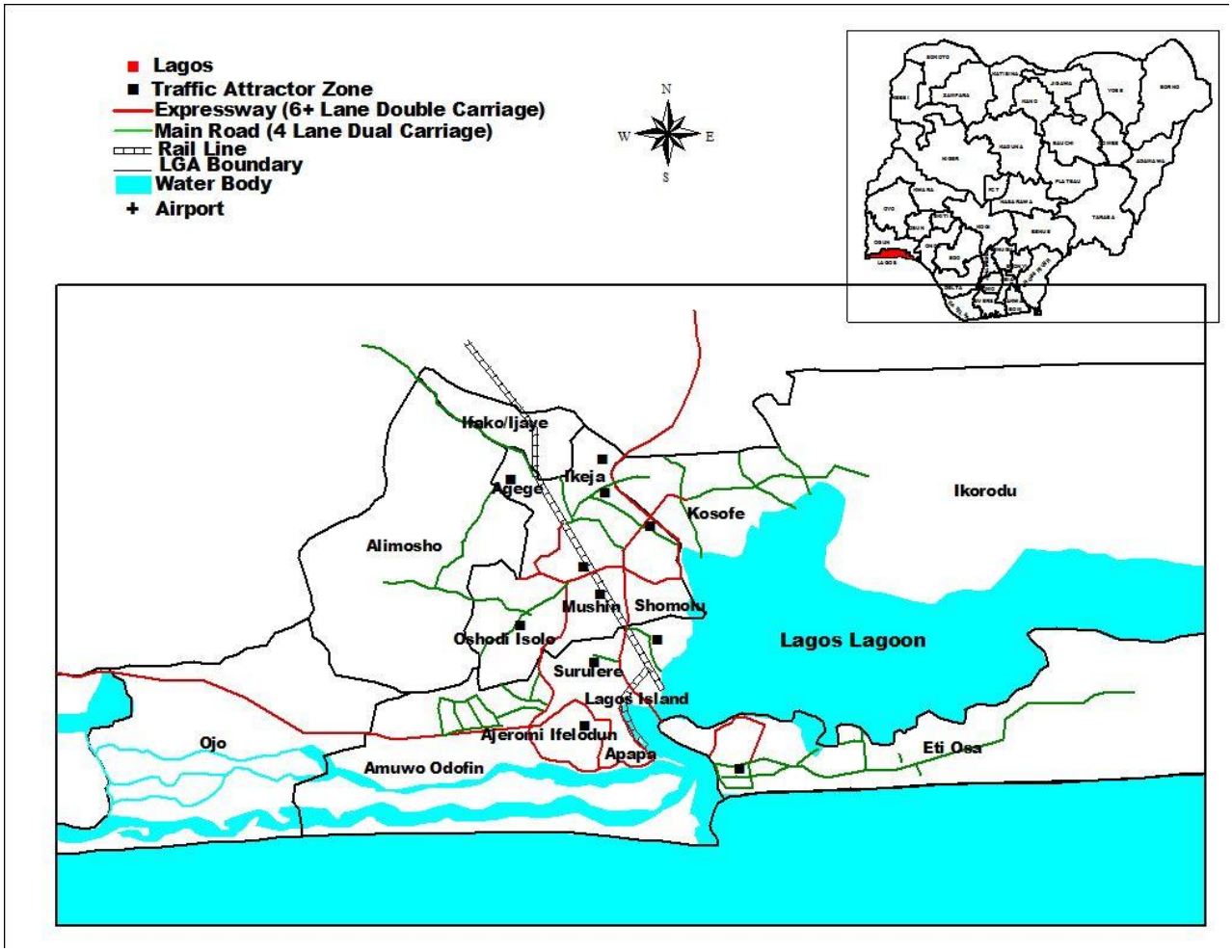

Figure 1. Metropolitan Lagos. Lagos State within the 36-State Structure of Nigeria **inset**.

In an attempt to address the transportation problems in Lagos, in particular, the Federal government in 1988 initiated the Federal Urban Mass Transit Programme (FUMTP) scheme to cover road, rail, water and intermodal transport provision. This scheme was aimed at enhancing the mobility of the people through the provision of high passenger capacity buses, ferries and railway coaches and operated by the government agencies. This massive investment project of over several billions of dollars in acquisition of various modes of transport carriages failed due to poor monitoring of operators, undue political inter fences, financial misappropriations, high operating cost and poor governance (Adeniji, 2000; Oyesiku, 2003). Obviously this was coupled with railway transport service that was since early 1980s inefficient and neglected over the years, compared to rail transport in developed countries (Filani, 2005).

