# Sustainable Transportation Solutions for Lagos: Assessing the Effectiveness of BRT on Ikorodu –CMS Corridor

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DOI: 10.56201/ijssmr.v10.no10.2024.pg.376.390

***Abstract***

*Transport is a subset of growth and an indicator of development which can be used to measure social economic trend of a given society (Kabir A. Akintola.,2018). Public transportation is made of different modes. Bus rapid transit (BRT) is one form of public transportation modes to ensure ease in movement across the metropolis. The aim of the study is to appraise users' perception on service quality with bus rapid transit on Ikorodu-CMS route. The study area is Ikorodu-CMS BRT corridor which cut across eight local government areas in Lagos State. The primary data were obtained through administration of questionnaire on BRT users' and Secondary data for the study were sourced from records of patronage from Lagos State Metropolitan Area Transport Authority (LAMATA). The study sample size is 382 bus rapid transit users. The administration of questionnaire at the terminals was based on the route on-peak and off-peak periods. The study data were presented with descriptive and inferential statistics. The study data collection, processing and presentation were carried out with statistical package for social sciences (SPSS). The research hypotheses were tested using Pearson moment product correlation coefficient. Sampled respondents make use of bus rapid transit on Ikorodu-CMS for different mobility needs such as work trip, school trip, business trip, social trip, religious trip and other trips. There is high patronage in term of frequency by users of the bus rapid transit system for urban mobility. The study revealed different observations among the BRT users/passengers on the service quality attribute of BRT operations along Ikorodu-CMS route. Some of the identified challenges to service quality and users' satisfaction with bus rapid transit operations on Ikorodu-CMS traffic corridor are overcrowded buses (overloading), poor ticketing process, lack of space at bus-stops, longer waiting time at bus-stop, non-consideration for the physically challenged and inadequate boarding arrangement. The study recommends that the State government should ensure that the operators of the bus rapid transit increase the fleet of buses to meet the growing demand for the BRT services on the transport corridor of Ikorodu-CMS and other section of Lagos metropolis especially during peak hour.*

## INTRODUCTION

### Background to the Study

The global transportation landscape has undergone significant transformations in recent years, driven by increasing urbanization, environmental concerns, and technological Advancements (World Bank, 2024). According to the international Energy Agency (IEA, 2024), transportation accounts for approximately 24% of global $Co_2$ emissions, emphasizing the need for sustainable transportation solutions. In response, cities worldwide are adopting Bus Rapid Transit (BRT) systems as an efficient, cost- effective, and environmentally friendly alternative to traditional transportation modes (United Nations Environment Programme, 2024)

Studies have consistently shown that well designed BRT systems can reduce travel times, increase passenger capacity and improve air quality (Transportation Research Board,2024). For instance, a study by the World Resources Institute (WRI,2024) found that BRT systems in Latin America have reduced greenhouse gas emissions by up to 30%. Moreover, BRT systems have been successful in enhancing social equity by providing affordable and accessible transportation options for low – income communities (Journal of Transportation Engineering, 2024). Despite the growing popularity of BRT systems, there remain significant challenges to their implementation, particularly in developing countries (journal of sustainable Transportation, 2024). Infrastructure costs, land acquisition, and public acceptance are common hurdles that cities face when introducing BRT systems (International Journal of Urban Sciences, 2024). Therefore, this study aims to appraise the feasibility and efficiency of BRT systems in Lagos exploring the benefits and challenges of implementing such systems.

Lagos State bus rapid transit system was introduced in 2008 (Olawole, 2012). The system was established to address the challenges of moving the population of Lagos State due to the identified inadequacy of the existing transportation system in the State which results in chaotic traffic flow, inability to move the residents of the state effectively, poor condition of buses and non-regulated operations such as indiscriminate stops to pick and drop passengers. Mobereola (2009) noted that existing transportation system prior to the introduction of BRT favoured short distances to maximize profit rather than to serve demand and operators have a reputation of being aggressive. Bus rapid transit system in Lagos State is geared towards solving the transportation challenges faced by commuters in Lagos State. However, in the operations of bus rapid transit system in the State, there are different issues and challenges, prominent among these is the efficiency of the bus transit operation which affects the quality of services and users' satisfaction of the BRT services.

