

Appraisal of Intra-Urban Road Furniture in Ilorin, Nigeria

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Abstract

Road furniture addresses several challenges associated with road transportation. On this premise, this paper appraises the intra-urban road furniture in Ilorin, Nigeria, aimed at taking the inventory, categorizing the available, and analysing the conditions and impacts of road furniture on the residents. The coordinates of the location for road furniture were determined with the aid of a handheld Global Positioning System (GPS), while a multistage sampling procedure was adopted for the distribution of 369 copies of a structured questionnaire among the residents. Personal enumeration and evaluation were used in evaluating existing road infrastructure while the Impact of Road Furniture Index (IRFI) was measured with the aid of a Likert scale of measurement and was developed to evaluate the impact on the residents. Maps, frequency and tables were used to illustrate and summarise the results of descriptive analysis. One thousand, one hundred and ninety-four (1,194) units of different road furniture were identified. The result revealed that the provision of road furniture within the study area is very inadequate and poorly maintained due to the high cost of construction, maintenance, and topography. Majority are in a state of dilapidation and not functioning effectively due to vandalism, inadequate maintenance, climatic conditions, and financial constraints. The study suggested the need for provision of adequate road furniture, repairs of dilapidated and total replacement of damaged ones for effective traffic control to enrich the sustainable development of urban roads as well as to ensure the safety of all the road users within Ilorin city.

Keywords

Intra-Urban, Road furniture, Spatial distribution, Transportation

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1. Background of the Study

Transportation is the system that is concerned with the circulation or movement of goods, people, and services with consideration for safety, comfort, and convenience (Rodrigue, 2020). It is a crucial part of the economic activities of all nations, which centres on increasing human satisfaction by changing the geographical position of goods, people, and services. There are several modes of transportation, and these include air, rail, water, and road (Ibrahim-Adedeji, 2011). Road transport is the most commonly used because it is readily available to every category of people, irrespective of their socio-economic status and cultural background (Poiani & Stead, 2015). Owing to the importance of the road transportation system and its level of efficiency, this transportation system is usually provided with road furniture such as road pavement, culverts, bus stop stands, streetlights, road signs and symbols, flyovers/bridges, and motor parks. This furniture is provided to ease the use of the road by commuters and for efficient monitoring of activities on this mode of transportation.

Road furniture refers to all public utilities related to the use of the road in various ways, directly or indirectly, that enhance the better usage of the road as a space. They are infrastructure built in different forms to ensure maximal functionality of road transportation in urban life, and play an essential role in both passenger and freight travel. Therefore, for any transportation system to function effectively, there must be appropriate facilities, services, maintenance, and traffic management measures (Usman, 2014). These facilities include the road network, footpaths, bridges, and road furniture. The facilities of the road transportation system complement the city system and are an engine on which the city functions. Roads are not only meant for movement but also for a living environment that protects and advances human interaction, with the aid of proper road furniture planning and designs (Poiani & Stead, 2015). Basically, road furniture comprises of various items or structures placed in, on, over, or around the road for the security and convenience of road users for different purposes such as traffic control, lighting, information, relaxation, waiting, waste control, and aesthetics.

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Others include traffic barriers, traffic lights, streetlights, billboards, road signals, post boxes, phone booths, bus stops, benches, toilets, waste bins, drinking water stands, fountains, watering troughs, and plants. They are to coordinate and ensure the free flow of traffic at intersections and along other traffic corridors. Social benefits of road furniture, according to Ivanová and Masárová (2013), include reducing traffic congestion and enabling individuals to reach places where their needs can be satisfied. Besides, road furniture can enhance the good landscape, image ability, and identity of a place.

Developed countries such as Germany, China, the United Kingdom, the United States, and Denmark are served with adequate road furniture, and they are randomly distributed along their major road corridors (Anciaes, 2022; Pérez-Acebo et al., 2022; Tomaney, 2017). They are served with road furniture like road signs and symbols, streetlight, street benches, pedestrian crossings/bridges, good road pavements, bus stops, and bus stands. However, in the developing world, such as Asian countries like India, Afghanistan, and African countries like Egypt, South Africa, Algeria, Morocco, and Ghana, with particular reference to Nigeria, the reverse is the case on the availability and spatial distribution of road furniture (Wang et al., 2020). Nigerian cities are characterised by inadequate and poorly maintained road furniture, which has rendered the current ones dilapidated, requiring major repairs and total replacement (Adedotun et al., 2017; Samuel & Frances, 2018; Usman et al., 2020). In Slovakia, roads were built, expanded, and upgraded depending on the political and economic situation in the country. The distribution of road furniture is also concentrated in major cities where it serves more of political importance, and not randomly distributed (Ivanová & Masárová, 2013; Pojani & Stead, 2015).. As noted by Adediran et al. (2016), the condition of roads and their furniture in most African cities, particularly in Nigeria, is pathetic. Inevitably, the neglect of roads and provision of road furniture multiplies the cost of repairs at the end of every rainy season and sharply increases the cost of vehicle maintenance.

