Evaluation of public transportation system from the perspective of passengers

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Abstract In this research, Nigeria’s Akure-Owo Axis public transportation system (PTS) passenger satisfaction is evaluated. It was required because certain Nigerian urban centres’ weak transportation infrastructure made it difficult for people, products, and services to move freely. Meanwhile, the significance of public transportation resides in the basic truth that accessibility and mobility are necessary for both economic development and the effective and efficient flow of products and services in cities of many developing nations. There was discovered to be twelve bus services. To gather the necessary data at the terminals (Akure and Owo Park), the research used questionnaires and field observation. Passengers at the two terminals were given one hundred and twelve (112) questionnaires. Standard deviation and weighted mean were used as descriptive tools. Also utilized to provide descriptive statistics was gap analysis. The results showed that passengers were dissatisfied with the drivers’ skills, the vehicle’s condition, overloading and over speeding, the drivers’ attitudes, the drivers’ adherence to traffic laws and orders, and the cost of the trip.

Keywords: expected service, perceived service, PTS, passengers

1. Introduction

Public transportation (PT) is any form of transportation that is accessible to the general public and is run by either public or private organizations. Buses, trains, subways, trams, and ferries are a few examples of PT. An important function is PT for many individuals depends on it to obtain to and from positions such as work, school, the doctor, and others. In addition, since it lessens congestion in traffic and releases greenhouse gases, it is an environmentally friendly substitute for using individual vehicles. According to the area they provide, transit systems come in a variety of sizes and levels of sophistication. Despite some cities have fewer alternatives; some have substantial networks of buses, trains, and subways. PT is crucial for offering populations cost-effective, reliable, and secure transportation solutions. Many times, governmental organizations, such as municipal or regional transit authorities, run PTS. As a substitute, institutions may be run by individuals under government contracts. Government subsidies, taxes, and cost collections are just a few of the sources of funding available for PTS (Leng and Cormann 2020). The way various people perceive and engage with their travel experience is referred to as the passenger viewpoint. That may involve things like their attitudes, expectations, and feelings about the means of transportation, the lodgings, and the whole trip experience. Many other things, such as individual preferences, past experiences, and the caliber of the travel experience, have an impact on passengers’ perspectives. For transportation providers and travel agencies to match the demands and expectations of their consumers, it is essential to comprehend the viewpoint of passengers. Detailed agreements outline how transit providers and authorities should interact. The operational, financial, and technological standards that operators have to conform to, as well as the consequences of non-compliance, are outlined in the contracts (Canitez et al 2019).

The Chinese government has implemented several changes in recent years to improve the availability of PT and effectively promote PTS. To enhance service and attract new customers, analyzing the many features of PT might reveal the areas where it performs poorly. Therefore, the ability of the PTS to draw in and keep passengers is a key factor in determining its success. One of the most crucial metrics for assessing the state of urban PT is the quality of the service provided (Zhang et al 2019). PTS has made a lot of improvements with the introduction of information technologies. However, the fact that numerous disruptions and uncertainty are one of the technique’s biggest challenges. A new framework model for IoT-based PT is offered for better-coordinated transfer solutions that incorporate the scheduling issues of shared taxis, buses, and subways. Utilizing periodic patterns to anticipate transport flow for the study of passenger and traffic flow, mining is offered (Luo et al 2019). The review procedure often involves getting input from passengers via questionnaires, interviews, focus groups, or online discussion forums. It entails taking into account several variables that
have an immediate influence on the happiness, practicality, and efficiency of travelers. Determining how much it costs to use PT in proportion to the income levels of the users and the perceived value they get from the service, taking into account things like ticket costs, tariff schedules, and any applicable discounts. Assessing the connectedness of the transportation network overall and the ease with which passengers may switch between various forms of transportation, such as buses, trains, and other connecting services, to guarantee smooth trips (Liu et al 2021). Evaluation of a PTS from the perspective of passengers refers to evaluating how well the system meets the requirements and expectations of the passengers who use it to get from one point to another. The evaluation can involve various aspects of the transportation system, including its accessibility, reliability, affordability, safety, convenience, and comfort. The assessment may cover a range of transportation-related factors, such as the system’s efficiency of use, dependability, expense, security, simplicity, and pleasure (Chen et al 2021). Szau and Jahan 2022 determined they were sound, adaptable, and diverse enough to be used in big-city transportation systems. The framework will enable system management in a centralized way, enabling far more effective transit among cities. Big data analytics methodologies may be utilized to provide information for practical decision-making and policy development to address the issues posed by the problems of increasing traffic congestion on the roadways. Guillermo et al (2022) examined a structure for modelling information gathered from PT was developed. To connect data and enable the gathering of geographical information while traveling, the Tiger Graph system was employed, and Django Python was used as the web framework for the (geographic insight website 2020).