Ikorodu-CMS bus rapid transit route is the dominant BRT route in Lagos metropolis consisting of full segregated and partial segregated bus lanes. The route link two major hubs (Ikorodu and Lagos Island) and also serve adjoining urban settlements. The ability of the Ikorodu-CMS BRT system to achieve its broad goal of sustainable urban mobility in Lagos metropolis is underpin by it efficiency level which could be determined by the level of user satisfaction and the quality of service delivery. It is therefore the aim of this study assess Ikorodu-CMS BRT system level of efficiency. Studies on bus rapid transit in Lagos State were conducted before the extension of fully segregated BRT services to Ikorodu main town. Therefore, previous studies on bus rapid transit operations do not cover its operations in Ikorodu town. This creates gap in knowledge with regards to bus rapid transit operations on Ikorodu-CMS traffic corridor. This study covers the whole operation length of bus rapid transit on Ikorodu-CMS route and therefore filled the identified gap knowledge gap of non-coverage of the total Ikorodu-CMS bus rapid transit route.

The aim of the study is to appraise the adoption of bus rapid transit on Ikorodu-CMS corridor. In such a way that to examine the socio-economic characteristics of Ikorodu-CMS BRT route users;assess the level of BRT patronage along Ikorodu-CMS route; and identify bus rapid transit system users' challenges along Ikorodu-CMS route

**Study Area**

Ikorodu-CMS BRT corridor is located in Lagos State. Lagos State is located on the south-western part of Nigeria, it lies approximately on longitude $2^0$ 42'E and $3^0$ 22'E East respectively and between latitude $6^0$ 22'N with a total land area of 3,577 sq. km (Odumosu, 1999). The State is bounded in the North and East by Ogun State of Nigeria, in the West by the Republic of Benin, and in the South by the Atlantic Ocean.

Ikorodu-CMS BRT traffic corridor cut across eight local government areas in Lagos State, these are Ikorodu, Kosofe, Ikeja, Shomolu, Surulere, Mainland, Mushin and Lagos Island local government areas. Ikorodu-CMS bus rapid transit corridor covers approximately 36 kilometers in length. There are four terminals located along the BRT corridor (Figure 1). The first terminal is located at Ikorodu, second at Mile 12, third at Moshalashi while the fourth terminal is located at CMS. The Ikorodu-CMS BRT system is about 65 percent physically segregated from the regular roadway and 20 percent is separated by road markings. The BRT operates seven days a week, between 0600 and 2200 on weekdays and with reduced hours of operation on the weekends (LAMATA, 2016)

Figure 1.1: BRT Corridor Showing Bus Stops and Terminals


## Review of literature

### Bus Rapid Transit

Public transport prior to the implementation of the BRT system was unregulated, dominated by private sector operators and failed to meet consumer needs and in order to address the challenge of urban transport and also find a cheaper form of transport, the BRT system was developed (Wright and Hook, 2007). Deng and Nelson (2011) opined that Bus Rapid Transit (BRT) is a modern breed of urban passenger transportation with a consistently growing global importance due to evidence of an ability to implement mass transportation capacity quickly and at a low-to-moderate cost.

### Bus Rapid Transit Components

Bus rapid transits could be seen as a system. Maunganidze (2011) stated that BRT could be seen from its elements, system performance and system befits. The elements form the core of BRT system, system performance areas BRT could be assessed such as travel time saving, reliability, identity and image, safety and security, capacity and accessibility and benefits are advantages derivable from the system.