Lack of road furniture and its inadequacy contributed to the exacerbation of many road transportation problems, such as road accidents, traffic congestion, and delays, as well as bad roads, high cost, shortage of fuel, and poor vehicle maintenance (Ivanová & Masárová, 2013). In addition, inadequate road furniture is a significant inhibitor to urbanization and commercial activities.

It poses a high level of difficulty to the expansion of the private sector, road facilities, and many transport activities, such as the movement of goods and services across various geographical locations. Similarly, damaged road furniture affects the safety of road users and the environment. Damaged guardrails can create a nuisance on the road, and defective road signals can lead to fatal road accidents. Without the necessary road furniture, the road transportation system might not function effectively, which might have an effect on the overall functionality of the city structure. It is on this premise, this paper appraises the intra-urban road furniture in Ilorin with a view to taking inventory and categorizing all the road furniture, identifying the available road furniture, analysing their conditions, and impacts on the residents. This will help to suggest sustainable measures towards their adequate provision and safety of all the road users and residents.

2 Review of the relevant literature

2.1 Road Transportation

Transportation is arguably one of the most important infrastructural facilities in a city (Nikitas et al., 2017). Without it, the city system cannot function as it deals with the movement of people, goods, freight, and services. However, there are several modes of transportation, which includes air; rail; road; water; cable; pipeline; and space. Road transportation is the movement of goods/freight, services, and personnel from one place to another on roads (Okigbo, 2012). In Nigeria, road transportation has grown tremendously with increasing population and economic activities, with majority of urban dwellers heavily depending on road as the mode of transportation for the satisfaction of their basic social and economic needs (Atoyebi et al., 2015). It is the most dominant mode of transportation in the country that accommodates both vehicular and pedestrian traffic, and it compliments other mode of transportation such as rail, water, and air due to its level of flexibility. The major advantage of road transportation is that it can enable door-to-door delivery of goods and materials and can provide a very cost-effective means of cartage, loading, and unloading (Islam et al., 2016). Improved transportation system allows more trade and a greater spread of people, while the economic growth of cities has always been dependent on increasing the capacity and rationality of the transportation system (Afolabi et al., 2016).

The nature of road transportation depends on the degree of development of the local road infrastructure, the distance, and the price for the transportation services (Afolabi et al., 2016). The means of road transportation that are used locally and internationally includes; vehicles and, animals transport. The vehicles transport includes wagons, automobiles, bicycles, buses, trucks, and tricycle. In some countries, particularly the rural settlement of third world countries, road transportation is by horse-drawn carriages, donkey carts or other non-motorized mode (Anciaes, 2022). While these modes of road transportation are becoming obsolete, they are still used in the study area (Ilorin) and other adjoining villages and towns. It is therefore important for effective management and maintenance as well as the provision of the needed road furniture due to its high level of importance in the transportation system. The need for the provision and maintenance of this road furniture cannot be over-emphasized. This underscores the need for their spatial analysis.

2.2 Road furniture

Road furniture is infrastructure built in different forms to ensure maximal functionality of road transportation in urban life and plays an essential role in both passengers and freight travels. Therefore, for any transportation system to function effectively, there must exist the appropriate facilities, services, maintenance, and traffic management measures. These facilities include the road network, footpaths, bridges, and road furniture (Abdulkadir, 2014). The facilities of road transportation system complement the city system and are the engine on which the city functions (Ogunbodede, 2008). Road furniture is surfaced, near to a road but separated from it, which has an entrance and exit allowing certain specific necessities to be satisfied (Samuel & Frances, 2018). Road furniture consists of the fixed installations of road hardware such as terminals, bus stations, road furniture, trucking terminals, traffic control systems, and refuelling depots such as fuel, and gas station. The provision and planning of the road furniture as an integral aspect of the road transportation system is important for an effective and efficient road transportation system. Without the needed road furniture, the road transportation system might not function effectively, which might have an effect on the overall functionality of the city structure. It was against this background that this study analyses the

spatial distribution of road furniture in Ilorin with a view to identifying the essential features of the road furniture and proffering sustainable measures to the identified challenges.

2.3 Availability and Spatial Distribution of Road furniture

The characteristics and functions of transportation systems determine the quality of urban spaces. The provision of adequate road transport facilities compliments this to achieve a sustainable city devoid of transportation problems. In addition, the functional and symbolic roles of road furniture may also set standards and expectations of quality for the development of an area. Availability of road furniture and their spatial distribution differ in cities across the world. In the developed countries such as United States, United Kingdom, Germany, Japan and China, roads are serviced with adequate road furniture which makes mobility of road users easier (Currie & Walker, 2011; Pérez-Acebo et al., 2022; Tomaney, 2017). In the United States, the available road furniture includes toll plaza/stations, bridges, underpass, terminals, traffic control systems, and electrical systems (Currie & Walker, 2011). These facilities are evenly distributed along major road corridors in the country (Longobardi et al., 2016; Volker et al., 2013). In the United Kingdom according to Geurs et al. (2009), the available road furniture includes pedestrian crossings, bollards, street lights, traffic control systems, road signs and symbols, phone booth, terminals, bus stands, toll plaza, car park, bicycle tracks, and bridges. Their study further asserted that these facilities are evenly distributed among the rural and urban roads of the countries. The available road furniture in Italy includes service areas, petrol stations, garages, café/restaurants, hotel, emergency phone booths, toilets; cars wash locations, traffic control systems, and trash bins concentrated along major highways, and motorways (Pérez-Acebo et al., 2022). In Portugal, the available road furniture includes parking areas, toilets, emergency phones shops, relaxation zones, panels with tourist information, restaurants, children's playing grounds, traffic control systems, road signage, lightning and symbols (Anciaes, 2022).