Lagos is the largest metropolitan centre in Nigeria with about 12 million people with its relatively small size has traffic problems are greater than those of cities many times its size. A major commercial and transportation centre not only in Nigeria but the entire West Africa region is often crippled by its with increasing traffic delays and air pollutant level since late 1980s already making it almost an unliveable city (Mabogunje 1968; Olukoju 2003). The city's that traffic congestion is very chaotic that is observable in virtually all streets in metropolitan area caused by the sub-optimal manner in which the roads are used including

roadside and on-road parking, roadside trading and total disregard of traffic regulation by road users, who are significant human contributions to the traffic problem (Ogunsanya, 2002; Oyesiku and Odufuwa, 2008). Going by the variations in traffic count on different corridors and sections in metropolitan Lagos, more than 80 percent of the roads in the study area are heavily congested, going by the 2000 vehicles per hour benchmark (Table 1). Applying the WBCSD (2004) traffic congestion categorization, extreme congestion is predominant on most of the roads in the city daily.

Table 1. 12 Hours Traffic Count on Selected Roads in Metropolitan Lagos

Roads		Nos. of vehicles in both direction (12 hours traffic counts)	Nos. of vehicles in both direction p/hour	Average volume/capacity v/c ratio
1.	Third Mainland Bridge	180,902	15,075	7.5:1
2.	Carter Bridge	22,962	1,914	0.9:1
	Eko Bridge	90,130	7,511	3.7:1
4.	Western Avenue	87,190	7,266	3.6:1
5.	Murtala Mohammed Way	1,302	1,085	0.5:1
6.	Herbert Macaulay Way	33,458	2,788	1.3:1
7.	Ojuelegba – Mushin	14,983	1,249	0.6:1
8.	Ikorodu Road.	117,303	9,775	4.8:1
9	Agege Motor Road	28,245	2,354	1.1:1

Source: : Odeleye and Oni (2007)

Lagos is a mega city on the move with a huge six (6) million people move around requiring one form of mobility or the other, therefore the choice of BRT as a roadway system becomes inevitable (Badejo, 2008). BRT in Lagos is the first of its kind in sub-Saharan Africa, and 14 remains the only BRT whose cost of delivery is very low when compared to other BRT projects in other parts of the world (Mobereola, 2008). Lagos State Government, through Lagos metropolitan Area Transport Authority, has spent close to ₦5billion (Five Billion Naira is equivalent to about $420 million) to put in place all infrastructures for the BRT. These include physical demarcation of the routs, three terminals, bus shelters, bus depot garage that could stow over 100 high-capacity buses, generators to power street lights at night when there is no electricity from public power source, provision of lane markings and reflective traffics signs and reflectors on the physical barrier separating the BRT lane from others lanes (Mobereola, 2008).

Despite the Lagos transport challenges, the metropolis remains the nation's economic engine and commercial nerve centre of West Africa and therefore the introduction of BRT as part of the overall public transport improvement scheme is a remarkable turnaround towards an effective and efficient movement of passengers, goods and services.

4. CONCEPTUAL UNDERPINNING

BRT provides the unique ability to offer a combination of express and local service. Depending upon demand, vehicles can stop at all stations, some stations, or no stations between their origin and destination. Unlike many rail systems, passengers are not forced to sit through multiple stops before reaching their destination (Vincent, 2002). In other words, BRT provides high frequency service throughout the day, eliminating the need to consult a trip schedule. Just arrive at the station, and the next vehicle appears within minutes. Moreover, in the area of route Structure, BRT's flexibility makes it possible to design systems that offer more passengers the option of a no-transfer, one-seat ride to their destination. For the price of a single rail line, multiple BRT routes can be implemented, offering the community a thicker network of rapid transit routes (Vincent, 2002). The route structure can be presented in easy to read format, eliminating the need to follow complicated bus maps. This makes the system more attractive to a greater number of customers, thus enhancing ridership (APTA, 2003; 2005).