BRT Elements, System Performance and System Benefits


Source: Diaz, 2009

**Bus Rapid Transit Benefits**

Wright (2004) asserts that BRT attempts to address deficiencies in current urban transportation services by providing a rapid, high quality, safe and secure transit option which is a result of: reduced travel times; improved reliability; upgraded human amenities; improved safety and security; improved identity and a quality image; improved accessibility; and increased capacity. Bus Rapid Transit reduces traffic congestion, guaranty a fast and reliable travel time improve air quality and meet the mobility needs, particularly of the less privileged and poor masses of the Lagos metropolis (LAMATA, 2012). Hence through provision of urban transport mobility services from hindrance by other road users' adequate mobility is ensured. Canadian Urban Transit Association (2004) report BRT advantages over other mass transit systems the potential for greater patronage and higher capacities, the possibility of incremental implementation, and the induction of land use changes. In addition to these, BRT system allows busses to flow freely through highways, even when local traffic lanes are congested beyond capacity (Biegler, 2011).

**Bus Rapid Transit Challenges**

According to Hensher and Golob (2008), despite the growing acceptance that BRT is a time-efficient mode to implement in urban environments that face rapidly-growing mobility needs especially in comparison with fixed rail schemes, the political economy is often favorable to those candidates offering rail alternatives as part of their proposals in electoral debates. The authors premised their assertion on the assumption that a bus service is generally perceived as being less permanent than a rail service. However valid this point might be, its application in environment such as Nigeria is suspect. This could be argued on the strength of political events in Lagos State, where bus rapid transit represents on the main point of political office seekers.

i. The peculiarities of BRT system operation in developing countries was drawn by Hidalgo and Gutierrez (2013), and Carrigan et al. (2011). The authors opined that several BRT systems in developing countries suffer problems such:
ii. Rushed implementation – several components could be incomplete at the time of commissioning, but gradual improvement over time has been observed
iii. Tight financial planning – systems usually do not receive operational subsidies;
iv. Very high vehicle occupancy levels – six to seven standees per m2, which is quite frequent nowadays and can make the user experience unpleasant;
v. Early deterioration of infrastructure – lack of road surface reinforcement or problems in design and construction result in maintenance issues;

vi. Delayed implementation of fare collection systems – often requiring longer timetables than initially expected and very tight supervision;
vii. Poor communication during disruptions caused by construction – can erode public support for the project, and insufficient user information and education prior to the system launch can lead to chaotic conditions or even protests;
viii. Integration deficiencies – for instance, in any urban transit system, the walking catchment area tends to be particularly important since walking is typically the primary access mode for urban stations nonetheless, the reality is that accessing BRT stations is not as easy or safe as it should have been.

**Lagos State Bus Rapid Transits**

According to Oyesiku (2009) BRT is a flexible rapid transit mode that combines stations, vehicles, services running ways and Intelligent Transportation System (ITS) elements into an integrated system with a strong positive identity that evokes a unique image. Based on Nikitas and Karlsson (2015), among the three African BRT applications, the most recognizable is the one in Lagos, Nigeria. The first phase of the Lagos BRT runs from Mile 12 through Ikorodu Road and Funsho Williams Avenue up to CMS became functional 2008 it covers a road extent of 22 kilometres, and runs a 16 — hour operations from 6.00 a.m to 10 p.m; using 220 buses to move more than 200,000 passengers daily (LAMATA, 2012).The BRT lite single route is 65 percent physically-segregated and 20 percent separated by road markings (LAMATA, 2009). Olowosegun et al (2014) noted Lagos BRT as a new form of BRT focused upon delivery a system to meet key local user needs, with the aim of improving quality of life, economic efficiency and safety within a clearly defined budget.

The bus rapid transit operation has been extended to Ikorodu town. The Mile 12 – CMS BRT system is tagged BRT lite which has the BRT lanes partially segregated along the corridor, while the Mile 12 – Ikorodu Town BRT Extension is tagged BRT classic which has the BRT lanes in the middle without any interference from other traffic except at designated new u-turn points (LAMATA, 2012). Both the BRT lite and BRT classic segment combined passes across eight (8) local government areas which include Ikorodu, Kosofe, Ikeja, Shomolu, Surulere, Mainland, Mushin and Lagos Island.

To address challenges to Lagos State BRT system, Adebambo (2009), there is a need, for instance, to ensure greater coordination with local planning and operating agencies for the purpose of identifying BRT potential, and a need to conduct research, develop operational techniques, and promote the use of ITS technology to enable safe and efficient deployment of BRT. In addition, BRT implementation also may require policy and institutional reforms, such as changes in transportation planning and roadway management practices (to give buses priority in traffic), vehicle purchasing, transit regulations and contacting (to maintain a high quality of service), and urban design (to increase development near BRT routes) (Nikitas and Karlsson, 2015).

