Eco-mobility Approach for a Sustainable Neighbourhood Road Infrastructure within a Mixed-use Community: The Searchlight on Festac Town, Amuwo Odofin, Lagos

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Abstract

In major cities in Nigeria, the current modes of transportation are generally chaotic and unsustainable. We therefore have to rethink how to adopt the seamless integration of sustainable transportation alternatives. Poor maintenance is one of the factors adduced to be responsible for the current deteriorated state of mobility corridors and the existing road infrastructure. Overpopulation and increasing socio-economic activities of Festac Town exerts undue pressure on the infrastructure, thereby accelerating deterioration. The study is underpinned by Eco-mobility principles. This study is aimed at assessing the eco-mobility approach for a sustainable neighbourhood road infrastructure within a mixed-use community. Developing a sustainable mobility strategies that brings the neighborhood streets back to the people is an objective which this study pursue. A multi-staged sampling technique was adopted for the study. On-site qualitative approach was majorly employed through the interviews conducted assessing the major mobility corridors and streets from 1st to 7th avenues. A sample frame of 15 major roads with outdoor open spaces along the selected roads all within the selected avenues and major street roads. The instruments for data collection were oral interviews and personal/physical observations. The activity profiles, locational data and geospatial coordinates of each avenue were imported into ArcGIS (Version 10.5, ESRI) for various land-use analysis. The sustainable eco-mobility strategies will reduce transportation impacts, create civilized streets that meets environmental design standards of commuter’s safety and comfort that are compatible with the unique urban structure and culture of metropolitan Lagos. This study evaluated the issues relating to sustainable eco-mobility, the connection between climate change and transportation systems, the impact of urban mobility on public health and wellbeing. It further outlined policy frameworks to be considered in order to have a sustainable neighbourhood streets mobility networks within a mixed-use community.

Keywords: climate change, environmental design, mobility corridor, mixed-use community, sustainable eco-mobility.

1. Introduction

Sustainable transport came into use as it is used to describe modes of transport and systems of transport planning, which are consistent with wider concerns of sustainability [1]. It is a mobility system as one that allows the basic access and development needs of individuals, companies and the society to be met safely and in a manner consistent with the people and environmental health and public wellbeing [2]. Sustainable eco-mobility promotes equity within and between successive generations [3]. It is noteworthy to state that it is affordable, operates fairly and efficiently. It offers a choice of transport mode and it supports green economy of any community especially within an urban settlement like in the case of Festac Town a mixed-use community in Lagos metropolis, as well as
balanced state and regional transport developments. Part of the major advantages of advocating for the adoption of eco-mobility framework is that it limits environmental impacts while reducing emissions of greenhouse gas into the atmosphere. Eco-mobility uses renewable energy resources at or below their rates of generation and uses non-renewable energy resources at or below the rates of development of renewable energy substitutes, while minimizing the impact on the use of land, water, air and the generation of noise [4]).

1.1. Sustainable Neighbourhood Transportation Planning

Transportation planning and design choices have a direct influence on the physical development patterns, travel mode choices, road infrastructure costs, redevelopment potential, the health of natural resources and other community concerns [5]. This integrated mobility approach requires transportation and land-use planners/designers to examine the effects of transportation projects on future growth, development, and long-range economic goals [6]. Transportation planning will get the best results for communities when it is part of a comprehensive approach that includes land-use and environmental planning at the local, state and regional levels [7]. The aim of this study is to assess the eco-mobility approach for a sustainable neighbourhood road infrastructure within a mixed-use community. This study will explore the following objectives; developing a sustainable mobility strategies that brings the neighborhood streets back to the people, adopting the seamless integration of sustainable transportation alternatives, improving user’s experience of different street mobility, the need to ensure safety and security for all road user, creating a sense of place through effective and meaningful place making within the street/neighborhood, embrace innovative planning strategies and foster street transportation resiliency. We therefore have to rethink how to move around and reinvent modern ways that are smart, resilient and non-motorized so as to reduce the constant emission of carbon and other carcinogenic greenhouse gases into the atmosphere thereby polluting the environment. The following research questions were considered in this study:

1. What is the present condition of the urban street infrastructure, street mobility services and non-motorised transportation facilities, are they still in good conditions?
2. Why are the mobility infrastructures no longer attractive and suitable for commuters?
3. Are there existing mobility policies and guidelines enforceable by the planning authorities?
4. What are the eco-mobility alternatives needed to be integrated into the transportation network masterplan of Lagos metropolis?
5. What are the connections and the interconnectivity between sustainable transportation systems, climate change, health and wellbeing of the people?

