Journal of Art, Architecture and Built Environment (JAABE)
Volume 9 Issue 1, Spring 2026
ISSN(P): 2617-2690 ISSN(E): 2617-2704
Homepage: https://journals.umt.edu.pk/index.php/jaabe

Title:	**Assessment of Parking Facilities for Urban Transportation Sustainability at Central Business District Area of Ilorin City, Nigeria**
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DOI:	https://doi.org/10.32350/jaabe.91.05
History:	Received: February 12, 2026, Revised: March 04, 2026, Accepted: May 22, 2026, Published: June 30, 2026
Citation:	Oladimeji, S. B., Olatunji, S. S., Abubakar-Kamar. T. A., & Adedo, Z. I. (2026). Assessment of parking facilities for urban transportation sustainability at central business district area of Ilorin City, Nigeria. *Journal of Art, Architecture and Built Environment*, *9*(1), 112–134. https://doi.org/10.32350/jaabe.91.05
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Conflict of Interest:	Author(s) declared no conflict of interest

A publication of
School of Architecture and Planning
University of Management and Technology, Lahore, Pakistan

Assessment of Parking Facilities for Urban Transportation Sustainability at Central Business District Area of Ilorin City, Nigeria

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Abstract

Rapid urbanization in most urban areas in developing nations has necessitated the demand for efficient parking facilities for urban mobility. The current study aimed to evaluate the present conditions of parking facilities in the Central Business District (CBD) area of Ilorin city, Nigeria. Furthermore, the study focused on their impact on urban transportation sustainability. A mixed methods approach was employed, using questionnaires, observations, and interviews to assess the quality, availability, and conditions of parking facilities in the study area. Using the Likert scale rating, Satisfaction Index (SI) results from the administered questionnaires (n=122) indicated that restrooms (SI = -0.22), seating areas (SI = -0.24), and parking spaces (SI = -0.14) ranked lowest (9^{th}) in user satisfaction. On the other hand, retail spaces (SI = +0.77) ranked highest showing satisfaction but still unorganized. The findings revealed significant deficiencies in parking facilities, including inadequate parking spaces, poor maintenance, and insufficient amenities. The study concluded that these conditions also contribute to traffic congestion, safety concerns, and decreased quality of life for commuters. The study highlighted the need for improved parking facilities for the sustainability of urban transportation and recommended strategic interventions to address these challenges.

***Keywords*:** central business district, parking facilities, urbanization, urban sustainability

Introduction

Transportation in urban cities is crucial in developing and underdeveloped countries, such as Nigeria. This is because it cumulatively affects economic growth, productivity, environmental pollution, air quality, and commuter experiences. The Central Business District (CBD) area of Ilorin commonly, referred to as the Post Office area, is an important hub for transportation in the city (Babatunde et al., 2014). The CBD faces numerous traffic problems

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due to improper planning and regulation of the parking areas (Ahmed, 2015). Furthermore, improper use of spaces and high volumes of vehicular movement are among the factors which make the city unlivable and the transport system unsustainable (Aderamo & Abolarin, 2014; Olawepo et al., 2020). This research therefore, assessed, examined, and identified the conditions of existing parking facilities in the CBD area of Ilorin, Nigeria towards a sustainable urban transportation and enhancement of mobility efficiency.

Due to an increase in human population and expansion of settlements, there is a need for transportation of people and goods from one location to another. According to Ching (2023), one of the parameters to measure a citys functionality is its public transportation infrastructure. The economic success, wealth, and influence of any community or country are directly proportional to how effective their transportation network and systems are (Ambrose & Rhoda, 2019). Well-planned parking facilities and transportation infrastructure, such as multilevel car parking, dual carriage roads, and parking garages, are the major traffic management strategies. These strategies are helpful in the reduction of congestion and cruising times (Sethy et al., 2020) by providing designated areas for parking of vehicles (Shoup, 2018). Additionally, well-planned parking facilities help reduce traffic pressure on adjoining streets, thus cumulating into a sustainable transportation system in the cities (Willson, 2018).

Transportation of people and goods is part and parcel of human activities. Moreover, it helps in facilitating the movement of people and goods from one point to the other (Adu, et al., 2024; Ahmed, 2013). However, urbanization due to industrial revolution in the world has led to the concentration of major economic activities and employment in the urban areas. This poses a significant threat to the survival and sustainability of people living in the urban areas (Aderamo & Abolarin, 2014).