The main engine of a nation’s economy is PT. Instead of counting the number of individuals who drive private automobiles, the actual indicator of a nation’s growth is the proportion of people who use PT. Shen et al (2021) provided to share China’s experience with PT control and prevention efforts to advance worldwide adaptation to COVID-19. During all nations around the globe begin manufacturing, it will be especially crucial to prevent and manage illness when using public transit. Aparicio et al (2021) utilized trip information to extensively investigate evolving urban mobility dynamics within multimodal PTS. It blends quantitative perspectives with improvements in machine learning. The present COVID-19 epidemic has caused changes to urban mobility patterns in the city of Lisbon, and these changes are being thoroughly tracked using a similar method. Cedar (2021) provided an effort to depict the potential, logistics, and means of mobility for metropolitan areas. The inefficiency of utilizing private cars makes the case that in the future, when autonomous and electric vehicles are developed, PCs will not be able to compete with the potential of urban transportation networks. Grahn et al (2021) presented a strategy for informing such policy using a data-driven manner that specifically examines the relationship between TNCs and bus transit in Pittsburgh. Due to a lack of trip-level data, transportation network companies (TNCs) offer mobility services that invisibly influence travel habits. Their interactions with other forms of transportation may directly affect society, necessitating the implementation of the proper policies. Porru et al (2020) provided insight into the application of smart transportation solutions distinct in rural and urban settings. The region’s transportation systems are under pressure to adapt innovative strategies as a consequence of moving demographics in outlying locations. The use of IoT technology has been demonstrated to be a beneficial solution to the movement problems in rural regions and has given rise to the idea of smart land. Yan et al (2019) provided the reactions of users to a suggested integrated transit system. They performed a large-sample survey to gather information on both revealed preference and asserted preference, and then they fitted an RP-SP hybrid logarithm analysis to arrive at the primary factors influencing the choice of commuting mode. Owais et al (2021) integrated the bus and subway systems into a single, interconnected transit network to provide a workable solution to the design issue for a subsurface section. The consistent and non-demand-oriented criterion for the design tries to improve the connectedness of the whole transportation system. According to predetermined demand node pairings, the metro lines are constructed to minimize passenger transfers through the transportation network.

2. Study Area

The Akure-Owo expressway connects the western and northern regions of the nation and is a particularly active federal route as a consequence. The road was among the kinds of highways built from Benin to Ilesha in 1965 as pavement dressed, and it underwent its last significant interventions through Akure-Owo in 1998. In 1978, it was transformed into asphaltic concrete. The road’s Owo-Akure segment begins at the Ikare intersection in Owo and ends at that place. It is now clear why the road is in such fantastic shape because this stretch has just undergone extensive restoration. However, based on the FGNSRT study from 2010, it was found that culverts, drains, and bridges are all suffering from varying degrees of scouring and siltation and would need a variety of repairs and upkeep, such as painting and cleaning of bridge bearings, joints, and weep holes. Based on Akure to Owo, 51 km separates the two cities. Iluabo, Ogbesa, USO, and Emure are the principal cities along the axis. Benin-Ado Park in Akure and Post Office Park in Owo are two of the significant parks mentioned in the axis. The location of the Akure-Owo is seen on the geographical map below.

3. Research Methodology

Due to the average and generic structure of the statistical data types, the study is explanatory. Both primary and secondary sources were employed to get the data. The demographics being studied are the people that use the PT along the
Akure-Owo axis in Nigeria's Ondo State. Passengers who routinely travelled along the axis were given a well-designed questionnaire to complete to gather primary data. The National Union of Road Transport Workers, which coordinates the Akure-Owo axis, provided the daily movement records that were used to calculate the study's sample size. According to the records, there are at least fourteen minibuses that run back and forth along the axis, each of which can accommodate 14 passengers. The number of passengers, which came to 112, was divided by the number of minibuses that ran every day. However, throughout the investigation, both random and purposeful approaches to sampling were employed. To guarantee that only passengers who had travelled around Akure-Owo were polled, a purposeful sampling technique was required. The randomized procedure was chosen to guarantee that all participants had the same chance to be sampled for the study. A gap analysis was used to examine the information that was gathered for the study. Comparing expectations and perceptions of quality services was done using gap analysis. The idea behind gap analysis is that, as the difference between expected and perceived services (ES and PS) increases, quality will be viewed as becoming steadily less than desirable. When Expected Service (ES) and Perceived Service (PS) are identical, quality is good. Likewise, when ES is less than PS and PS > ES, quality will become increasingly satisfactory as the PS > ES gap widens. To examine the purpose of this investigation, the weighted average measurements of the expected service (ES) and the perceived service (PS) were contrasted, and a gap analysis depending on the weighted mean amounts has been carried out. In addition, the significance of standard deviation in the research of vision is such that one is unable to overstate. The standard deviation, a measurement that reveals the range of a variable's significance, is important for figuring out if survey respondents are heterogeneous or homogeneous. The period or range given follows has been selected to represent the respondents' perceptions of heterogeneity or homogeneity.