Historically, transportation and town planners have de-emphasized the role of streets mobility and efficiency in shaping neighborhoods [8]. Decisions about street size and design in many communities have focused on getting as many cars as possible through the streets as quickly as possible but street design determines whether an area will be safe and inviting for pedestrians, cyclists and other commuters [9]. Urban street design has important environmental impacts which determines the viability of eco-friendly modes of transportation. It also influences the volume of storm water runoff, the water quality of that runoff and the magnitude of the urban heat island effect [10]. The study adopted the theory and principles of Eco-mobility as discussed by both International Council for Local Environmental Initiatives [11] and [12]. It is a principle that is used to describe travel through integrated, socially inclusive and environmentally friendly options like; walking, cycling, wheeling and public transport options. A mobile transport choice that has low to no carbon emissions compared to the personal automobiles powered by fossil fuels [12]. Eco-mobility transportation approaches such as complete streets sensitive urban solutions within the communities can create attractive neighbourhood and urban street roads that also improve mobility and safety of the road users [13]). Eco-mobility promotes sustainable travels through integrated, socially inclusive and environmentally-friendly options without depending on either public or privately owned vehicles [14].

2. Literature Review

The sustainable transport and street mobility refers to the broad subject of transport that is sustainable in the sense of social, environmental and climate impacts [4]. Sustainable transport systems make a positive contribution to the environmental, social and economic sustainability of the communities they serve [15]. There are many factors used for evaluating sustainability include the particular vehicles used, the source of energy; and the existing infrastructure used to accommodate the transport, the transport operations and logistics as well as transit-oriented development [16]. Transport systems exist to provide social and economic connections and people quickly take up the opportunities
offered by increased mobility with poor households especially at the rural settlements benefiting greatly from low carbon transport options [17]. [4] opined that the advantages of increased mobility need to be weighed against the environmental, social and economic costs that transport systems pose as shown in Figure 1 below. Transport systems have significant impacts on the environment, accounting for between 20% and 25% of world energy consumption and carbon emissions [18]. Ellabban stated that the majority of the emissions, almost 97%, came from direct burning of fossil and that the greenhouse gas emissions from transport are increasing at a faster rate majorly through the road transport [19]. The United Nations Environment Programme (UNEP) estimates that each year 2.4 million premature deaths from outdoor air pollution could be avoided. The carbon emissions are carcinogenic matters that not only causes ill health but also contribute to the impacts of climate change. The connection that is predominant between greenhouse gas emissions and particulate matter make low carbon transport an increasingly sustainable investment at local level- both by reducing emission levels and thus mitigating climate change and by improving public health through better air quality [20].

Eco-mobility allows cities to access goods and services in a sustainable manner, with the following benefits; improve urban quality of life, increases sustainable travel choices, promotes social cohesion, reduce greenhouse gas emissions and congestion, improve air quality, provide equitable transit options, improve local green economies and improve safety for cycling and walking (ICLEI, 2020).

![Figure 1: Possible scenario of clean Eco-mobility](image)