In addition, these routes can go into neighbourhoods and office parks, thus bringing transit to the people, rather than forcing people to get to a rail station by driving or via feeder bus systems. Once passengers are delivered to these *"off-line"* stations, the BRT vehicle can return to its dedicated row that is not possible with rail. BRT also uses Intelligent Transportation Systems (ITS) to track vehicle locations, control traffic signals, update passengers on travel time, and perform other important functions. These technologies can provide *"next vehicle"* displays, announce arrivals and departures ensure better traffic flow, and enhance safety and security on the vehicle and in the station. Some ITS technologies are in fixed locations, such as at the station or on broad the vehicle. Through digital wireless, however, net bus and other information can be transmitted to a customer's cell phone. Thus, customers can better time their departure for the station and spend more time with family or at the office (U.S. F.T.A, 2005). The new Intelligent Transportation Systems (ITS) or Advanced Public Transportation Systems (APTS) applications could contribute to improved bus service and increased bus operating speeds. Some ITS and APTS applications that a Bus Rapid Transit system might employ include: Smart" card fare collection methods; Automatic vehicle location (AVL) systems; Computer-aided dispatching and advanced communications; Precision docking at bus stops; Tight terminal guidance; Warning systems; Passenger information systems and Automated enforcement systems for exclusive bus lanes *(*Casey and Collura, 1994).

Similarly, Kain, et.al., (1992), argued that, successful Bus Rapid Transit systems can be expected to produce improvements in bus service, operations, and ridership, and to affect traffic congestion and air quality as summarised in Table 2.

A low-cost, basic BRT system would have some of the features in Table 2. An enhanced BRT system, reflecting full rapid transit objectives, would include all these features. A particular challenge for transportation professionals is to develop a BRT project without sacrificing the quality of any of these features. It may be prudent to develop a project incrementally, where an initial investment would put some of these features in place and others would be added in subsequent development stages. A key advantage of BRT is that the infrastructure and service can be implemented in phases over time, with full BRT service as the long-range goal (Lieberman, 2005).Therein lies the challenge: developing, at low cost, a BRT system that provides sufficient quality of service to achieve BRT objectives.

With specific reference to BRT project of Lagos city, the development process has three essential aspects that include: Planning and design of the alignments, stations, and operating conditions; Operating and maintenance of the eventual BRT service and Institutional arrangements, that is, state local partnerships that are critical to saving costs and optimizing effectiveness

Table 2. Basic Features and Attributes of Full BRT

Running way	• Dedicated running ways, exclusive bus lane • Distinctive pavement treatment
Stations	• Level boarding and alighting • "Branded," consistent with appearance of BRT vehicles • High-quality, attractive functional amenities
Vehicles	• Easy-to-board (level with platform) • Multiple-door boarding and alighting • "branded" exteriors that are distinctive and consistent with appearance of stations • High capacity • Pleasant interior conveniences • Quite • Low or zero emissions
Service	• Frequency all-day service • Short headways (10 minutes or better) • Wide station stop spacing
Route structure	• Simple route layout • Convenient transfer • Station locations coordinated with land use plans • Service to major activity centres
Fare collection	• Off-vehicle fare collection • Emphasis on prepaid fares
Intelligent Transportation Systems (ITS) and Technology	• ITS technologies (for example, real-time "next bust" arrival information signs at stations, "next stop" signs on board buses, smart fare payment media and technology, traffic signal prioritization traffic management) • Automated guidance features for precision operations

Source: Bus Rapid Transit. Volume II (2003): Implementation Guidelines. TCRP Report 90 (Washington, D.C.: TRB.).

The planning and design portion of the BRT project development process has been a challenge for the LAMATA and State Government. As BRT is rapidly being developed in Lagos as a cost-effective strategy to address growing congestion and mobility needs, LAMATA is working with a view to integrating BRT as an investment alternative into system and comprehensive corridor planning documents and project development processes. Planning and design solutions must integrate and balance community, aesthetic, historic, and environmental values with transportation safety, maintenance, and performance goals (Schwenk, 2002 cited in Caltrans, 2005). Among the expected benefits of well planned and designed BRT system include, its reliability, the system would run a four-minute headway,

meaning that every four minutes there would be a bus to pick passengers at the bus shelters, buses to be used for the system are raw; therefore BRT would offer a lot of comfort for the passengers. In addition, there are toilet facilities, flashing boards and security fence, as well as; park and ride space that are all benefits of both passengers and drivers. (LAMATA, 2008). Currently BRT is operating with 220 buses and 440 pilots/drives and 20 standby pilots/drivers in case of emergency or absentees. In spite of all these facilities and presumed enabling environment for effective and efficient operations of the scheme there is need to evaluate within the first year of operations the perception of the users and drivers, relatively to their level of satisfaction along with bus scheduling, such that adequate and accurate management and control strategies could be adopted.