## METHODOLOGY

**Data Type and Source**

The data required for this study include socio-economic characteristics of BRT users, waiting times, trip purpose, trip frequency, fare affordability, safety and security**.**The primary data was obtained through administration of questionnaire on BRT users' based on socio-economic characteristics and users' challenges.

**Study Sample and Sample Frame**

The samples for the study are users of bus rapid transit system along Ikorodu-CMS traffic corridor. Based on official records of the bus rapid transit management firm, there are three hundred and forty-five (345) buses in the fleet on Ikorodu-CMS route with an average capacity of forty-four (44) passengers and average five (5) trips daily per bus. This therefore gives a sample frame of 75,900 bus rapid transit passengers on Ikorodu-CMS route. mathematical expression (Morris Model) based on Kothari (2004) was adopted. This state:

$$n = \frac{z^2 . p . q . N}{e^2 (N-1) + z^2 . p . q}$$

N = the population size (sample frame)
p and q = 0.5 (the population proportions)
z = 1.96 (Critical value at 95% confidence)
e = 0.05 (Error level accepted at 5%)

Hence:

$$\frac{1.96^2 \times 0.5 \times 0.5 \times 75{,}900}{0.05^2 \times (75{,}900 - 1) + 1.96^2 \times 0.5 \times 0.5}$$

$$\frac{3.8416 \times 0.5 \times 0.5 \times 75{,}900}{0.0025 \times 75{,}899 + 3.8416 \times 0.5 \times 0.5}$$

$$\frac{72894.36}{189.7475 + 0.9604}$$

$$\frac{72894.36}{190.7079} = 382.23$$

Therefore, the study sample size is 382 bus rapid transit users

**Sampling Procedure**

The study sample size is 382 bus rapid transit users. There are five terminals located along the Ikorodu-CMS BRT corridor. These are Ikorodu terminal, Agric terminal, Mile 12 terminal, Moshalasi terminal and CMS terminal. Samples were taken in all the five terminus along the study traffic corridor; this is to ensure adequate coverage of bus rapid transit operations along Ikorodu-CMS traffic corridor. The total sample of 382 BRT users were distributed among the selected five termini along Ikorodu-CMS bus rapid transit corridor. The administration of questionnaire at the terminals was based on the route on-peak and off-peak periods. Thirty questionnaires were administered in morning peak period (7-11am) and evening peak period (4-8pm) respectively while 16 questionnaires were administered during the off peak period (12-3pm). The study adopts systematic random sampling technique in selecting BRT users at the selected terminals, this involve the selection of nth object. To determine the nth subject, the study sample frame was divided by the sample size (Asika, 2012). Therefore 75,900 (sample frame) was divided by 382 (sample size), this gives 199. Hence, bus rapid transit users were selected at every interval of 199.

## Data Presentation and Analysis

### BRT Users Socio-Economic Characteristics

Bus rapid transit users' gender classification Ikorodu-CMS traffic corridor reveals that male BRT users are 177 (48.9%) and female BRT users are 185 (51.1%) as presented in Table 4.1. Basic inference from this indicates that usage of bus rapid transit cut across gender, hence bus rapid transit operations on Ikorodu-CMS route is gender inclusive. This also shows that the views of both genders are considered in the study.

### Respondents' Age

The age of respondents in the study ranges from 18 years below to above 60 years. Bus rapid transit users who are less than 18 years are 8 (2.2%), 18-29 years, 30-39 years, 40-49 years, 50-59 years and 60 years above users are 67 (18.5%), 78 (21.5%), 85 (23.5%), 89 (24.6%) and 35 (9.7%) respectively (See Table 4.2). From this age cohort breakdown, it could be deduced that that usage of bus rapid transit services in Lagos metropolis cut across different categories of age, hence bus rapid transit services is utilised by both young and older population for the trips in Lagos metropolis.