Transportation systems encompass infrastructure (roads, bridges, terminals), vehicles, automobiles (cars, buses, tricycle, bicycles), and their operations, such as traffic management. Additionally, sustainable transportation systems play an important role for driving urban areas. This improves economic development and promotes quality of life for urban dwellers (SGArchitects, 2015; Stanley, 2022). Rapid urbanization has created a considerable pressure on urban transportation systems. This has resulted in a high demand of transport facilities, environmental degradation,

and insufficient infrastructure including roads, public transit networks, and pedestrian walkways. This leads towards an increase in challenges, causes bottlenecks, delays, and safety hazards as opined by Yannis and Chaziris (2022). Additionally, socio-economic differences often disproportionately affect the less privileged in the communities, limiting their access to transportation options (Costa et al., 2017; Shittu et al., 2015).

According to Adepoju (2021), functioning transportation in urban areas is very important. This is because it enhances economic activities, minimizes travelling time, and helps to improve accessibility of less privileged including people with disabilities. Transportation system that is efficient in terms of planning ensures that people, goods, and services move smoothly and safely, reducing delays and increasing productivity (Adekanye & Yahaya, 2019; Olawepo et al., 2020). According to Fatima and Kumar (2014), improving the public transit system of a city is directly proportional to reducing citizens' over-reliance on private vehicles. This reduces carbon emissions and pressure on road infrastructure, simultaneously enhancing urban transport efficiency. This is also in line with the Sustainable Development Goals (SDGs).

A well-organized transport system is the bedrock of effective urban transportation strategies. Patil and Shilpa (2017) and Eniola et al. (2013) emphasized that for users to experience comfort, there is a need to properly integrate bus terminus design with traffic management systems. According to Igbinosun and Omosigho (2015), causes of congestion in urban areas include poor road infrastructure, lack of formal parking facilities, and other facilities. This has contributed to an increase in illegal roadside parking and traffic obstruction.

Traffic flow management consists of various strategy implementations to control flow of vehicles and pedestrians in urban areas (Ajala, 2022). It is beyond ordinary enforcement of traffic regulations. It involves planning, provision, and maintenance of facilities in transportation. Results from several studies, for instance Adekanye and Yahaya (2019), Ahmed (2013, 2015) and Olawepo et al. (2020), among others, have examined the traffic conditions in Ilorin metropolis. However, these have failed to assess the conditions of its facilities and transportation challenges. This gap in the literature underscored the urgency and significance of the current study. Furthermore, this study also identified major challenges in transportation including parking issues, pedestrian safety, and inadequate transport

infrastructure as shown in plate 1 with a view to make the urban transportation sustainable.

Figure 1

Parking Facilities and Vehicle Congestion at the Post office Area, Ilorin

Note. Source: Igbinosun and Omosigho (2015)

Traffic Flow Management Measures

Transportation Terminals

Transportation terminals include bus terminals, ferry terminals, train stations, and other modal convergence points. These play a vital role in traffic management by consolidating passenger flow, reducing delays, and improving network efficiency (Vulevic, 2016). Along with designated hubs of different transportation modes, terminals also reduce traffic pressure on urban infrastructure by minimizing travel times and improving the performance of transportation system in urban areas (Zhang & Levinson, 2007).

Dedicated Parking Facilities

Multilevel car parking facility is one of the ways to manage traffic congestion effectively. Additionally, a structured parking garage control by government agencies or private individuals was being used to combat the traffic challenges in most cities. Cruising time can also serve this purpose by providing designated vehicle storage spaces (Sethy et al., 2020; Shoup, 2018). They help to reduce pressure on adjacent streets and improve urban traffic flow (Willson, 2018).

Signages and Road Markings

The essential communication tools between road users and authorities include signages and road markings, which are normally used to convey guidance, regulations, and warnings to the road users in the cities (Babić et al., 2020). According to Jin et al. (2022), wayfinding processes, such as orientation, route decision-making, and destination recognition, are significantly enhanced and well-designed, which are strategically placed signages. These systems have a considerable influence on driver behaviour. These also uphold lane discipline, speed control, spatial awareness, and hazard recognition, thereby guaranteeing road safety (Azimi et al., 2019). To make these signages and road markings more effective, there is a need to ensure and enhance visibility and quality, especially in low-light or adverse weather conditions. Retroreflective properties are also used to enhance nighttime visibility. The road marking materials for this purpose include paint, thermoplastic, and cold plastic. The commonly used is paint, although it requires frequent maintenance and also offers limited durability. Contrarily, plastic-based alternatives, such as thermoplastic and cold plastic provide greater wear resistance and enhanced long-term visibility (Petrukhina et al., 2021).

One-way Traffic Systems

One-way traffic systems are another traffic measure system to reduce delays and improve safety on the road. This is achieved by directing traffic in a single direction. Karimi et al. (2021) highlighted the effectiveness of one-way traffic systems in enhancing urban traffic flow. On the other hand, Feng et al. (2009) was of the opinion that they minimize vehicle conflicts caused by opposing vehicle movement.

Queue Management

Organized queue systems at bus bays prevent overcrowding and ensure orderly boarding and alighting. Elements, such as barriers, designated waiting areas, and signages contribute to improved passenger movement (Gonzales et al., 2021).

