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Passengers' Perception on Bus Rapid Transit Access: Case Study of Ikorodu-Mile 12 Corridor of Lagos State, Nigeria

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ABSTRACT

The Bus Rapid Transit (BRT) system is a transport infrastructure that has grown tremendously among developing countries, including Africa. However, the effectiveness of such a transport system needs an evaluation from the users' perception. Access to a transportation system is an important factor in measuring the effectiveness of a transport system. Using Ikorodu-Mile12 corridor as a case study, this study examined the commuters' perception on the level of access to Lagos BRT to evaluate its effectiveness. The research employed a case study approach with quantitative analysis methods to explore the commuter's perception using dimensions of accessibility, affordability, availability, acceptability and adequacy. A total of 343 questionnaires were sampled using the accidental strategy at bus stops and inside neighborhoods of the study area at a distance of 400m, 800m, and 1200m from BRT bus stops. The results revealed that more than half of the respondents are satisfied with BRT service affordability, accessibility and adequacy. The system is perceived to be satisfactory but needs improvement on bus service frequency, service information and staff attitude.

Keywords: Access, Acceptability, Accessibility, Affordability, Adequacy, BRT, Neighborhood, Public transport

INTRODUCTION

Infrastructure development, including an efficient transport system, is essential for urban development because it enables productivity and sustainable economic growth (Soyinka et al., 2016). As a significant transport infrastructure, Bus Rapid Transit (BRT) provides fast, comfortable, affordable urban transportation using a separate track to ensure quick urban mobility with outstanding customer service (Wright and Hook, 2007). Its operation is an integrated structure with a collection of facilities and services to enhance the BRT operations' fastness, reliability, and uniqueness (Levinson et al., 2003). Cervero (2013) identified two forms of BRT operations as the high-end (complete separated right of way) and low-end (partially separated right of way) forms of the BRT operation. BRT has evolved in different forms to ensure better efficiency and value for services (Merkert et al., 2017). In some

instances, it is used as a feeder service to rail transport and other types of the city transportation system.

In 2008, Lagos State, Nigeria, introduced the BRT system with one of its objectives being transport service for different social groups, particularly the deprived. The first phase of the system starts from Mile12 to Lagos-Island on a 22km corridor and the second phase connects Mile 12 to Ikorodu town. The system is, however, currently confronted with several challenges. Oshodi (2016) and several other studies identified that BRT has contributed 0.41% to daily passenger movement, and therefore uncertain if the BRT system is accessible to the public. To address this knowledge gap, this paper gives an in-depth understanding of BRT as a public transport system and measures its level of access in Lagos State using the Ikorodu-Mile12 section as a case study. This study examined the commuters' perception on the level of access to BRT to evaluate its effectiveness. The research employed a case study approach with a quantitative analysis method to examine commuter's perception using dimensions of *accessibility, affordability, availability, acceptability,* and *adequacy*. Subsequent sections of this paper describe the literature perspective, the study area, methodology, result, and discussion of the result. The conclusion of this research summarizes the level of access to the BRT system on Ikorodu-Mile12 corridor with a reflection on how empirical insights can inform policy formulation on public transportation planning.

BUS RAPID TRANSIT, ACCESS AND PERCEPTION

Bus Rapid Transit

The BRT has grown globally over the last couple of decades because of its relatively lower cost and flexibility of implementation compared to the rail transit system. According to Global BRT Data (2021), the system has been implemented in 179 cities, both in high and low-income countries. Many of the BRT popularity in the high-income economies is mainly linked to their more recourses coupled with a better organizational structure and strong political support for sustainable transport solutions (Malik et al., 2021). On the other hand, the popularity of BRT in developing countries, like Nigeria, is unnoticed due to several challenges such as lack or limited literature regarding the perceptions of the system's users to evaluate its significance and harness its opportunities.

Access

Access is a key concept within the field of transportation planning (Murray and Davis, 2001). It has different dimensions such as geographic accessibility, affordability, availability, acceptability, and others. Transport experts have given it different definitions, which includes economic benefit derived from the interaction between two activities. It is also regarded as the opportunity to partake in a service offered by a system based on its cost and proximity. While geographic accessibility is the distance covered or travel time taken to reach the transport service, access by affordability is the cost of using the service. Hence the longer the distance/travel time or higher the cost of

Table 1. List of indicators for each dimension is based on (Carruthers et al., 2005; Obrist et al., 2007).