Table 4.2: Age of BRT Users

| Age Cohort | Frequency | Percent |
|---|---|---|
| Less than 18 years | 8 | 2.2 |
| 18 – 29 years | 67 | 18.5 |
| 30 – 39 years | 78 | 21.5 |
| 40 – 49 years | 85 | 23.5 |
| 50 – 59 years | 89 | 24.6 |
| 60 years above | 35 | 9.7 |
| Total | 362 | 100.0 |

Source: Field Survey, 2018

### Marital Status of Respondents

Table 4.3 presents the marital status of users of bus rapid transit on Ikorodu-CMS route in Lagos metropolis. Based on the data in Table 4.3, a total of 121 (33.4%) users are single, 222 (61.3%) users are married while 13 (3.6%) users are separated/divorced and 6 (1.7%) are widowed. It could be deduced from this that usage of bus rapid transit services is enjoyed by users of different marital status. This clearly shows that the urban mobility needs of residents of Lagos metropolis most especially residents along the bus rapid transit uses regardless of marital status is met through operations of bus rapid transit.

Table 4.3: Marital Status of BRT Users

| Marital Status | Frequency | Percent |
|---|---|---|
| Single | 121 | 33.4 |
| Married | 222 | 61.3 |
| Separated/Divorced | 13 | 3.6 |
| Widowed | 6 | 1.7 |
| Total | 362 | 100.0 |

Source: Field Survey, 2018

### Educational Status of BRT Users

Educational background of BRT users on Ikorodu-CMS routes shows that a total of 23 (6.4%) of the total respondents sampled do not possess any form of educational attainment. Users with formal education are 339 (93.6%) of total respondents in the study area. These are primary

education, 14 (3.9%), secondary education 90 (24.9%) and tertiary education 235 (64.9%) as presented in Table 4.4. This clearly shows that educational background do not precludes individuals from the usage of bus rapid transit in Lagos metropolis and Ikorodu-CMS route. Further the large number of users with formal educational attainment clearly shows relatively high level of literacy among users of bus rapid transit on Ikorodu-CMS route. This shows the usefulness of the bus operations among users regardless of educational background.

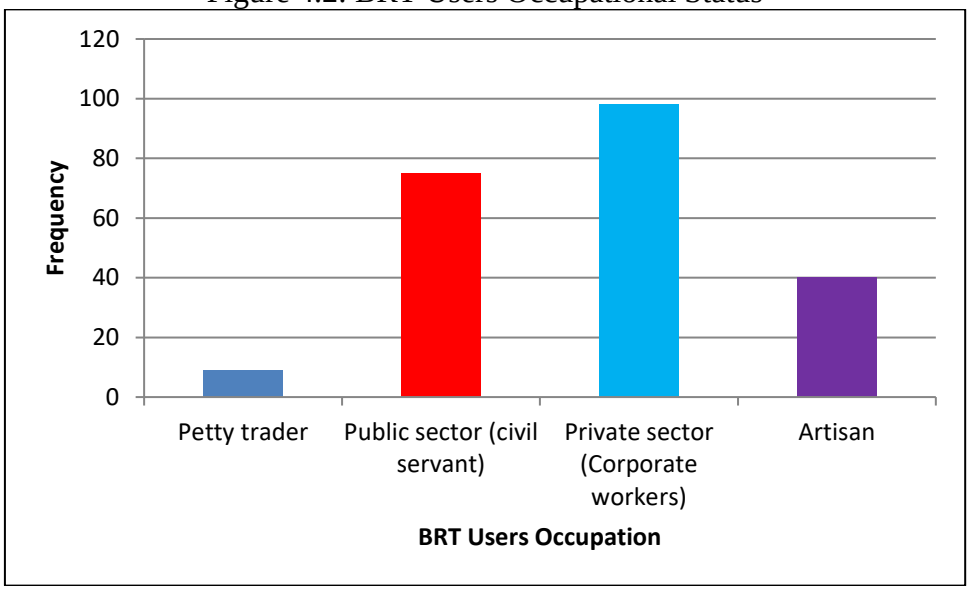
**Employment Status and Nature of BRT Users**