In Slovakia, roads were built, expanded, and upgraded depending on the political and economic situation in the country and were serviced by road furniture such as electrical systems, street benches, bus stands/terminals, signage, and markings which

are not spatially distributed among the cities of the country (Edsall et al., 2000; Ivanova & Masarova, 2013). The road furniture are nucleated in major cities where they serve more economic and political importance. However, in the developing countries such as India, Afghanistan, Armenia, and the majority of African countries, the reverse is the case regarding the availability and spatial distribution of road furniture (Wang et al., 2020). In India, the available road furniture includes flyovers, signalized junctions, subways, pedestrian bridges, street lights, traffic lights, road signs, and symbols (Ghosh & Kansal, 2014). In Africa, studies on road furniture are few, while, many of them do not touch on issues pertaining to their availability and spatial distribution. In most of the African countries such as Nigeria, Egypt, South Africa, Algeria, Morocco, and Ghana, the available road furniture includes flyovers, parking areas, petrol stations, street lights, traffic lights, road signs, and symbols (Pojani & Stead, 2015). The majority of the road furniture, such as the right of way in Nigeria is unpaved, narrow, circuitously aligned, and with narrow bridges, they are full of pot holes, and many of them remain passable only during the dry season and are devoid of their facilities (Samuel & Frances, 2018). The inadequate road furniture imposes a great constraint on mobility and people's access to infrastructural facilities such as markets, hospitals and schools.

2.4 Condition of Road furniture

Ancient and Medieval Planners provided extensive road furniture within their cities because the primary transportation mode available then was walking (Ghosh & Kansal, 2014). These facilities are usually pedestrian facilities due to the mode of transport available during these periods. The facilities are provided for pedestrians' comfort; however, the advent of motor vehicles, increasing volumes, and speeds of road traffic, has culminated in the provision of road furniture along traffic corridors. The inadequate and poor maintenance of these facilities has led to their dwindling condition, but their condition is better in the developed countries due to their continuing maintenance. The condition of road furniture in Slovakia is good, and the damaged ones are repaired or replaced immediately (Ivanova & Masarova, 2013). In the United States, the condition of the available road furniture is neat, clean, and good (Currie & Walker, 2011) whereas, the road furniture is inadequate and in a state of

dilapidation with major repair or replacement in majority of African countries (Adedokun, 2013). Their condition is highly pathetic because of their poor maintenance (Adediran et al., 2016).

2.5 Impacts of Road furniture

The lack of provision of road furniture and the neglect on the maintenance of the available ones increases the cost of repairs and vehicle maintenance (Ahmed, 2013). These have resulted in the exacerbation of many transportation problems such as road accidents, traffic congestions and delays, bad roads, and poor vehicle maintenance (Afolabi & Gbadamosi, 2017; Ukpata & Etika, 2012). The main problems associated with maintenance practices include inadequate finance, bad management, and poor design. Lack of road furniture, and good road pavement are the major causes of the transportation problems (Ukpata & Etika, 2012). Similarly, Ghosh and Kansal (2014) established that, travel delays remains to be a problem due to the poor condition of roads and inadequacy of road furniture.

Ivanova and Masarova (2013) observed that road furniture and development are scarce due to financial constraints and poor maintenance. Similarly, Adedokun (2013) noted that the poor road situation resulted from inadequacy of road furniture. However, despite the problems associated with road furniture, an empirical investigation to appraise the intra-urban road furniture in Ilorin, is yet to be carried out. It is on this basis, this study is carried out with a view to identifying the essential features, categorising, and examining the condition as well as impacts of road furniture on the residents in order to proffer sustainable measures to the identified problems.

3. Materials and Methods

This study appraises the intra-urban road furniture within the core, intermediate, and periphery areas of Ilorin. It took the inventory and categorised the road furniture, identified the available road furniture, their conditions, and the impact on the residents. The road furniture comprises of those provided by the government and non-governmental organisations. These include motor parks, culverts, drainage, bridges, road signs, traffic lights and signals, sidewalk, streetlight, road verge, and Closed-Circuit Television (CCTV) cameras. Ilorin, the capital city of Kwara State, is located on a Latitude of $8^{\circ} 24' - 8^{\circ} 36'$ North of the Equator and Longitude $4^{\circ} 10' - 4^{\circ} 36'$ East of the Greenwich Meridian, as shown in

Figure 1. The city lies on the plain of the South-Western part of Nigeria and is politically categorised as a North Central city in the country. The city lies along the Lagos-Kaduna highway, and it is about

306km from Lagos, 600km from Kaduna, and about 500km from Abuja, the Federal Capital City of Nigeria.