Vehicle Circulation Planning

Vehicle circulation routes that are well-planned within the terminals help in reducing conflicts between buses, other vehicles, and pedestrians. Meanwhile, well-defined routes and designated drop-off and pick-up zones

in urban cities help to prevent congestion and improve the overall traffic flow (Ambrose & Rhoda, 2019).

Concept of Multi-level Parking Facilities

The design and construction of multi-level parking facilities in Central Business District (CBD) provide a holistic solution to the problem of limited space in urban areas. By going vertical, these facilities make an efficient use of available land and provide ample parking spaces without occupying a large footprint. This reduces on-street parking, enhances traffic flow, and minimizes the time drivers spend searching for parking facilities (Cang & Phuc, 2020; Sethy et al., 2020). Furthermore, multi-level parking facilities contribute to smoother traffic operations and reduced carbon emissions. This also promotes pedestrian traffic, encourages the use of public transport, and generates revenue (Ahmed, 2015). Studies highlight reinforced concrete and steel as the predominant structural systems for multi-level parking facilities, chosen for their load-bearing capacity, durability, and adaptability to multi-level construction (Mahendran et al., 2018). Recent innovations include high-performance concrete and advanced steel composites, which enhance structural integrity and longevity (Mahendran et al., 2018).

The design of multi-level parking structures must efficiently allocate space for key components, such as parking bays, ramps, pedestrian walkways, and elevators to ensure safe and smooth circulation. Ramps are essential for vertical vehicle movement between levels and must be designed with appropriate slope and friction angles to prevent slippage, especially where spatial constraints demand steeper inclines (Mahendran et al., 2018).

Materials and Methods

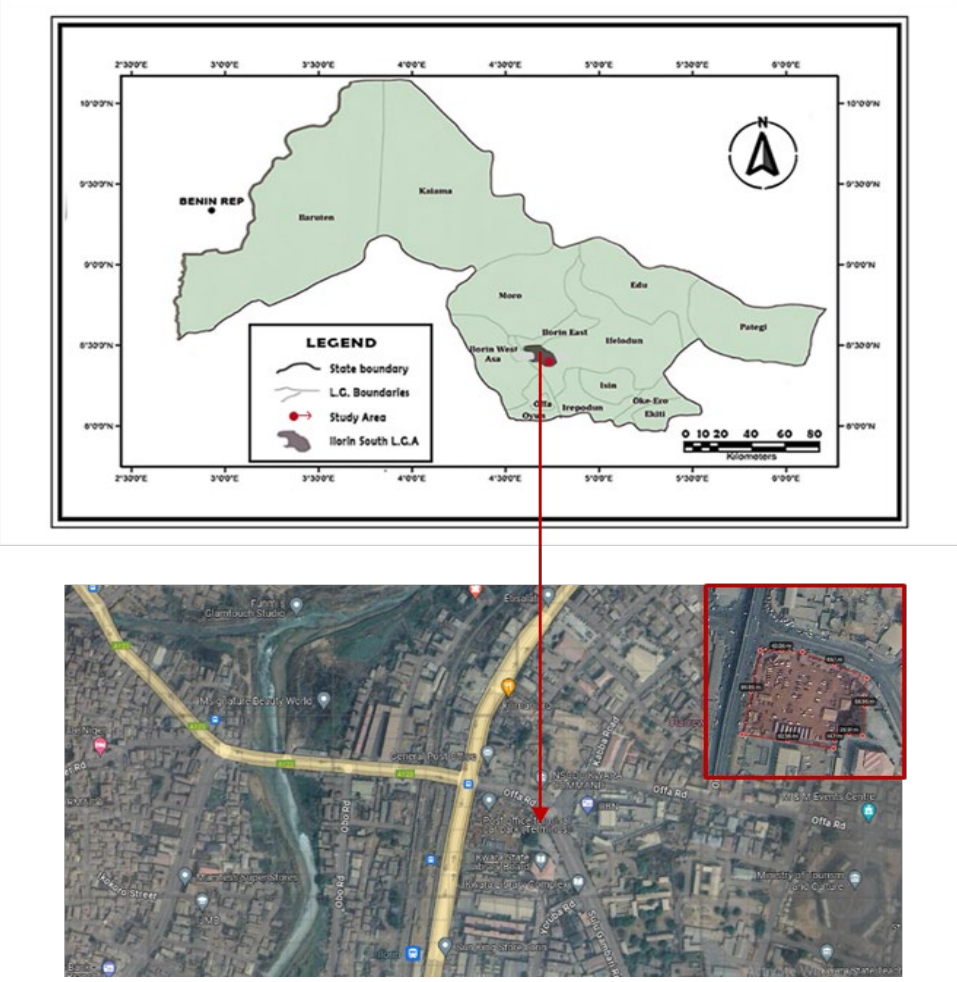
Study Area

The research was carried out in the city Ilorin, Kwara State Nigeria, on latitude 8.0301°N and longitude 4.0321°E in North-central Nigeria. Ilorin city falls between the transitional zone known as savannah region of the North and the South, making it a major transport and commercial hub (Owoseni, 2023). The rapid urban expansion in Ilorin can be traced to the time the city was made the capital of Kwara state, and this has led to an increased vehicular activity within the CBD (Babatunde et al., 2014). The focus of this study was the CBD, which is a high traffic zone situated near