To achieve climate neutrality, a 90% reduction in transport carbon emissions is needed by 2050 [22]. Transport services account for a quarter of the European Union’s greenhouse gas emissions and still it is growing [22]. The social costs of transport include road crashes, air pollution, physical inactivity, time taken away from the family while commuting and vulnerability to fuel price increases [23]. Eco-mobility indicates a new approach to mobility that highlights the importance of public and non-motorized transport and promotes an integrated use of all modes in a city [24]. Environmentally sustainable and socially inclusive, ecological mobile transport choices have low to no emission compared to the personal automobiles powered by fossil fuels [25]. [26] defines eco-mobility as the use of light electric vehicles, provided that the source of the electricity is from renewable energy sources. Incorporating eco-mobility into the development of traffic systems, road infrastructure and policies will benefit local governments in attaining the needs of the commuters [26]. Transport is responsible for about 26 percent of greenhouse gas emissions, much arising from personal car journeys (WHO, 2019). Achieving sustainable transport means putting users first and providing them with more affordable, accessible, healthier and cleaner alternatives to their current mobility habits. Automated and connected multimodal mobility will play an increasing role, together with smart traffic management systems enabled by digitalization [27]. The price of transport must reflect the impact it has on the environment and on health [28]. At present, transport solutions are linked with three primary concerns: urban sprawl, climate change and equal access to services and workplace. A major share of CO2 emissions is caused by transport, and to reduce them, solutions range from technological, behavioral and fiscal to infrastructural. Urban sprawl is mostly accredited to reliance on the private car as the prime mode of transport. The assessment of the World Health Organization reveals that in most Africa countries the urban sprawl is a challenge not only because of the increased fossil energy consumption but also due to the constant air pollution caused CO emissions [28]. Travelling greater distances takes more time, the street networks take up more valuable urban land and
all other urban infrastructures are not used efficiently. Non-motorized traffic is being discussed in every city, not least because walking is in many cities the only choice for the poorest citizen [29].

Urban mobility, urban design and land use patterns are inextricably connected [30]. Transportation facilities and street road networks have the power to shape development, influence property values, determines a neighborhood's character and quality of life. Litman opined that this expanded transportation choice makes it easier to incorporate physical activity into daily routines, reduces transportation costs, and gives more freedom and mobility to low-income individuals, senior citizens, disabled persons, and others who cannot or choose not to drive or own a car [12]. Providing a range of transportation choices and the walkable neighborhoods that support them can help improve air quality and reduce greenhouse gas emissions. According to US Environmental Protection Agency (EPA) the transportation sector represented the largest source of carbon dioxide emissions from fossil fuel combustion [31]. Greenblatt asserted that about 17 percent of United State (US) greenhouse gas emissions comes from cars and light-duty trucks [32]. Most of the developing cities in Africa are striving hard to improve their transport network and street connectivity situation and several new transport investments are being made by the government to ameliorate the traffic situation in the metropolis such as the rail mass transit systems, bus based systems (BRT) and also improving the road conditions and even expansion of the existing road space. The transportation sector that has been neglected is the Non-Motorised Transport (NMT) sector [30]. As shown in figure 1 above, it is the kind of a transport system that would not run on any gas powered motor such examples are walking, cycling, wheeling and green/electric cable vehicles. In the developing countries especially in Africa, it is believed that mostly the urban poor individuals make uses of walking and cycling as their basic means to access their farm settlements, work places, markets, town squares and also fetch their daily needs [17].

2.1. The Study Area

Amuwo Odofin is one of the 57 Local Government Councils in the Badagry Division that makes up Lagos State. It covers land mass of approximately 100sq.km, divided into two distinct geographical spheres of upland and riverine areas. For political expediency, the Local Government is divided into three geo-political zones, that is, the Riverine, the Middle Belt and the Upper Belt. The Upper belt comprises majorly; Amuwo Odofin Estate, Raji Rasaki Estate, Amuwo Odofin New Town, Festac Town, Abule Ado and Trade-fair Complex. There are twenty seven Community Development Areas (CDAs) operating within Amuwo Odofin Local Government Area. Spread among the 14 wards are 67 communities, 12 of which are Urban, 8 semi-urban and 47 rural and all connected with good road networks. Amuwo Odofin LGA has a population density of approximately 300,000 people per square kilometer with a population of over 1,500,000 according to the 2006 census and it shares its boundaries with Ajeromi and Ifelodun Local Government in the East, Oriade Local Government in the West, the Badagry Creek to the South and Isolo/Igando Local Government to the North (see figure 3). Festac Town with coordinates 6°27′N 3°16′ / 6.450°N 3.267°E is under the Amuwo Odofin Local Government Area and it has the federal housing estate located along the Lagos-Badagry Expressway of the state. It name is derived from the acronym FESTAC, which stands for Second World African Festival of Arts and Culture that was held there in 1977. The dominant group of dwellers are the retired and serving civil servants, religious organization, school and business owners. The town is comprised of residential neighborhoods, religious and commercial centers. Economic activities are well grounded due to such factors as adequate security facilities, good intra-city road networks, ready market and a generally conducive atmosphere which is prevalent in the mixed-use area. The population growth is constantly increasing in Festac since year 2000 with the population taking over 60% population of Amuwo-Odofin Local Government and is expected to continue to grow at a steady rate and that is one of the many reasons Festac Town is selected for this study.
The Festac link bridge (about 0.9km) (see plate 3&4) connects the town with other part of Lagos Mainland and the Oshodi-Apapa expressway through which most of the Bus Rapid Transit (BRT) services connecting Festac Town and forms part the urban mobility networks of the metropolis.