As indicated in figure 4.1 in this section, a total of 222 (61.3%) bus rapid transit users are employed, similarly a total of 64 (17.7%) users are not gainfully engaged. Furthermore, about 49 (13.5%) and 27 (7.5%) of the total users of bus rapid transit are students and retired individuals respectively. In addition to this, as presented in Figure 4.2, BRT users who are gainfully engaged in petty trading are 9 (2.5%), civil service are 75 (33.78%), corporate organisations are 98 (44.14%) and artisanship are 40 (18.02%). This data reveals that there is no discrimination with regards to occupation of individuals before the usage of BRT is allowed. This furthermore shows that movement within Lagos metropolis is used by different cadre of people and as such bus rapid transit operation on Ikorodu-CMS route would cater for different travel needs and expectation.

Figure 4.1: BRT Users Employment Status


Source: Field Survey, 2018

Figure 4.2: BRT Users Occupational Status




Source: Field Survey, 2018

### 4.2.6 Income Status Respondents

Monthly income examination of the total number of BRT users along the Ikorodu-CMS route who are gainfully engaged as presented in Table 4.5 clearly shows that of respondents showed that more than 90 percent of the respondents earned above N18,000 monthly income national minimum wage, however, about 10 (2.8%) earn below the national minimum wage of N18,000. It is expected that most of the respondents are financial capable to patronize BRT services. A breakdown of the set of respondents earning above N18,000 shows that

Table 4.5: Income Status of BRT Users

| | | |
|---|---|---|
| Below N18,000 | 10 | 2.8 |
| N18,001-36,000 | 51 | 14.1 |
| N36,001-72,000 | 120 | 33.1 |
| N72,001-144,000 | 38 | 10.5 |
| N144,000 above | 3 | .8 |
| Unemployed | 140 | 38.7 |
| Total | 362 | 100.0 |

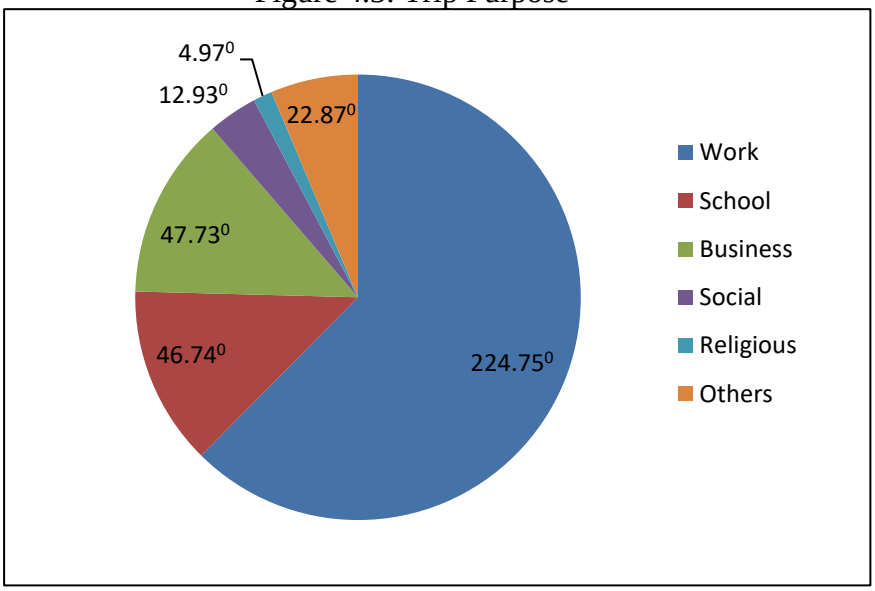
Source: Field Survey, 2018

**BRT Level of Patronage**

### 4.3.1 User Trip Purpose

As indicated in Table 4.5, 226 ($224.75^0$) of the total sampled respondents uses BRT for work trips, 47 ($46.74^0$) use the bus rapid transit for school trip while 48 ($47.73^0$), 13 ($12.93^0$), 5 ($4.97^0$) uses the bus rapid transit for business, social and religious trips respectively. However, a total of 23 ($22.87^0$) of total sampled users use the BRT for others trips which include market/shopping, visiting friends, running errands among others. This shows that bus rapid transit serves the residents of Lagos metropolis for all trip purpose.