the General Post Office and bounded by three major roads namely, Ibrahim Taiwo Road, Muritala Muhammed Way, Offa Road, and Omu Aran-Oja Oba Road as shown in Figure 1.

Figure 2

Map Showing the Location of the Study Area

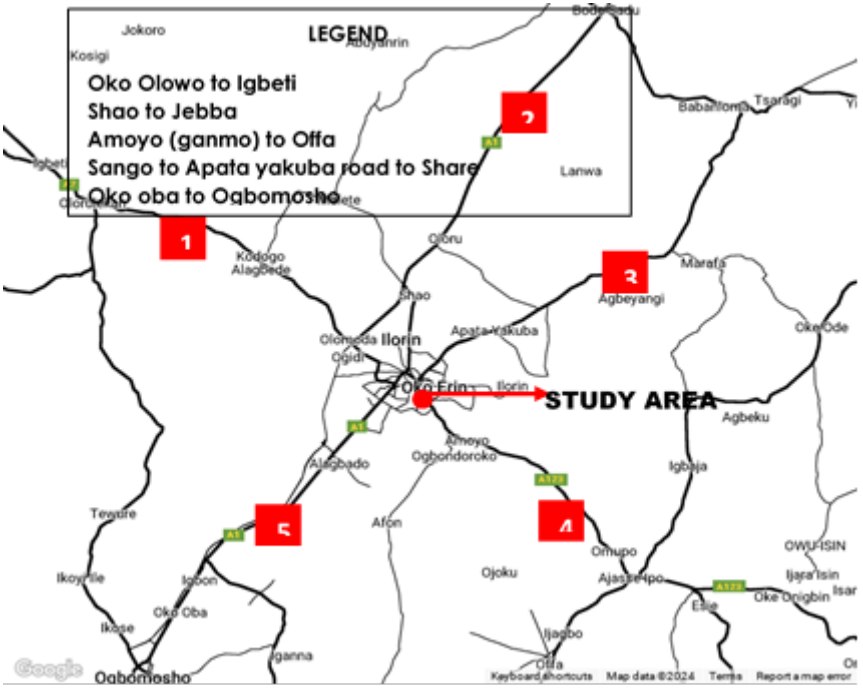


The CBD area of Ilorin is quite important since this is the convergence point of all the five major highways to the city, as illustrated in Figure 2. The five highways are, from Oko Olowo to Igbeti, Shao KWASU-Jebba, Sango to Share via Apata Yakuba, Amoyo (Ganmo) to Offa and Airport Road, and Oko Oba to Ogbomosho (Lagos route). The area functions as the

major economic and transport hub in the city. These were the major justification and selection criteria for this study.

Figure 3

Map Showing the Intersection of Five Major Roads



Note. Adapted from Google Maps (2024)

Methodology

The questionnaires were administered to drivers and selected passengers within the sample frame to collect information on user demographics and their perceptions on conditions of bus terminal facilities. These included ticketing counters, waiting areas, restrooms, seating areas, traffic flow, infrastructure as well as traffic management and operations within the CBD of the city. The questionnaires also covered areas, such as cleanliness, maintenance, and accessibility, as well as the availability. These also focused on the adequacy of parking spaces, vehicle segregation, provision for people with special needs, such as ramps, pedestrian walkways, and signages among others. The questionnaires also assessed the effectiveness of traffic signage, traffic volume, vehicle types, route patterns, and

congestion levels. Both drivers and passengers constituted the respondents, the drivers comprised commercial vehicles, such as tricycles, taxis, minivans, minibuses, 14- and 18-passenger buses, and Marco polo buses

Sample Frame and Sample Size

The study adopted both multistage and accidental sampling techniques otherwise known as convenience sampling due to the commercial vehicles' nature of being in transit. Commercial vehicles are usually not static in nature, they move in and out of the study area in Ilorin, depending on the movement from neighboring states and communities, such as Ekiti, Kogi, Offa, and other cities. Ilorin as the capital city constituted the primary study area. The sampling process was divided into three stages. The first stage was the CBD area identified as the main focal point, due to its high movement of vehicle-per-hour rate (Adekanye & Yahaya, 2019).