Access dimensions	Indicators
Accessibility	Travel distance/ time to BRT bus stops
Affordability	BRT fare
Availability	Availability of Tickets, frequency of the buses at stops
Acceptability	Service information, ticketing type, staff attitudes
Adequacy	BRT hours of operation

transport service, the higher the unlikeness to access the service. Geographic proximity to the public transport system is a significant factor for the social and physiological well-being of the people, and it has an impact on the socioeconomic development of the area.

Perception

Based on the conclusion of Tiznado-Aitken et al. (2020), there are two main approaches to measuring access: large-scale quantitative evaluations of available opportunities or small in-depth qualitative studies of accessibility barriers. A qualitative method could be an in-depth interview, a focus group discussion or participants observation or perception. Perceptions are shaped by people's experiences, based on the practical knowledge gained from doing, seeing or feeling something. In the context of urban transport, accessibility is viewed by different users based on their personal and collective travel experiences as well as satisfaction which in turn shape their perceptions (Tiznado-Aitken et al., 2020). The perception of people on public transport facilities is based on their travel experience which might include their qualitative analysis of access. Therefore, it is essential to incorporate public transport users' experience and satisfaction within access analysis. Hence, this study assessed the perception on access level to BRT service in the study area with five dimensions. **Table 1** presents the dimensions and list of indicators of an efficient public transport system - accessibility, affordability, availability and acceptability suggested by Carruthers et al. (2005), including the adequacy dimension from research by (Obrist et al., 2007).

Lagos BRT Context

BRT in Lagos was commissioned for operation in 2008 and aimed to improve traffic congestion as well as fare affordability within Lagos (Oluwaseyi and Olawunmi, 2016). The BRT has created easy access to public transport for Lagosians and has a daily ridership level of 200,000 passengers (Ogunkoya, 2008; Global BRT Data, 2021). The system has a significant impact on passengers' mobility in the Lagos metropolis. On the other hand, Somuyiwa and Adebayo (2009) found out that less than half of the passengers were satisfied with the BRT service, and some were totally dissatisfied. Adedayo et al. (2014) conducted an access level to the BRT system by different socioeconomic groups using ease of entrance into the bus, affordability, age,

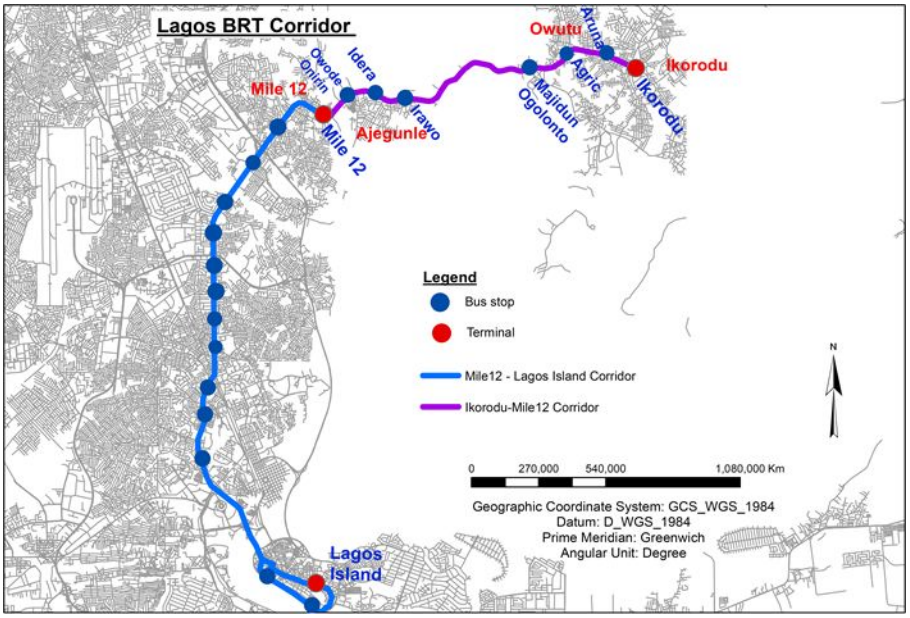

Figure 1: Lagos BRT Corridor. Source: Authors' analysis based on data from LAMATA.

and physical disability to further corroborate the findings of (Somuyiwa & Adebayo 2009).