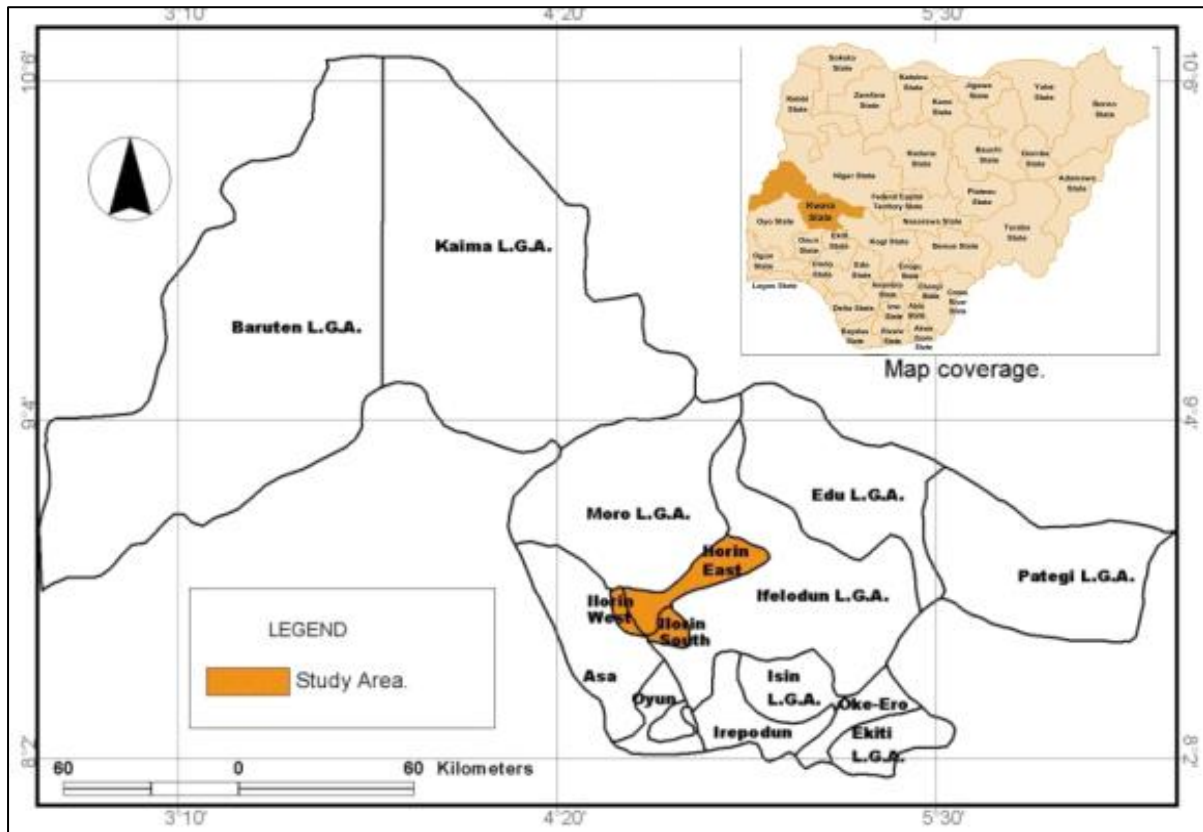


Figure 1: Ilorin within the Context of Kwara State
Source: Kwara State Ministry of Lands and Housing, 2024

At present, the city of Ilorin cuts across three (3) Local Government Areas, namely Ilorin West, Ilorin East, and Ilorin South Local Government Areas. The population of Ilorin is 766,000 according to the National Population Commission (NPC, 2011), with an annual growth rate of 2.84%. Although Ilorin was developed as an administrative centre, both economic and social activities have greatly influenced its growth in recent times. Traditionally, the indigenes primarily engage in farming, pottery making, and weaving. Recently, a greater percentage of people engage in trading activities and are self-employed, like mechanics, carpenters, and artisans.

The sampling frame for the study is the population of the three local government areas, made up of Ilorin city and these include Ilorin West, Ilorin South, and Ilorin East Local Government Areas. The entire city of Ilorin, was categorised into three strata, namely core, intermediate, and periphery zones. The population of the three local

government areas was projected to 2023. To determine the sample size for the study, the formula of $S = X^2NP(1-P) / d^2(N-1) + X^2P(1-P)$ developed by Krejcie and Morgan (1970) and proposed by Eichenberger et al. (2011) was adopted. Where S represents the required sample size, X^2 indicates the table value of the Chi-square for 1 degree of freedom at the desired 0.95 confidence level, which is 3.841 (1.96 x 1.96), and N designates population size. Furthermore, P designates population proportion (assumed as 50% that is 0.50, since this would provide the maximum sample size) and d is the degree of accuracy expressed as a proportion, which is 5% that is 0.05. Some other scholars (Akinyode, 2017; Uakarn et al., 2021) adopted this formula. The sample size was calculated to be 369.