Table 1

Sample Size from Sample Population (Post Office Park)

S/N	Types of Vehicles	Sample Frame	Sampling Percentage	Sample Size (Number)
1	Tricycle (Kekenapep)	70	19%	13
2	Taxi	14	38%	6
3	Minivan (Sienna).	50	19%	9
4	Minibus (korope)	60	19%	11
5	14-seater Bus	60	19%	11
6	18-Seater Bus	50	19%	9
7	Marcopolo Bus	8	19%	2
	Total	312		61

The next stage was the categorization of the commercial vehicles operating within the area into different types, such as tricycle, mini-bus, mini-van, 14-seater bus, and 16-seater bus among others. The third and the final stage was the estimated number of vehicles in each category obtained from management of the parking facilities through the record keeper, to guide sample distribution. The sample size for the study was determined using the findings of (Aderamo & Abolarin, 2014). According to the findings, taxi is the most prevalent mode of transportation in Ilorin and as a result, sample size for the study consisted of 39% taxi and 19% from each

of the other categories of vehicles in the study area. This method ensured a fair representative selection of commercial vehicles in the study area. This distribution was applied to the sample frame to guide fair distribution of questionnaires across vehicle types (Grafström & Schelin, 2014), as shown in Table 1.

The study used a dual-distribution approach in attaining the responses in each vehicle type in the sample frame, one questionnaire was administered to both the driver and a passenger in the same vehicle. This method ensured a balanced representation of the operators' and the passengers' perspectives. A total number of 122 questionnaires was distributed, 61 questionnaires to drivers and 61 to passengers. The detailed distribution is presented in Table 2.

Table 2

Sample Size from Sample Population (Post Office Park)

Vehicle Type	Sample Frame	Sample Size (19% or 38%)	Number of Drivers (1 each)	Number of Passengers (1 each)	Total Questionnaires
Tricycle (Kekenapep)	70	13	13	13	26
Taxi	14	6	6	6	12
Minivan (Sienna)	50	9	9	9	18
Minibus (Korope)	60	11	11	11	22
14-passenger Bus	60	11	11	11	22
18-passenger Bus	50	9	9	9	18
Marcopolo Bus	8	2	2	2	4
Total	312	61	61 Drivers	61 Passengers	122 Questionnaires

Data Analysis and Satisfaction Index (SI) Calculation

A Satisfaction Index (SI) was employed to quantify user satisfaction with terminal facilities, based on responses from a structured questionnaire using a five-point Likert scale. Each response option was assigned a numeric value ranging from 1 (Not Available) to 5 (Very Good), as shown in Table 3. The SI provides a quantitative measure of how well existing facilities meet user expectations.

Table 3
Likert Scale and Corresponding Ranking used for Satisfaction Index (SI) Calculation

Likert Scale	Scale Ranking Used
Very Satisfied = 5	Very Good = 5
Satisfied = 4	Good = 4
Fairly Satisfied = 3	Fair = 3
Slightly Satisfied = 2	Poor = 2
Not Satisfied = 1	Not Available = 1

The satisfaction weight value for facilities in the park was computed by summing the product of the number of responses in each category and their scale values, as shown in

$$\text{SWV} = (a \times 5) + (b \times 4) + (c \times 3) + (d \times 2) + (e \times 1) \quad (1)$$

Where, $a, b, c, d,$ and e is the number of responses rated very good, good, fair, poor, and very poor, respectively. The mean score of each facility was arrived at by division of the SWV by number of responses (NR),

$$X = \frac{\text{SWV}}{\text{NR}} \quad (2)$$

Where, X is the mean score and NR is the number of responses for that facility.

The overall mean score was computed as the average of all individual facility mean scores,

$$\bar{X} = \frac{\sum X}{n} \quad (3)$$

Where, $\sum X$ is the summation of all the facilities' mean scores, and n is the total number of facilities assessed lastly, the SI for each facility was calculated by subtracting the overall mean score ($\bar{X}$) from the facility's mean score (X) as shown in

$$SI = X - \bar{X} \quad (4)$$

Where, SI is the satisfaction index for a specific facility, X is its mean score, and $\bar{X}$ is the overall mean score.

Results and Discussion

Appraisal of the Current Condition of the Post Office Parking Area

This section presents the results of a detailed user assessment of the current condition of the study area. One official from the Ministry of Urban and Regional Planning Ilorin, affirmed that the study area, that is, CBD park is the officially designated bus terminus in the city's master plan. The study aimed to assess users' perceptions of comfort, convenience, and the adequacy of key facilities.