Many researchers have focused their attention on customer evaluations of services in an effort to find ways to improve service quality (Fisk et al., 1993). The dominant theoretical model employed in research into customer satisfaction is the *'expectancy/disconfirmation model'* in which customers are satisfied (dissatisfied) if their experience and perceptions of the service they receive exceed (fail short of) their expectations (Payne and Holt, 2001). Within this framework, therefore, there are two key elements to consider in analyzing satisfaction: people's expectation of the service and attributes of the service that influence people's experience and perceptions. **However** here are some variables that influence customer expectations and these are represented in Fig .2

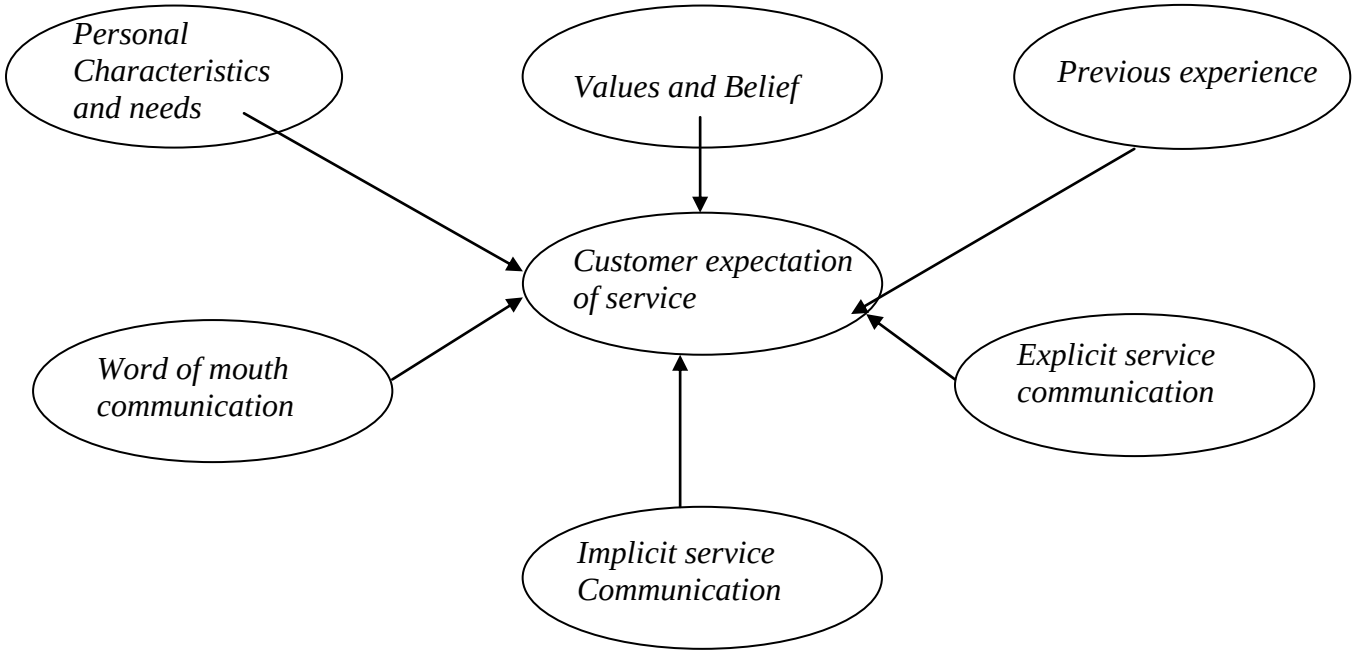

Fig .2. Factors Influencing Customer Expectations.
Source: Based on Account Comission (1999) and MORI (2002)

The study, therefore attempts to examine the satisfaction level of service quality of BRT scheme in Lagos as suggested by Wen Li and Chan (1998), which are modified to suit the Nigerian standards. As in the case stated by Natalisa and Subroto (2003), combine the variables of product quality and service quality into variable of service quality and studied the customers' perception of service quality in the domestic airline services of Indonesia. This

perhaps will pioneer that application of these models in transport infrastructure, like BRT scheme, that is new in sub-Saharan Africa as initially established.