Enumeration of road furniture was carried out using a handheld GPS to determine the coordinates of their locations and direct observation to preliminarily assess their condition, while a multistage sampling technique was employed in

questionnaire administration. The first stage was the enumeration of localities within Ilorin city. The second stage involved the use of a stratified sampling technique to categorise the localities into three strata (i.e., spatial structure), and these are core, intermediate, and periphery areas. The third stage involved the use of a random sampling technique to administer a questionnaire in each of the three localities among the 369 residents. The collected data were managed with the aid of the statistical package for the social sciences (SPSS) version 22. In addition, the Impact of Road Furniture Index (IRFI) was developed to evaluate the impact of road furniture on residents in core, intermediate, and periphery areas. The index was measured using a Likert scale of measurement of Very High Impact (5); High Impact (4); Neutral (3); Low Impact (2); and No Impact at All (1). The index was obtained by dividing the Overall Sum of Weighted value (OSW) by the Number of Respondents or Sum of Weighting. The tables, frequency, and charts were used for illustration.

4 Results and Discussion of Findings

4.1. Inventory and Categories of Road Furniture in Ilorin

Table 1 summarises road furniture inventory, revealing a total number of one thousand, one hundred and ninety-four (1,194) units of different road furniture across Ilorin. The intermediate zone had the highest (37.4%) road furniture, followed closely by the core zone with 36.4% while the periphery zone had the least (26.2%) road furniture, as shown in Table 1 and Figure 2. This implies that the periphery zone was not adequately provided with road furniture. This is unlike developed nation where road furniture is adequately and randomly provided (Anciaes, 2022; Pérez-Acebo et al., 2022; Tomaney, 2017).

Among the road furniture provided within the city, street light is the most available (81.6%), with about 40% located in the core zone, 37.1% in the intermediate and 22.9% in the periphery zone. With the provision of streetlight, there is a sense of safety for road users at night. In contrast, a separated pedestrian walkway was not available in any of the zones, while an underpass was very scarce (0.08%), with only one located in the intermediate zone. High cost of construction, maintenance, and topography of the area, were most likely responsible for the low provision of underpasses in the study area. The finding is in line with that of Wang et al. (2020) who discovered that road furniture are not adequately and spatially distributed in the developing world.

Table 1: Inventory of Road Furniture in Ilorin

| Road Furniture | Spatial Structure | | | Total | % |
|------------------------------|-------------------|----------------------------|-----------|-------|------|
| | Core | Inter-mediate | Periphery | | |
| Flyovers/bridges | 1 | 2 | NILL | 3 | 0.3 |
| Street lights | 390 | 361 | 223 | 974 | 81.6 |
| Culverts | 3 | 8 | 4 | 15 | 1.3 |
| Bus Stop Stand | 2 | 3 | NIL | 5 | 0.4 |
| Parking Area | 2 | 4 | 2 | 8 | 0.7 |
| Motor Parks | 9 | 5 | 6 | 20 | 1.7 |
| Separated pedestrian walkway | NIL | Along the Traffic Corridor | | 0 | 0 |
| Road Signs and Symbols | 21 | 55 | 74 | 150 | 12.6 |
| Underpass | NIL | 1 | NILL | 1 | 0.08 |
| Traffic Light | 5 | 4 | 3 | 12 | 1 |
| Pedestrian crossing | 2 | 3 | 1 | 6 | 0.5 |
| Total | 435 | 446 | 313 | 1,194 | 100 |
| % | 36.4% | 37.4% | 26.2% | | |

Source: Field Survey, 2024

4.2 Condition of Road Furniture

Before examining the condition of the road furniture, the study tried to appraise the providers of various furniture, since this might influence the quality and current condition of the provided furniture. Table 2 reveals that a larger proportion (85.1%) of the road furniture was provided by the government, while the remaining (14.9%) was provided by Community-Based Organizations (CBOs) (9.8%) and Non-Governmental Organisations (5.1%). This result was similar across the study area. However, at the intermediate zone, no road furniture was provided by non-governmental organizations or community-based organizations. This implies that only the government provides the road furniture at the intermediate zone. This is not far-fetched as this is the primary practice within the Nigerian context where government (i.e., Federal, State, and Local) is largely responsible for the provision of roads and the ancillary road furniture. In Nigeria, the responsibility for road construction and maintenance are shared among the three tiers of government - federal, state, and local, with each handling roads within its respective jurisdiction.

The federal government is saddled with the responsibility of constructing federal roads and the provision of road furniture such as streetlights, road signs and symbols, and traffic lights. This is the same for both the state and local government. Road furniture in Ilorin was mainly provided and maintained by the federal government. This led to the inadequate distribution and poorly maintained

road furniture in the study area, particularly in the core area. However, in some cases, where any level of government does not construct roads, community-based organisations and non-governmental organisations, such as religious organisations, provide road furniture such as bus stop stands and streetlights.