METHODOLOGY

Case Study

The case study area is Ikorodu, which is one of the 20 local government areas in Lagos state. It is subdivided into six local council development areas (LCDAs), with only one of them (Ikorodu West) having the BRT corridor. According to the Lagos Bureau of Statistics (2017), Ikorodu has a population of 689,043 with a density of 1997.23 inhabitants/km^2. Asides from the rail system, Ikorodu shares the same characteristics with other parts of Lagos. Ikorodu-Mile12 BRT corridor is one of the phases indicated for BRT service in Lagos state. The BRT corridor complements the existing 22km Mile12-TBS BRT corridor as shown in **Figure 1.** The system has eight bus stops in three different neighborhoods (Ikorodu Garage, Owutu, and Ajegunle). The neighborhoods have different spatial characteristics regarding public transport and distance to Lagos metropolis. The level of access to BRT service on this corridor is unknown as no study has been conducted in this area. Thus, Ikorodu-Mile12 corridor is essential and adopted in this study to evaluate the access level and enhance adequate policy formulation for future BRT connectivity in the area.

METHODS

The study adopts case study methods with quantitative data collection and analysis. A questionnaire survey using accidental strategy was adopted for

the primary data sources, while the secondary data are published articles and documents. The survey was administered at the BRT bus stops, informal buses (popularly known as danfo) stops and inside the three neighborhoods (Ikorodu Garage, Owutu, and Ajegunle) at 400m, 800, and 1200m from BRT bus stops to get a wider view on the system. The questionnaires consisted of closed and open-ended questions in numeric and Likert (Bryman, 2012). The Likert scale structure "from 1 – very dissatisfied to 5 – very satisfied" was used to collect data on the perception of access to the BRT service on Ikorodu – Mile12 corridor using *availability, affordability, accessibility, adequacy and acceptability* dimensions. The questionnaire was administered electronically using an open-source app, 'Kobotool box', for mobile data collection that works both on and offline (Kobotoolbox, 2018). In contrast to the estimated 360 respondents for this study, a total of 343 respondents were administered because of challenges such as delayed government agency approval and hostility of some respondents.

RESULT AND DISCUSSION

BRT Users Travel Behavior

The analysis of the respondent's travel behavior, as presented in **Table 2,** revealed that a significant number (more than 50%) of them, particularly at Ajegunle neighborhood, travel for the purpose of work. It was also observed that the majority of the respondents at Ikorodu garage travel every day while most of those in Owutu and Ajegunle travel more during the weekdays. The result further revealed that more than 80% of the respondents use BRT for their usual travel purpose, perhaps because of the separated lane the BRT ply and low ownership of private cars. The majority of the respondents leave home for their usual travel purposes by the time BRT begins operation. An insignificant number (less than 20%) leave before the operation of BRT. The travel destination of all the respondents is located outside the neighborhoods, particularly on Lagos Island.

Perception on Access to BRT Service

The perception of BRT users was measured using five dimensions (*availability, affordability, accessibility, adequacy and acceptability*) as explained earlier. The disparity in respondents' perceptions from each neighborhood is shown with their satisfaction level in **Figure 2**. The analysis of BRT service affordability as presented revealed that most respondents are satisfied with the affordability of BRT fares, work in the organized private sector, and belong to the middle-income class. The analysis further showed that less than 10% are very satisfied and as well very dissatisfied with the fare of BRT. More than 50% of the respondents in Ikorodu garage and Owutu neighborhoods are either satisfied or very satisfied with service fare. The major reason for the affordability satisfaction is that the fare is cheaper than the informal buses. This result confirmed the claim of Adedayo et al. (2014), which discovered that 50 per cent of Lagos residents have affordable access to the BRT service.

Table 2. Travel behaviour.