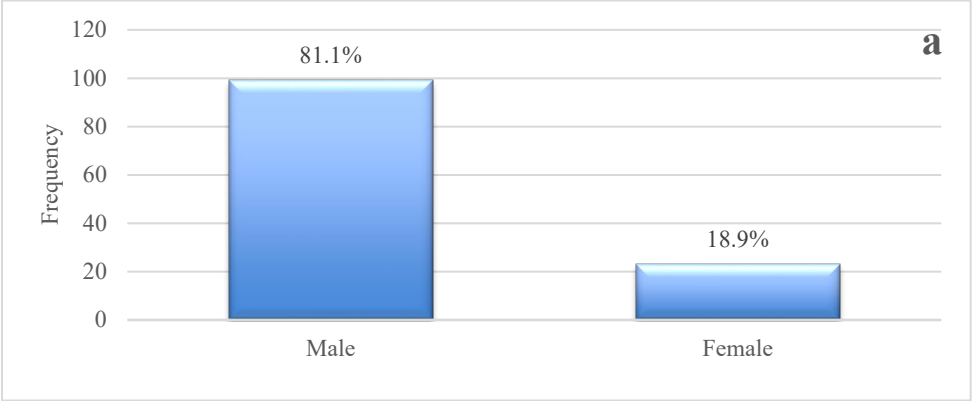
Demographic Information of Respondents

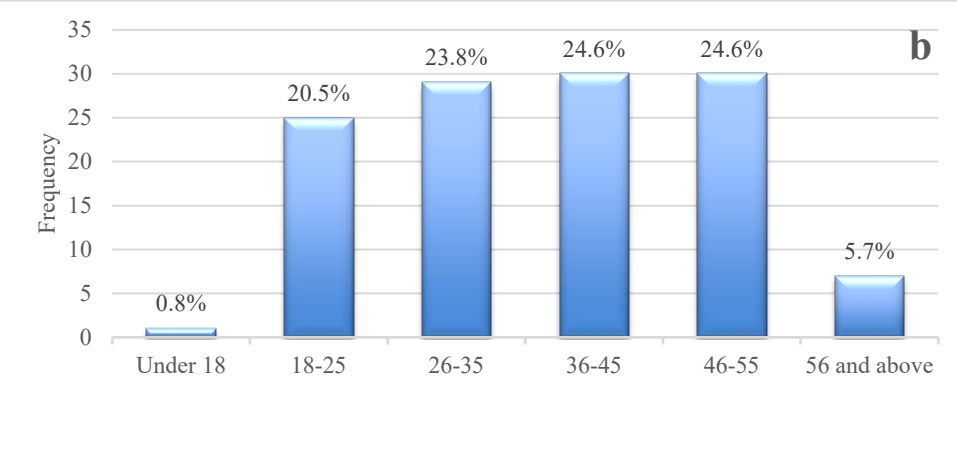
The results from the findings, as shown in Figure 3a, reflect that a considerable proportion of respondents in the study area were males (81.1%), while only 18.9% were females. This did not come as a surprise because it reflected the dominant involvement of men as the transport business was regarded as males' business in the study area.

Additionally, Figure 3b below revealed age distribution of respondents. The majority (49.2%) of the respondents were between 26-45 age group. This is a reflection that the majority of users were young adults, likely engaged in business of transportation or work-related travel. However, respondents aged between 46-55 constituted 23.8%, which indicated that the parking terminal also caters to a significant older demographic. On the other hand, lowest representation of users above 55 years (5.7%) may be connected to the parking facilities' few accessibilities to physical demands.

Figure 4

Demographic Information of Respondents (a) Gender Distribution, (b) Age Distribution





Condition of Facilities

The results from the conditions of various parking facilities indicate that the waiting areas for the passengers were in a very poor condition with 43.8% of respondents as shown in Table 4. However, 16.5% of the respondents also rated the waiting areas to be poor. Only 2.5%, 9.1% of the respondents in the study area showed that it was in very good and good condition, respectively. Additionally, 28.1% were of the opinion that waiting areas were in fair condition. This suggests that the waiting areas in CBD bus terminal of the study area need attention which may account for the reason many passengers patronize illegal packings in the study area.

Furthermore, the study showed that 46.2% of the respondents confirmed that the restrooms were in very poor condition, and 26.1% revealed that their condition was poor. This implies that the majority of the users affirmed that the rest rooms were not accessible. Meanwhile, 1.7% and 5.0% of the minorities showed that the restrooms were in very good, good condition, respectively. While, 21.0% of the respondents were of the opinion that the restrooms were in fair condition. Based on the assessment of the ticketing counters, half (49.6%) of the respondents opined that they were in very poor condition, and 21.8% showed that they were in poor condition. On the other hand, (12.6%) revealed that they were in good or very good condition.