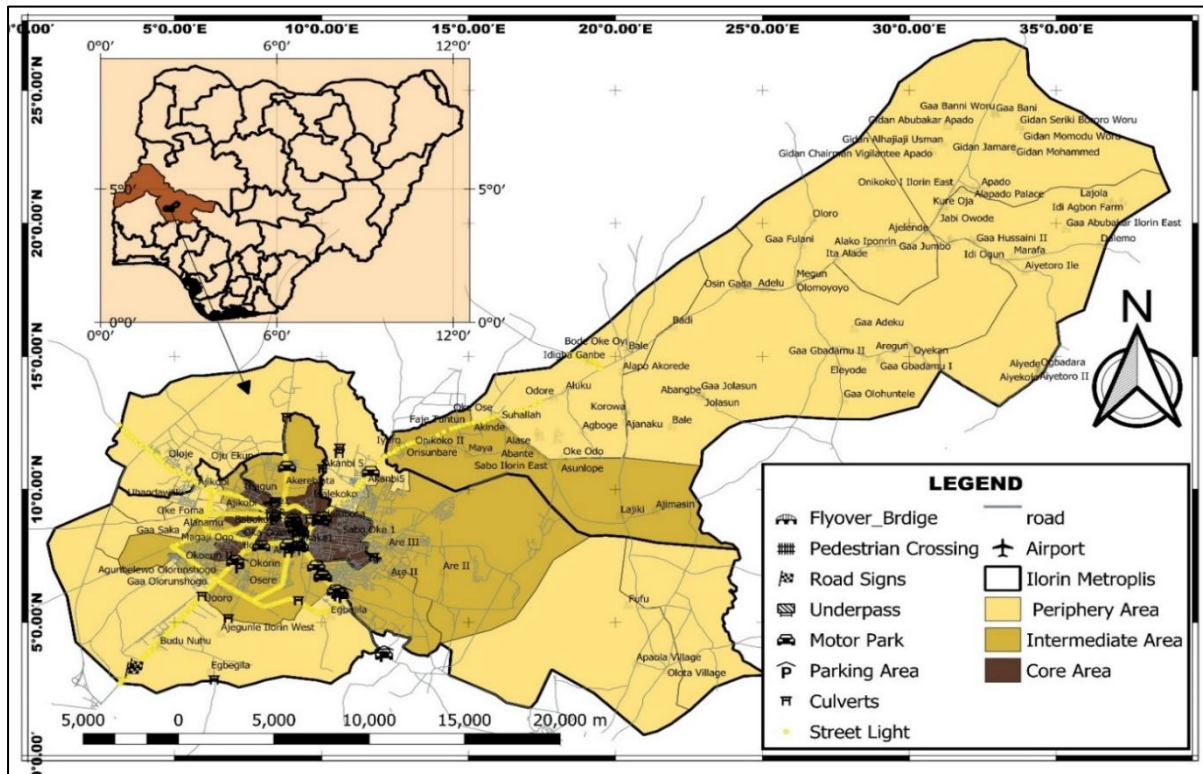


Figure 2: Spatial Distribution of Road Furniture in Ilorin
 Source: Field Survey, 2024

Table 2: Providers of Road Furniture in Ilorin

| Agency | Frequency % | Spatial Structure | | | Total |
|----------------|----------------|-------------------|--------------|-----------|------------|
| | | Core | Intermediate | Periphery | |
| Government | Frequency. | 125 | 102 | 87 | 314 |
| | % | 33.90 | 27.60 | 23.60 | |
| Non-Government | Frequency | 13 | 0 | 6 | 19 |
| | % | 3.50 | 0.00 | 1.60 | |
| CBOs | Frequency | 30 | 0 | 6 | 36 |
| | % | 8.10 | 0.00 | 1.60 | |
| Total | Frequency | 168 | 102 | 99 | 369 |
| | % | 45.50 | 27.60 | 26.80 | |

Source: Field Survey, 2024

This is usually evident during the periods of political campaigns, religious festivals, and cultural celebrations. Physical enumeration and evaluation of the existing road furniture in the study area were mostly in fair condition, with some areas of the city respectively had ‘good’, and ‘poor’ road furniture. The road furniture in the city is observed to be generally inadequate and poorly maintained to the extent that the majority of the furniture is in a state

of disrepair and needs replacement. For instance, some of the road pavements at Agba Dam Housing Estate, CBN Lodge way, Olorunsogo to Biada, Gaa-Akanbi to Agbabiaka, Ojomu close Basin, Niger Basin to Zango, Fate-Tanke, Awolowo road, Pipeline, Tanke to University of Ilorin, Minaret to Mark, Adewole-Mandate, and Okefoma roads were in bad condition as shown in Plates 1 and 2.



Plate 1: Poor Condition of Road Pavement at Kilanko-Offa Garage Road, Ilorin
Source: Field Survey, 2024



Plate 2: Poor Condition of Road Pavement at GRA, Ilorin
Source: Field Survey, 2024

These road pavements need major repair. The condition of road furniture, such as traffic lights, is in good condition (Plate 3). Although different factors contribute to the condition of road furniture in each of the zones of the study area, however, interaction with a few residents reveals that vandalism, inadequate maintenance, poor transportation policies, climatic conditions, and

financial constraints contribute majorly to the condition of road furniture. The observed condition of the road furniture in the city area brings to mind the negative consequences of poor road furniture documented in the literature (Samuel & Frances, 2018; Usman, 2014) and these include road accidents, traffic congestion, and delays (Ivanová & Masárová, 2013).