5. FINDINGS AND DISCUSSION

One of the cardinal objectives of this paper is to present the findings on the level of passenger satisfaction relatively to service provided. These elements were used to determine the level of satisfaction, using Likert scale measurement as initially discussed and they include:

Travel time: This determines how fast the buses are on this scheme relatively to other public transport.

Comfortability: This emphasises on the level of comfortability before and during the journey/trip. In other words, it includes all the facilities provided at bus stations and bus stops, availability of space at bus stops and stations as well as spaces available in the buses, particularly the nature of overcrowding and otherwise.

Reliability: The extent of how passenger can rely on this scheme to make trips.

Timeliness: How prompt when it is needed to be used.

Ease of Use: This basically about availability and accessibility of the Scheme

Relationship with driver: This is about the nature of the relationship with the drivers/pilots that is taking control of the vehicle. This is to determine by the extent of hostility or friendliness of the drivers.

Experience of Drivers: This measures the extent to which the drivers/pilots are able to handle the buses and understand some basic road signs, observing other road users and manipulated the steering under some special circumstances in the course of the trip.

Competency of Drivers: This is similar to the experience of driver factor, but the difference is in the situational control of the vehicle and how the drivers relate to the situation around including attending to the passengers and other road users along the route. This also measures the extent to which the driver takes charge of possible scenario driving to trips that will enhance safety.

Ease of Waiting Time: This is similar to Timeless but differs in terms of provision of information at the bus stops in respect of when the buses are expected to arrive or in case there is a delay if information is available on the extent (time) of delay and if there is a total cancellation whether or not alternative buses are provided. In addition, the factor also measures the consistency of available information on delays and so on.

Safety along Trip: This is about safe arrival and has to do with all the above mentioned variables, as well as the rate of incident or / and accidents of the buses, relatively to other local bus services.

All these variables were evaluated and assessed relatively to services provided by other public transport system and summarized in Table 3. An important factor of effectiveness of public transport system is time spent during a trip to get to destination. With reference to the

BRT scheme in Lagos, most interviewed passengers, over 56% of the sampled (see Table 3), indicated that they satisfied with the speed compared to other modes of public transport. Similarly very high proportion of the sampled passengers were satisfied with the status of the services of the scheme in terms of comfort ability (63%), reliability (64%), relationship of the drivers with the passengers (57%), experience of the driver (70%), competence of the drivers, particularly in attending to the passengers and other road users (80%), and overall safety of the passengers during the trips (81%). The very high level of satisfaction indicated by the passengers in respect of comfort ability of the buses during their trips, experience of the drivers and competency of the drivers are not too surprising. In the first instance the buses, over 200 of them, are new and their maintenance is prompt. Compared to the multifarious public transport buses in the city, those often used for public transport are very old used buses imported from Europe and America and obviously very unquotable seats not really designed for tropical use. What buses owners then do is to adjust the seat to accommodate more passengers to maximize return on use, not minding the comfort of the passengers.

Experience and competency of the drivers are not in doubt due to the fact that virtually all the drivers employed for the BRT scheme were at one time or the other once employed by the private transport operators in the city. They are well familiar with the roads and the mannerism of passengers and other road users and therefore handling very new buses is more of fun and pleasure. This is more so that they equally have the right of way (dedicated lanes) through the city.

Table 3. Level of Satisfaction Derived by the Passengers (in percentages).