\[
\text{Interval} = \frac{\text{Maximum count} - \text{Minimum count}}{\text{number of range}}
\]

\[
\text{Interval} = \frac{s - 1}{5}
\]

Interval = 0.8

The amount of pleasure that participants evaluated will differ divided into intervals, with each interval equal to 0.8 for each separate variable, which translates to the following:

Translation of the Rating System

a. 2.60 – 3.39: The passenger is neither satisfied nor dissatisfied.
b. 1.80 – 2.59: The passenger is dissatisfied.
c. 4.20 – 5.00: The passenger is heavily satisfied.
d. 1.00 – 1.79: The Passenger is highly dissatisfied.
e. 3.40 – 4.19: The Passenger is satisfied.

In addition,
a. 2.60 – 3.39: The service is good.
b. 1.80 – 2.59: The service is fair.
c. 4.20 – 5.00: The service is excellent.
d. 1.00 – 1.79: The service is Poor.
e. 3.40 – 4.19: The service is very good.

The standard deviation of 0.8 is justified because respondent perceptions are homogeneous if the standard deviation in the study is less than 0.8, but heterogeneous if the standard deviation in the study is greater than 0.8.

4. Results and Discussions of Findings

In order to determine the optimum outcome, we looked at factors including socioeconomic status of passengers, frequency of travel, cost, and identify the heterogeneity and homogeneity of consumers' perceptions of transportation, number of passengers, service quality, and techniques for enhancing public transportation.

4.1. Social-Economic Characteristics of Passengers

The data in Table 1 provided insight into the socioeconomic makeup of the study's sample of passengers. Sex, age, and level of education are among the factors taken into account. 33.9% of travelers were female and 66.1% of passengers remained male, according to their sex. This demonstrates that men make up the bulk of the travelers along the Akure-Owo route. This may be due to the fact that gender-specific differences in women’s mobility and travel activities exist. Gender-specific differences in female movement and travel behaviors exist. In this area, there are discernible gender differences in travel behavior that may be attributed to a variety of circumstances, including age, financial level, society perspective, time, distance, family size, etc. In terms of marital status, there were 27.7% of single people, 48.2% of married people, 17.9% of divorced people, and 6.3% of widowed people. According to the research above, most of the travelers were married. This
suggests that married individuals visit the region more often than persons in other marital status categories. This may be because married individuals must travel about to take advantage of opportunities to satisfy their daily needs and support their household. An analysis of the travelers' ages reveals that 27.7% of them are between the decades of 20 and 30; 44.6% are among the categories of 30 and 40; 18.8% are between the ages of 40 and 50; and 8.9% are over the age of 50. All indications point to the bulk of passengers being in the 30 to 40-year age range. This suggests that people in this age group have a significant impact on their search for employment. This is a working age group that is active and capable of overcoming the intricate difficulties presented by the surroundings. Based on the passengers’ educational backgrounds, it was clear that most of them had college degrees. This suggests that the users of the PTS along the Akure-Owo axis were informed enough to share their degree of satisfaction. While most of them expressed the opinion that PT in the region is more affordable than other forms of transportation along the axis, which encourages people to use it. A majority of the travelers on the Akure-owo route were merchants, next to students, professionals, and artisans, according to their employment status.

<table>
<thead>
<tr>
<th>Social-Economic Characteristics</th>
<th>Percent</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Occupation Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>22.3</td>
<td>25</td>
</tr>
<tr>
<td>Trader</td>
<td>40.2</td>
<td>45</td>
</tr>
<tr>
<td>Professional/artisan</td>
<td>22.3</td>
<td>25</td>
</tr>
<tr>
<td>Civil servant</td>
<td>22.3</td>
<td>17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td>112</td>
</tr>
<tr>
<td>20-30</td>
<td>27.7</td>
<td>31</td>
</tr>
<tr>
<td><strong>Age Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-40</td>
<td>44.6</td>
<td>50</td>
</tr>
<tr>
<td>40 -50</td>
<td>18.8</td>
<td>21</td>
</tr>
<tr>
<td>50 and Above</td>
<td>8.9</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0</td>
<td>122</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>33.9</td>
<td>38</td>
</tr>
<tr>
<td>Male</td>
<td>66.1</td>
<td>74</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td>112</td>
</tr>
<tr>
<td>No Formal Education</td>
<td>8.9</td>
<td>10</td>
</tr>
<tr>
<td><strong>Education Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>27.7</td>
<td>31</td>
</tr>
<tr>
<td>Secondary school</td>
<td>18.8</td>
<td>21</td>
</tr>
<tr>
<td>Tertiary above 40-50</td>
<td>44.6</td>
<td>50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td>112</td>
</tr>
</tbody>
</table>

4.2. The regularity of the journey, the cost of travel, and an explanation for using PT along Akure Owo Road

According to the frequency of passenger travel or movement along the Akure–Owo road, 13.4% of them did not travel along the route regularly, 35.7% sometimes, and 50.9% often. These suggest that the vast majority of the passengers along the axis travel often and, as a result, have a thorough understanding of the route. A majority of the respondents (54.5%), however, asserted that the expense of a trip ranges from ₦600 and ₦500. Figure 1 shows the regularity of the journey, the cost of travel, and an explanation for using PT along Akure Owo Road.