Plate 3: Traffic Light and Solar-powered Street Light at Challenge, Ahmadu Bello Way, Ilorin
Source: Field Survey, 2024

4.3 Impacts of Road Furniture on the Residents

The Impact of Road Furniture Index (IRFI) was used to determine the impact of road furniture on residents. The mean index value that is above the mean IRFI value has an impact on residents, while those below the mean IRFI value have little or no impact on residents. From the analysis presented in Table 3, the result reveals that road furniture has negative impacts on residents in the core, periphery, and intermediate areas. These negative impacts were road accident (IRFI = 3.86), environmental nuisance (IRFI = 3.41), traffic congestion (IRFI = 3.27), increase emission of noise and air pollution (IRFI = 3.20), and increase cost of vehicle maintenance (IRFI = 3.12).

However, there was a spatial variation in the impact of road furniture among the core, intermediate, and periphery areas. While the core and the periphery have similarities in the impact of road furniture on residents, the intermediate has both positive and negative impacts of road furniture on residents. As evidenced from Table 3, the mean IRFI for the core area was 2.85. The negative impact of road furniture on residents in the core area included road accidents (IRFI = 3.56); increased cost of vehicle maintenance (IRFI = 3.23); increased emission of noise and air pollution (IRFI = 3.18); contribution to traffic congestion (IRFI = 3.15); contribution to nuisance to the community (IRFI = 3.05); and increased transport cost (IRFI = 2.97).

The positive impacts were a reduction of crime incidence (IRFI = 3.27) and a reduction in the cost of vehicle maintenance (IRFI = 3.14). Nevertheless, road furniture did not have an impact on land value (IRFI = 1.77); economic activity (IRFI = 2.40); resident mobility (IRFI = 2.44); aesthetics (IRFI = 2.44); traffic congestion (IRFI = 2.45); road maintenance (IRFI = 2.74); reduction of road accidents (IRFI = 2.80); and reduction of noise and air pollution (IRFI = 2.80). This implies that the impact of road furniture in the core area of Ilorin is majorly negative. This resulted from the fact that the study had earlier revealed that the majority of the road furniture, like traffic lights and streetlights, as well as culverts, road signs, and symbols in the core area, were either in bad or fair condition with little or no form of maintenance. The majority of this furniture was not functioning effectively. This implies that the road furniture was not contributing positively in the core area of the city.

As shown in Table 3, the mean IRFI for the intermediate area was 2.97. The negative impacts of road furniture were their contribution to the road accident (IRFI = 4.14), constituted nuisance (IRFI = 3.66), and caused traffic congestion (IRFI = 3.46). The positive impacts included reduction of noise and air pollution (IRFI = 3.63), reduction in travel time (IRFI = 3.60), reduction in cost of vehicle maintenance (IRFI = 3.47), boosting of economic activity (IRFI = 3.09), and reducing traffic

congestion (IRFI = 3.01). However, road furniture had little or no major impact on the improvement of aesthetics (IRFI = 1.81), improving resident mobility (IRFI = 1.99); land values (IRFI = 2.17); increasing transport cost (IRFI = 2.35); reducing road accidents (IRFI = 2.54), not reducing crime incidence (IRFI = 2.66), and increasing the cost of vehicle maintenance (IRFI = 2.95). This implies that, unlike the core area where the majority of the impact of road furniture was negative, the impact of road furniture in the intermediate area consisted of both positive and negative impacts.

The positive impact of road furniture on residents in the intermediate zone of Ilorin included a reduction in noise and air pollution, a reduction the travel time, a reduction in the cost of vehicle maintenance, a boost in economic activity, and a reduction in traffic congestion. On the other hand,

the negative impacts were their contribution to road accidents, constituting a nuisance and traffic congestion. The positive impact on residents in this zone resulted from the fact that there was more functional road furniture, such as flyovers/bridges, underpasses, streetlights, traffic lights, and road pavements that were in good condition. As a result, they contributed positively to residents within the zone. Nevertheless, road furniture such as underpasses, damaged road pavement, non-functional traffic and streetlights, potholes, and damaged culverts at some locations like Akanbi, Ajikobi, and Ogidi contributed negatively to the residents. The negative impacts included traffic congestion, environmental nuisance, and a reduction in resident mobility, as well as an increase in transport costs and road accidents