Level	Travel Time	Comfortability	Reliability	Timeliness	Ease of Use	Relationship With Drivers	Experience of Drivers	Competence of Drivers	Ease of Waiting time	Safety
Fully Satisfied	**16.4**	**17.5**	**20.5**	**11.7**	**9.7**	**17.3**	**19.8**	**20.3**	**6.0**	**38.5**
Satisfied	**39.5**	**44.8**	**44.0**	**40.5**	**40.3**	**40.4**	**59.3**	**59.8**	**15.3**	**43.1**
Indifferent	**14.3**	**12.0**	**12.7**	**18.3**	**11.4**	**10.3**	**7.7**	**7.3**	**20.3**	**17.7**
Dissatisfied	**15.3**	**20.5**	**12.2**	**14.5**	**25.9**	**18.0**	**6.2**	**7.0**	**24.6**	**0.2**
Fully Dissatisfied	**14.5**	**5.2**	**10.6**	**15.0**	**12.7**	**14.0**	**7.0**	**5.6**	**33.8**	**0.5**

However, low level of satisfaction is attributed to the factor of timeliness/promptness (51%) and ease of availability of the buses in the scheme (50%). Unlike the situation in Europe and America and indeed in most developed countries of the world, public transport service have specific time of arrival at the designated bus stops and stations. Evaluation of the Lagos BRT scheme shows that none of the passengers' bus stops has any. Therefore planning to be at such bus stops is impossible. Passengers have to just wait till the buses arrive and in some

cases they are very full to be boarded and making them wait sometimes endlessly. As such it's very difficult to state that indeed the services are prompt on arrival and reliable. The slogan is that "you board when you see one". As a result of this situation, it is not surprising that most interviewed passengers were highly unsatisfied in terms of the ease of waiting and long period of the staying at the bus stops. As shown in Table 3, over 58% of the passengers indicated either dissatisfied or fully dissatisfied. The waiting time varies between 30minutes and one hour depending the period of the day. The peak periods of the early rushing hours are noted for shorter waiting time. Again this is attributed to the buses scheduling generally. This equally corroborates the observation of non-usage of technology (software) for route planning and bus scheduling. This no doubt, has negative influence on the part of service enjoyed by the passengers.

Generally, the evaluation of the level of satisfaction of the passengers making use of the BRT scheme show that significant proportion of them were indeed satisfied (over 60%) when all the factors were considered and about 12% fully dissatisfied. This indicates a remarkable success of the scheme at least on the part of the users, that is the passengers. As observed, there has been about 35 per cent of cross- over users from private car use to BRT scheme within the one year of its operation. The reasons given were that of its comfortability and reliability. Many more indicated as well the factor of speed, that is it is equally fast in getting them to their destinations, particularly those whose place of work are very close to the main routes. More importantly, many of cross-over users indicated that the use of BRT services is safe.

It is important to point out that this short coming negates one of the fundamental features and attributes of full BRT which is intelligent Transportation Systems (ITS) and Technology. This includes ITS technologies (for real-time, "next-bus" arrival information sign at status, "next stop' – sign on board buses, smart fare payment media and technology, traffic sign prioritization, traffic management and Automated guidance features for precision operators and docking. Similarly it includes adaptive traffic signal priority to minimize traffic impacts and manage headways. It is against this background that the determinants of the buses and drivers scheduling are further examined and discussed.

One of the objectives of this paper is to evaluate bus scheduling that determines rate and quantity of Buses on a route. Basic correlation coefficient was adopted, using variables that were presumed to have influenced on bus and drivers' scheduling. These dependent variables include: travel time; number of bus-stops; volume of passengers; frequency of the drivers on the route; turnover of fares on the route; familiarisation of the driver on the route; status of the buses in terms of their newness or faultiness; route structure (in terms of route layout, conveniency of transfer and service to major activity centre); distance of shared lane in mixed traffic or dedicated line and fare collection (be it prepaid fare collection or on-vehicle). The predictors separately are drivers (also called/pilots) and number of buses on each of the three routes in the scheme.

First pair-wise correlation coefficients of all the variables were obtained. The result revealed that the obtained correlation coefficients were generally very low among the variables and indeed in most cases were not statistically significant. However, only three pair of variables had high correlation coefficients and were statistically significant as shown in Table 4.

Table 4. Correlation Coefficient of Determinants of Bus/Drivers' Scheduling

	Correlation Value	Sig
Par 1 Buses & Passenger	0 .895	.000
Par 2 Buses & Pilots	0.850	.000
Par 3 Passenger and Pilots	0 .995	.000

Source: Field Survey, (2008)

Based on the Table 4, it is obvious that, there is not only linear relationship among these variables, but high positive and significant interaction. The fact that volume of passengers correlates highly and significantly with both number of drivers on each of the route and buses deployed on the routes gives instant impression that the variable might have high significance influence on the predictors. A further analysis using two – stage least square method that incorporates regression and analysis of variance models.