Figure 4.3: Trip Purpose




Source: Field Survey, 2018

### 4.3.2 Bus Rapid Transit Patronage

From the total sampled users of bus rapid transit on Ikorodu-CMS route, 22 (6.1%) used bus rapid transit rarely, 35 (9.7%) uses bus rapid transit sometimes, 99 (27.3%) uses bus rapid transit often while 206 (56.9%) uses bus rapid transit on Ikorodu-CMS route always (Table 4.6). Basically, this reveals that about 85 percent (56.9% and 27.3%) of sampled users use the transit to address their mobility demand regularly. This shows that bus rapid transit system in Lagos metropolis is critical to urban mobility in Lagos metropolis.

Table 4.6: Bus Rapid Transit Patronage

| | Frequency | Percent |
|---|---|---|
| Rarely | 22 | 6.1 |
| Sometimes | 35 | 9.7 |
| Often | 99 | 27.3 |
| Always | 206 | 56.9 |
| Total | 362 | 100.0 |

Source: Field Survey, 2018

### 4.3.3 Bus Rapid Transit Patronage Frequency

Ikorodu-CMS bus rapid transit users' patronage level was further examined using quantitative dimension, that is, determination of the numbers of trip made. The study data on patronage of BRT in the study transport corridor (Ikorodu-CMS) revealed that 206 (59.9%) of the respondents commute daily using bus rapid transit services. Furthermore, 22 (6.1%) of respondents uses bus rapid transit twice a week, 35 (9.7%) uses BRT thrice a week, while a total of 99 (27.3%) respondents uses rapid bus transit services more than 4 times a week (Table 4.7).

Table 4.7: Bus Rapid Transit Patronage Frequency

| Trip Frequency | Frequency | Percent |
|---|---|---|
| Daily | 206 | 56.9 |
| Twice a week | 22 | 6.1 |
| Thrice a week | 35 | 9.7 |
| More than 4 times a week | 99 | 27.3 |
| Total | 362 | 100.0 |

Source: Field Survey, 2018

**There is no significant relationship between patronage of BRT and income of users'**

Pearson moment product correlation inferential statistical test was conducted on depended variable of bus rapid transit system patronage level of the sampled respondents and their level of income (independent variable). From the result as presented in Table 4.13, it is revealed that significant level of this test is .304, hence $p > \alpha$ (p value greater than alpha)**.** Based on the decision rule that null hypothesis is accepted and alternate hypothesis is accepted, that it, there is no significant relationship between the patronage of BRT users and their income**.** This basically implies that income socio-economic characteristics of the user do not in any way determine their patronage of bus rapid transit system. This implies that regardless of income category sampled respondents and residents of Lagos metropolis bus rapid transit is used to fulfill their urban mobility needs. This further indicates the importance of bus rapid transit system in urban public transportation in Lagos metropolis.

Table 4.13: BRT Patronage and Income of Users Correlation Test

| | | Income Status of BRT Users | Bus Rapid Transit Patronage |
|---|---|---|---|
| Income | Pearson Correlation | 1 | -.069 |
| | Sig. Level | | .304 |
| | N | 222 | 222 |
| Patronage | Pearson Correlation | -.069 | 1 |
| | Sig. Level | .304 | |
| | N | 222 | 362 |

Source: IBM SPSS Statistical Output, 2018

**Bus Rapid Transit Challenges**

The sampled BRT users on Ikorodu-CMS route identified challenges confronting the BRT operation on Ikorodu-CMS route to include overcrowded buses (overloading) (2.2%), poor ticketing process (24.3%), lack of space at bus-stops (10.8%), longer waiting time at bus-stop (11.0%), non-consideration for the physically challenged (27.9%) and inadequate boarding arrangement (23.8%) as indicated in Table 4.14. These represent a cross-section of major challenges faced by the users of BRT services in Lagos metropolis. The issues of overcrowded buses could be attributed to demand for BRT services exceeding supply, especially during the morning and evening peak periods. Poor ticketing process as challenges could be attributed largely to the manual issuance of ticket at the bus stops and bus terminal which often results in long queue and in some cases rowdy scenes. Most of the bus rapid transit bus stops are constrained in space.