The results from the analysis, as shown in Table 4, also revealed that seating facilities in the parking areas were in very poor condition as responded by half (50%) of the respondents. On the other hand, 21.7% rated the seating facilities as poor. The 10% of respondents showed that the

seating facilities were good or very good. Additionally, on the rating of the administrative facilities, about 40% revealed that the administrative building was in a very poor condition. On the other hand, 19.8% of the respondents were of the opinion that they were in poor condition, only 13.2% revealed that they were in good condition. On retail services (shops and kiosks) around the parking facility, more than half (52.9%) of the respondents rated them to be fair. However, 19% and 7.4% of the respondents revealed that the shops and kiosks for petty traders in the parking facility were in very poor condition, respectively. Although this is not surprising because these shops and kiosks were provided by private individuals as a means of their livelihood.

As represented in Table 4, about three quarter (74.4%) of the respondents stated that the facilities for people with disabilities in the study area were not even available. Furthermore, about 1.7% of the respondents revealed that there were facilities for people with special needs in the study area, while 19.0% were unsure about this. This significant deficiency shows a lack of major features, such as ramps and accessible pathways, making the parking spaces not friendly to people with mobility challenges.

The results from Table 4 also revealed the parking facilities at the study area. A total of 63.1% of the respondents rated the parking facilities as poor or very poor, indicating serious issues with space availability and management. Additionally, 35.3% rated the facilities as very good. This result corroborates the findings of Ahmed (2015), Adekanye and Yahaya (2019) that the lack of organized parking spaces is one of the critical issues in Ilorin's CBD.

Table 4

Condition of Parking Facilities at Ilorin CBD

Facility	Very Good Freq/%	Good Freq/%	Fair Freq/%	Poor Freq/%	Very Poor Freq/%	Total Responses
Waiting Areas	3 / 2.5%	11 / 9.1%	34 / 28.1%	20 / 16.5%	53 / 43.8%	121
Restrooms	2 / 1.7%	7/ 5.0%	26 / 21.0%	31 / 26.1%	55 / 46.2%	121
Ticketing Counters	4 / 3.4%	11 / 9.2%	19 / 16.0%	26 / 21.8%	60 / 49.6%	121
Seating Facilities	4 / 3.3%	8 / 6.7%	22 / 18.3%	26 / 21.7%	61 / 50.0%	121

Facility	Very Good Freq/%	Good Freq/%	Fair Freq/%	Poor Freq/%	Very Poor Freq/%	Total Responses
Administrative Facilities	0 / 0.0%	16 / 13.2%	33 / 27.3%	24 / 19.8%	48 / 39.7%	121
Retail (Shops and Kiosks)	4 / 3.3%	21 / 17.4%	64 / 52.9%	23 / 19.0%	9 / 7.4%	121
Parking Space	0/0.0%	3/1.7%	42 /35.3%	47/38.7%	29/24.4%	121

Traffic Flow and Congestion

Table 5 reveals that almost three-quarters (83.6%) of the respondents in the study area were of the opinion that there was high or very high levels of traffic congestion, especially during the peak hours at the CBD. This was due to the illegal parking facilities and deficiencies in management of the traffic in the area. However, few respondents (15.6%) revealed that the traffic flow was at a moderate level, while only 0.8% rated the congestion as very low.

Table 5

Traffic Congestion During Peak Hours

Level of Congestion	Frequency	Percentage (%)
Very Low	1	0.8%
Low	0	0.0%
Moderate	19	15.6%
High	39	32.0%
Very High	63	51.6%

Traffic Control System

Pertaining to the assessment of traffic control systems at the CBD as revealed in Table 6, only 0.8% of the respondents stated that the traffic signals in the study area were effective. On the other hand, a small portion (13.2%) showed that the traffic control system was moderately effective. Whereas, the majority showed that the traffic control system was slightly effective (10.7%) or not effective (12.4%). The highest percentage, that is, (62.8%) of the respondents revealed that traffic signals were not available at all.

Findings on the effectiveness of signages were slightly better than traffic signals, with 4.2% of the respondents stating these as effective and 9.2%

stating these as moderately effective. However, a significant portion of respondents, that is, (13.3%) and (19.2%) showed that the signages were slightly effective and not effective, respectively. Meanwhile, more than half of the respondents (54.2%) revealed that the signages were not even available in the study area.

Regarding the results on lane markings, only 0.8% of the respondents revealed that these markings were highly effective and 2.5% of the respondents stated these as effective. However, a significant number of respondents, that is, 14.0% and 16.5% revealed that the lane markings were slightly effective and not effective, respectively. Additionally, a majority of respondents (53.7%) indicated that lane markings were not even present in the study area as shown in Table 6.