The results of these analytical techniques, using Driver/Pilots as dependent variable and buses and passengers as independent variables revealed a very high value of the Multiple R that is highly significant statistically (Table 5). Similarly, in a separate model when buses are used as dependent variable and the drivers and passengers as predictors, the results also showed a very high value of the Multiple R that is highly significant statistically (see Table 5).

Table 5. Summary of two- stage Least Squares Analyses Model Description

Dependent variable	ANOVA F ratio	Sig. Level	Multiple R	R Square	Adjusted R
***Drivers/ Pilots**	**109.56**	**0.000**	**0.933**	**0.871**	**0.870**
****Buses**	**85.23**	**0.000**	**0.726**	**0.529**	**0.587**

*** B**uses and passengers as independent variables (equation 1)
** Drivers and passengers as predictors (equation 2)

Table 5 revealed F-ratio values that are significant, meaning that it is not by chance that the predictors significantly contribute to the variation in the criterion or dependent variable for equations 1 and 2 respectively. Indeed, passengers' volume alone contributed over 80% and 52% in providing explanation to the variation of the dependent variable in equation 1 and 2 respectively. The import of this is that this one variable determines bus scheduling method and it shows that bus planning revolves around passengers, that is, the more the passenger in a route, the more the buses allocated to the place. Again, the buses allocated per route is influenced by the drivers/pilots available. This goes to confirm that the bus scheduling method is based on intuition or perhaps manually done. This might be predicated on the newness of the scheme, coupled with the coverage area that though large, but part of the metropolitan area of the state. Suffice it to acknowledge that level of technology, such as proper, adequate and accurate software for bus scheduling is conspicuously not in use. Despite this, the output of the operations of the scheme has been somewhat successful and to a considerable extent satisfactory to the passengers.

6. CONCLUSION

The significant of public transport of cities in many developing countries lies in the fundamental fact that mobility and accessibility are essential for economic growth and of necessity to provide efficient and effective movement for goods and services. The failure of the public transportation system however and indeed overall transportation system in the cities has led to further marginalization of the greater majority of the people in these cities and consequently economic deprivation. Mobility is critical to the well being of large population living in Lagos metropolis and after several attempts by the governments over several years, BRT scheme seems working, providing relief to public transport users. BRT, like similar segregated public transport services, offer much higher levels of service than conventional bus or minibuses (that are the main feature of Nigerian urban public transport system) services operating on the existing road network. BRT is also significantly cheaper to provide than rail based systems and combined more readily with the existing road systems (World Bank-Africa Region, 2005, p.35).

Previous studies at the global level focused on total demand, peak loads, commercial speeds, capital costs and fares, but there is scanty literature on passengers' satisfaction and the challenges of buses scheduling in an environment of low level of information and communication technology use with respect to the use of the BRT, the scheme is considered the best option for many developing world cities and therefore critical to understand the potential problem facing the scheme as they occur in sub-Saharan cities. This gap in our understanding is what this paper has attempted to fill.

Using multivariate analytical methods, the major determinants of continuous use of the BRT scheme are reliable and stable cheaper fares, comfortability, reliability, and availability of the bus services. However, long time of waiting at the bus steps resulting from buses and drivers scheduling challenges seems to be among the critical issues in the use of the scheme.

As observed, the determinants of buses and drivers' scheduling is simple the volume of passengers on the routes and obviously done manually. It is also remarkable to note that though manual bus scheduling and route planning seems suitable for now, however, as more routes are added and more buses introduced, challenges of employing more sophisticated technology would set in and this is better done at this inception of the scheme. This is more so that a significant aspect of the expected turnaround of public transport service as a result of BRT scheme is short waiting time, is yet to be achieved going by the revealed level of satisfaction of the passengers. This, no doubt, is at variance with some of the expected benefits of the scheme. In the light of this, the authority (LAMATA) should forge strategic partnership with some of the institutions and corporate organization to the country to embark on more scientific approaches to route planning and bus scheduling with a view to ensuring that the scheme provides dependable modern public transportation services.

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