4.3. The impressions of travelers regarding public transport services such as heterogeneity or homogeneity

The analysis of standard deviation may be utilized to identify the heterogeneity and homogeneity of consumers' perceptions of transportation. One approach for figuring approximate measurements of dispersion that informs us about the range of a variable's value is the average deviation. According to this model, each people's opinions of a specific service are different or homogeneous if the average variation is greater than the gap. In similar veins, all participants' perceptions of a specific service are comparable or homogeneous if the standard deviation is smaller than the gap. The analysis and representation of the passengers' perceptions of the PTS are shown in Figure 2 below. According to the descriptive analysis shown in Figure 2 below, all services, except safety, have standard deviation values for service quality and passenger satisfaction that are larger than 0.8. One of the distinctive features of transportation as a derived demand is that passengers felt differently or heterogeneously about the services given when the standard deviation was more than 0.8. Given that passenger safety is seen as crucial in comparison to all other services, it follows that passengers felt similarly about safety if the standard deviation of safety is smaller than 0.8. The passengers' perspective and the state of safety service are comparable.
4.4. Passenger Satisfaction Level and Public Bus Service Quality along the Route

The analysis and representation of the degree of passenger satisfaction and the caliber of the bus transportation service throughout the route are shown in Figure 3 below. According to the gap analysis shown in figure 3 below, passengers were dissatisfied with the skill of drivers, the state of the car, overloaded and over speeding, the drivers' demeanor, the drivers' adherence to traffic laws and orders, and the cost of the trip.
4.5. Methods of Improving PT

The opinions of the passengers on how to enhance the functioning of PT along the Akure-owo axis are shown in Table 2 below. According to the analysis, 49.1% of the passengers recommended driver training, 19.6% supported following traffic laws and orders, 17.9% advocated routine vehicle maintenance, and 13.4% suggested lowering transportation costs and improving relationships between drivers and passengers. According to the investigation, the majority of passengers believed that educating drivers would enhance PT in the study region. The foregoing was supported by the observation that well-informed and educated PT drivers will go a long way toward lowering the number of accidents that take place on the road.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Ways of Improving Public Transport</th>
<th>Percentage</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Compliance with Road</td>
<td>19.6</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Safety Rules and Orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Others</td>
<td>13.4</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Regular Maintenance of Vehicle</td>
<td>17.9</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Training of Drivers</td>
<td>49.1</td>
<td>55</td>
</tr>
</tbody>
</table>

5. Conclusions

The majority of the passengers agreed that training the drivers, followed by compliance with road safety rules and order, will improve the public transport system in the study area. This study carefully assessed the passengers’ satisfaction with the public transport system in the Akure-Owo Axis, Nigeria. The results showed that the price of public buses is less expensive than other vehicles. The results also showed that passengers along the Akure-Owo axis were dissatisfied with the following service indicators: driver competence, vehicle condition, dependability, overloading and excessive speeds, and driver altitude, adherence to traffic laws and order, and cost per journey. The Federal Road Safety Corps (FRSC), educational institutions that specialize in transport management, and the National Union of Road Transport Workers (NURTW) should work together to conduct periodic training, tests, and seminal for public bus drivers to address the issues. This will boost their efficiency and dependability as well as their ability to interact politely with passengers while going about their daily business. Before a public bus is permitted to be utilized for public usage, notably for transportation passengers, FRSC shall control and inspect its conditions. This will minimize any unnecessary delays that can happen from a car breaking down in transportation. Similar to what was said above, the FRSC’s efforts to control bus loading and speeding need to be strengthened. As a result, there will be fewer accidents on the road. The FRSC should monitor drivers’ adherence to traffic laws and instructions to prevent accidents on our roads. It should be mentioned that certain FRSC officers have been known to accept payments from drivers who break safety regulations. The people (passengers) should be given more authority via a whistleblowing strategy by reporting such instances to the head of operations and anti-corruption authorities to checkmate this. This will advance the sector’s return to sanity and create a society devoid of accidents. A scientific technique for calculating the cost of transportation per trip should be developed by the public and private partners, including the transport research institution. This will put a stop to the nation’s notoriously persistent transportation expense rise.

Ethical considerations

Not applicable.

Declaration of interest

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