Table 6

Effectiveness of Traffic Control Systems at Ilorin CBD Parking Facility

Traffic Control System	Highly Effective (5)	Effective (4)	Moderately Effective (3)	Slightly Effective (2)	Not Effective (1)	Not Available (0)	*n*
Traffic Signals	0 (0.0%)	1 (0.8%)	16 (13.2%)	13 (10.7%)	15 (12.4%)	76 (62.8%)	121
Signages	0 (0.0%)	5 (4.2%)	11 (9.2%)	16 (13.3%)	23 (19.2%)	65 (54.2%)	120
Lane Markings	1 (0.8%)	3 (2.5%)	15 (12.4%)	17 (14.0%)	20 (16.5%)	65 (53.7%)	121

Satisfaction and Safety Features

This section presents the results of user satisfaction analysis pertaining to the parking facilities and safety features. The findings revealed poor ratings across most variables as presented in Table 7. Most facilities showed negative SI scores, reflecting widespread dissatisfaction with the availability and condition of those facilities.

According to the results, the rating of parking spaces was lowest with -0.14 SI. This is not surprising as the traffic congestion was common in the study area. Seating facilities with (-0.24) SI followed in the lowest ranking, while restrooms also had the low score of -0.22 SI, reflecting critical deficiencies in provision and maintenance. Ticketing counters, (-0.19), ramps, with an SI of -0.31 revealed that the parking facilities did not provide accessibility to people with disabilities. Waiting areas, with an SI of -0.05, were also rated low. This indicates that they were either inadequate or did

not serve user needs effectively. Due to these reasons, many passengers patronized illegal bus terminals in the study area. Administrative facilities fared marginally better at -0.07 but still reflected user dissatisfaction.

Among the facilities that showed positive rating included retail activities with a positive index of +0.77, likely due to the fact that they were provided and maintained by private individuals. This was followed by pedestrian walkways, though slightly better at +0.30, still indicated unsatisfactory provision for pedestrian safety within the parking facility. The findings are in agreement with Adekanye and Yahaya (2019) and Olawepo et al. (2020) in their studies on deficiencies in transport facilities within Ilorin.

Table 7

Satisfaction Index (SI) for Parking Facilities

S/N	Facility	SWV	Mean Score (X)	Overall Mean ($\bar{X}$)	Satisfaction Index (SI)	Ranking
1	Retail (Shops and Kiosks)	348	2.88	2.11	+0.77	1st
2	Pedestrian Walkways	220	1.85	1.55	+0.30	2nd
3	Administrative Facilities	247	2.04	2.11	-0.07	3rd
4	Waiting Areas	249	2.06	2.11	-0.05	4th
5	Ramps	149	1.24	1.55	-0.31	5th
6	Ticketing Counters	229	1.92	2.11	-0.19	6th
7	Restrooms	225	1.89	2.11	-0.22	7th
8	Seating Facilities	224	1.87	2.11	-0.24	8th
9	Parking Spaces	332	3.04	3.18	-0.14	9th

Conclusion

The study concluded that, despite several mini motor parking facilities operating within study area, only one parking facility at the CBD area is legal as contained in the master plan of the city. Therefore, the current situation of the parking facilities is not in line with SDGs of sustainable cities. The operations of other illegal parking facilities in the area have a

significant impact on the deterioration of parking facilities, traffic rowdiness, and spatial disorder. The findings revealed major infrastructural and operational deficiencies, including poor facility provision, lack of pedestrian safety features, substandard user amenities, and the absence of a planned transport structure. These all contribute to user dissatisfaction, inefficient, non-organized, and inadequate transport services.

Future Recommendations

The study recommended that, for transportation to be sustainable and due to the limited space in the CBD of the city, multi-level terminal facilities should be strategically implemented in other key areas of Ilorin to decentralize transport activities and reduce congestion. Additionally, continuous public awareness and education campaigns should be conducted for both drivers and users on the proper use of transport facilities to enhance orderliness and facility upkeep. The planning of mini bus stations directly linked to the major terminals should be prioritized to ensure efficient passenger transfers and seamless network connectivity. There is a need for total overhaul of the facilities. Moreover, physically-challenged individuals must be provided with ramps and elevators to meet universal access standards. Additionally, effective signages, information points, and traffic control systems should be provided to achieve a sustainable city. Future studies should explore the integration of intelligent bus stops and connected operations that can communicate real-time arrival and departure data across the transport network.

The design should provide covered waiting areas, comfortable spaces integrated into the terminal flow, provision of designated information points, and customer service desks placed at every point of entry and within. This would improve user orientation and operational efficiency across the entire city's parking facilities.

Author Contribution

Oladimeji Samuel Bolaji: conceptualization, investigation, writing – original draft. **Sherifudeen Saminu Olatunji:** data curation, investigation; resources. **Aishat Tayo Abubakar-Kamar:** methodology, writing – review & editing. **Zulkarnain Ibrahim Adedo:** formal analysis, validation, investigation.

Conflict of Interest

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

Data supporting the findings of this study will be made available by the corresponding author upon request.

Funding Details

No funding has been received for this research.

Generative AI Disclosure Statement

The authors did not use any type of generative artificial intelligence software for this research.

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