The aforementioned are contributory to the challenges of longer waiting. In addition, poor buses scheduling coupled with limited number of buses could also be attributed to the challenge of longer waiting time. From personal observation design of the bus rapid transit bus stops and bus terminals do not consider the physically challenged users, hence, the identification of this as a problem by 27.9 percent of the sampled users. Also, the bus stops and terminal boarding arrangement is inadequate. About 23.8 percent of respondents identified this as a challenge. These challenges reduce the efficiency of bus rapid transit on the transport corridor. Addressing these challenges is imperative.

Table 4.14: Bus Rapid Transit Challenges

| Challenges | Frequency | Percent |
|---|---|---|
| Overcrowded buses (Overloading) | 8 | 2.2 |
| Poor ticketing process | 88 | 24.3 |
| Lack of space at bus-stops | 39 | 10.8 |
| Longer waiting time at bus-stop | 40 | 11.0 |
| Non-consideration for the physically challenged | 101 | 27.9 |
| Inadequate boarding arrangement | 86 | 23.8 |
| Total | 362 | 100.0 |

Source: Field Survey, 2018

### 4.7.2 Bus Rapid Transit Improvement Measures

Based on the identified challenges of bus rapid transit, user-respondents were of different opinions on measures to address these challenges as presented in Table 4.15. Improvement

measures as identified by the respondents include increases in the number of bus (3.6%), consider the dilemma of the physically challenged (8.0%), encourage the use of e-ticketing (19.9%), improved passengers boarding process (16.9%), improve security at the bus-stops and terminals (21.0%), improve buses intersection crossing (19.3%) and provide more information on bus operation at bus-stop & terminals (11.3%).

Table 4.15: Bus Rapid Transit Improvement Measures

| | Frequency | Percent |
|---|---|---|
| Increases bus number | 13 | 3.6 |
| Consider the dilemma of the physically challenged | 29 | 8.0 |
| Encourage the use of e-ticketing | 72 | 19.9 |
| Improve passengers boarding process | 61 | 16.9 |
| Improve security at the bus-stops and terminals | 76 | 21.0 |
| Improve buses intersection crossing | 70 | 19.3 |
| Provide more information on bus operation at bus-stop & terminals | 41 | 11.3 |
| Total | 362 | 100.0 |

Source: Field Survey, 2018

**Major Findings**

**Bus Rapid Transit Users Characteristics and Patronage Level**

The study shows that bus rapid transit users consist of both gender, 177 (48.9%) male and 185 51.1%) female and in same vein users cut across age cohorts, respondents' age of range from less than 18 years to 60 years and above. Bus rapid transit enjoys the patronage of highly educated residents of Lagos metropolis as well as the lesser educated residents. It is also revealed that on the BRT route, different cadre of persons with different employment status, both employed and unemployed use of the bus rapid transit to fulfill their mobility needs while users include different persons of varied level of income status. Sampled respondents make use of bus rapid transit on Ikorodu-CMS for different mobility needs such as work trip, school trip, business trip, social trip, religious trip and other trips. There is high patronage in term of frequency by users of the bus rapid transit system for urban mobility.

**Conclusion**

The importance of effective mobility in a fast growing city like Lagos metropolis cannot be overemphasized. The ability to move increase socio-economic activities, improve standard of living and also ensure that environmental and other challenges associated with traffic congestion are eradicated or reduced to the barest minimum. Bus rapid transit provides the platform to ensure sustainable urban transportation. In achievement of the study aim this research has made contributions to the body of knowledge in urban and regional planning through provision of empirical evidence on the level of satisfaction enjoyed by users of bus rapid transit on Ikorodu-CMS route which provides the platform for improved service delivery on the route and Lagos metropolis in general. The study also further revealed the interplay between users' satisfaction and quality service attributes.

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