Table 3: Impact of Road Furniture on Residents in Ilorin

| S/N | Impacts | Spatial Structure | | | IRFI |
|------------------------------------|--|-------------------|--------------|-----------|-------|
| | | Core | Intermediate | Periphery | |
| 1 | Increase land value | 1.77 | 2.17 | 1.99 | 1.98 |
| 2 | Improve resident mobility | 2.44 | 1.99 | 2.03 | 2.15 |
| 3 | Improves aesthetics | 2.72 | 1.81 | 2.55 | 2.36 |
| 4 | Reduce road accidents | 2.80 | 2.54 | 2.16 | 2.50 |
| 5 | Reduce traffic congestion | 2.45 | 3.01 | 2.19 | 2.55 |
| 6 | Improve road maintenance | 2.74 | 2.96 | 2.41 | 2.70 |
| 7 | Boost economic activity | 2.40 | 3.09 | 2.82 | 2.77 |
| 8 | Increase transport cost | 2.97 | 2.35 | 3.11 | 2.81 |
| 9 | Reduce travel time | 2.76 | 3.60 | 2.27 | 2.88 |
| 10 | Reduce noise and air pollution | 2.80 | 3.63 | 2.45 | 2.96 |
| 11 | Reduces crime incidence | 3.27 | 2.66 | 3.29 | 3.07 |
| 12 | Increase cost of vehicle maintenance | 3.23 | 2.95 | 3.18 | 3.12 |
| 13 | Increase emission of noise and air pollution | 3.18 | 2.98 | 3.43 | 3.20 |
| 14 | Traffic congestion | 3.15 | 3.46 | 3.21 | 3.27 |
| 15 | Reduce cost of vehicle maintenance | 3.14 | 3.47 | 3.44 | 3.35 |
| 16 | Environmental nuisance | 3.05 | 3.66 | 3.51 | 3.41 |
| 17 | Contribute to road accidents | 3.56 | 4.14 | 3.87 | 3.86 |
| Total | | 48.43 | 50.47 | 47.91 | 48.94 |
| <i>Mean (\bar{x})</i> | | 2.85 | 2.97 | 2.82 | 2.88 |

Source: Field Survey, 2024

NOTE: IRFI – Impact of Road Furniture Index

$$IRFI = \frac{\text{Sum of Waiting (SR)}}{\text{Frequency}} \bar{x} = \frac{\sum IRFI}{17}$$

Table 3 reveals the mean IRFI for the periphery area as 2.82. The negative impact of the road on residents in this zone included road accidents (IRFI = 3.87), environmental nuisance (IRFI = 3.51), increased emissions of noise and air pollution (IRFI = 3.43), traffic congestion (IRFI = 3.21), increased cost of vehicle maintenance (IRFI = 3.18), and increased transport cost (IRFI = 3.11). The positive impacts were a reduction cost of vehicle maintenance (IRFI = 3.44) and a reduction in crime

incidence (IRFI = 3.29). The negative impact is boosting the economic activity (IRFI = 2.82). Conversely, road furniture had no impact on land value (IRFI = 1.99), resident mobility (IRFI = 2.03), reduction in road accidents (IRFI = 2.16), reduction in traffic congestion (IRFI = 2.19), reduction in travel time (IRFI = 2.27), improving road maintenance (IRFI = 2.41), reducing noise and air pollution (IRFI = 2.45), and improvement of aesthetics (IRFI = 2.55).

This presupposes that the major impacts of road furniture on residents in the periphery area were negative. The negative impacts were their contribution to road accidents, contribution to environmental nuisance, increasing the cost of vehicle maintenance, increasing the emission of noise and air pollution, traffic congestion, and increasing the transport cost. This is similar to their impact on residents in the core area. This implies that the little positive impacts of road furniture on residents in the periphery area resulted from the good or fair condition of the road furniture within the zone.

5. Conclusion and Policy Implications

The study reveals that there was inadequate provision of road furniture in Ilorin unlike some developed countries. Besides, they are poorly maintained to the extent that the majority of them were in a state of dilapidation that needs replacement. The factors that contributed to this pattern of distribution are majorly on the fact that the road furniture in Ilorin was mainly provided and maintained by the government. The inadequate distribution and poor condition of the road furniture, particularly in the core area of the city, in most cases, were based on politics. Lack of road furniture and their inadequacy in some areas of the city contributed to many problems, such as road accidents, traffic congestion, and delays.

Spatial distribution of road furniture, therefore, becomes an obvious path on which urban planners must embark for sustainable development of urban roads, as well as enabling safety for both human and vehicle within the study area. The quality and spatial distribution of road furniture present in an area determine the future development of such an area. It requires proper design and distribution for sustainable development and human existence. Appropriate road furniture should be properly designed, adequately provided, and well-maintained for the effective functioning of the transportation

system. This will reduce traffic along the corridor, reduce travel delay, and enhance sustainable development. The form of road furniture and its spatial arrangement must ensure visibility, sightlines, lighting, and accessibility with necessary considerations for women, children, age and the disabled. Roads that are prone to risks and unsafe conditions need to be given the right furniture. The provision and planning of the road furniture as an integral aspect of the road transportation system is important for an effective and efficient road transportation system.

Community-based organizations (CBOs), faith-based organizations, and other benevolent individuals can be encouraged in the provision and maintenance of road furniture across the core, intermediate, and periphery areas. This will improve the provision and maintenance of road furniture in the study area, relieve much of the burden from the government, and enhance the random distribution of the road furniture within the city. There is a need for the government, in collaboration with community organizations to establish a proactive maintenance and repair schedule for road furniture to address wear and tear promptly. Well-maintained road furniture ensures the longevity of facilities, reduces safety hazards, and enhances the overall users' experience. The installation of smart traffic lights that use real-time data to optimize signal timings based on traffic conditions will effectively reduce traffic congestion, minimise waiting times, and enhance overall traffic efficiency. This paper appraised the intra-urban road furniture in Ilorin with a view to taking inventory and categorizing all the road furniture. It identified the available road furniture, analyse their conditions, and impacts on the residents. Suggestions were made for their adequate provision and safety of all the road users and residents. However, further studies on intra-urban road furniture can dwell on the functionality, effectiveness and maintenance of the road future.

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