Travel behaviour	Categories	Ikorodu Garage (%) n = 130	Owutu (%) n = 109	Ajegunle (%) n = 104
Purpose of travel	Work	57	63	69
	School	13	7	7
	Hospital	0	0	0
	Leisure	5	6	5
	Shopping	7	8	17
	Others	18	16	2
Frequency of public transport use	Everyday	48	39	33
	Weekdays only	34	43	57
	Weekends only	2	0	2
	Occasionally	16	18	8
	Never	0	0	0
Usual mode of travel	BRT	88	87	88
	Danfo	0	4	5
	Private car	5	7	7
	Motorbike	2	2	0
	Okada	4	0	0
	Taxi	1	0	0
	Others	0	0	0
What time do you leave home	Before 6:00am	7	15	5
	6:00 - 7:00am	39	28	18
	7:01 - 8:00am	21	28	31
	8:01 - 9:00am	13	20	29
	9:01 - 10:00am	2	4	12
	After 10:00am	18	5	5
Motor vehicle ownership	Yes	32	35	48
	No	68	65	52
Destination of their usual purpose of travel	Within the neighbourhood	0	0	0
	Outside the neighborhood	100	100	100

Also, perception on accessibility analysis showed that most of the respondents in the study area are either satisfied or very satisfied with the time and distance covered to reach the BRT stop. This result, however, differs from the claim of Adedayo et al. (2014) that public transport in Lagos seems not to be close to residents locations.

A significant number of the respondents in the entire study area are very dissatisfied with BRT service availability and acceptability. About 70% of the respondents are very dissatisfied with BRT service in Ajegunle neighborhood, more than 55% in Owutu neighborhood, and about 50% of them at Ikorodu Garage neighborhood are very dissatisfied. The dissatisfaction is as a result of lack of service information, perhaps attributed to service disruptions, low frequency of BRT buses, long waiting time etc. The outcomes of these two dimensions, therefore, contradicts the findings of Oluwaseyi A (2016), in which he claimed that more than 50% of BRT users were satisfied with its service. However, most of the respondents in the three neighborhoods are neutral about how adequate the operation period of the BRT service. This is because more of the respondents travel within the operating hours of BRT.

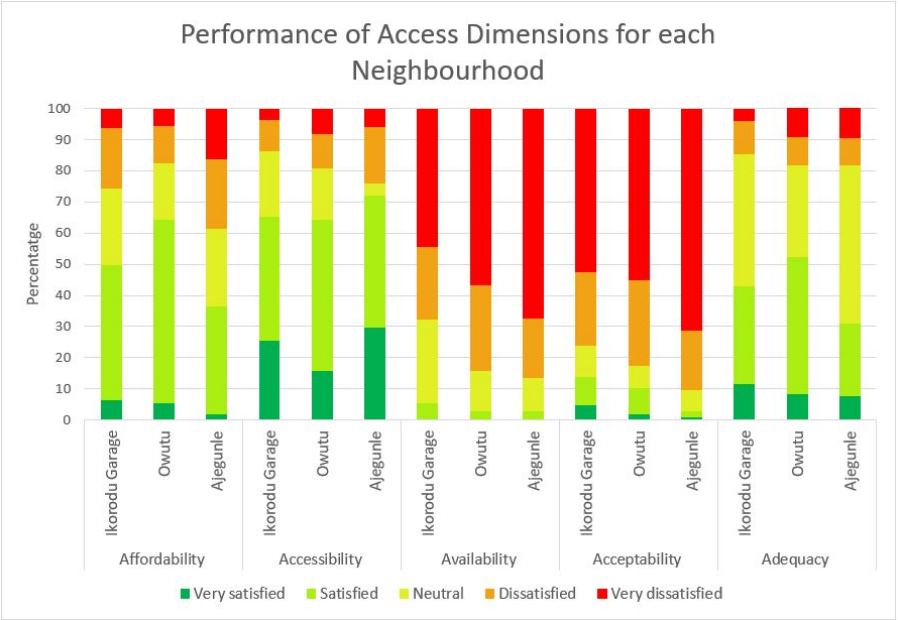

Figure 2: Access dimensions across the three neighbourhoods.

CONCLUSION

This study assesses the passenger's access level perception on the Ikorodu-Mile12 BRT corridor, and it answers the question of what is the access level to the BRT service? The availability, affordability, accessibility, adequacy and acceptability are found to be good dimensions to measure the access level because of the characteristics of the BRT as well as that of the users. It was found that more than half of the respondents are satisfied with the accessibility, affordability and adequacy of BRT service because it can easily be reached, is cheaper comparatively and has a good service operating hour. However, more than half of the respondents are dissatisfied with the BRT service acceptability and availability mainly because of the long waiting time. This study contributes to the literature on public transport and informs policymakers in Lagos and Nigeria on the development of sustainable transport policies. It also recommends further studies on factors influencing BRT usage in Lagos to identify the area of improvement in service delivery.

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