2.2. The Existing Layout of Festac Town

Festac Town is built in a grid network consisting of seven major roads/avenues from which minor roads extend. These avenues are identified by their numbers: 1st, 2nd, 3rd, 4th, 5th, 6th and 7th Avenues respectively. The 1st, 2nd, 4th and 7th Avenues surround a portion of the town in what seems like an almost rectangular road network which are connected and accessible through each other. The 3rd and 5th avenues run parallel within the town. The 6th avenue is found in a portion of the town accessible through a bridge from the 1st Avenue. The town consists of cul-de-sacs or closes which are named in an alphabetical order. Festac town is accessible from the Lagos-Badagry Expressway through three main gates that open into the 1st, 2nd and 7th avenues which are the First, Second and Third gates respectively. The town is also accessible through the Festac Link Bridge. Consisting of over 5,000 contemporary dwelling units and seven major avenues (1st-7th avenues), the town was designed in an efficient grid in order to accommodate upwards of 45,000 visitors as well as any Nigerian employees and officers working during festival. In the past three decades shortly after the festival, many of the residential apartment are then converted to administrative and commercial facilities to service the town (see plate 1). Some of the infrastructures are police, fire stations, electricity station and easy access to public transportation, dedicated cycling/pedestrian lanes/sidewalks, supermarkets, banks, health centres, and public restrooms. Some of the landmarks taken for assessment were; parks, banks, open field grocery stores, bus-stops, hotels, bus-transit stations and postal service point. Selected shuttle service owners, cyclist and pedestrians within the town were also interviewed alongside with other road users. Since the year 1977 the mobility network of road constructed with Class II bike lanes of about 25km of an average width of 1.8m attached with 1.5m sidewalks (see plate 5-7).
Plate 1: Festac Town layout as-built as at 1977. Source: Festac Town Resident (Respondent’s archive), 2019.
Plate 2 (Right): Existing land-use layout of Festac Town. Source Researcher’s study, 2019.

Plate 3&4: Satellite imagery showing Festac Town. Source: Google Earth Pro, 2019.

Plate 5 (left): Analysis showing the soil elevation map of the study area. Source: ESRI Map, 2019.
Plate 6 (right): Analysis showing watershed of the study area. Source: ESRI Map, 2019.

Plate 7: Analysis showing link roads of the study area. Source: ESRI Map, 2019.
3. Methodology
A multi-staged sampling technique was adopted for the study. A sample frame of 15 major roads that have notable outdoor open spaces, medians, bike lanes and sidewalks along the selected roads was adopted for the study. The major streets/roads were purposively selected, while a random sampling was employed to select the open spaces within Festac town. Hence, third (3rd) avenue (3.8km Approx.), fifth (5th) avenue (3.3km Approx.) and Road 23 (2.2km) (see table 1). Thus, the fifteen street roads selected are relative to the size of each stratum, covering the high, medium and low density zones. The areas have different mixed-use destinations and public infrastructure (security, health facilities, schools, refuse, road, drainages etc.).

The instruments for data collection were oral interview and personal/physical observations. The first set of interviews were conducted with selected road users (private, commercial shuttle operators, cyclist, pedestrians, hawkers, newspaper vendors, market men and women) with seventeen (17) respondents within the town along the major avenues, while the second phase of interviews with five (5) respondents was conducted with the management of the Federal Housing Authority (FHA), the Amuwo Odofin Local Government Council Executives/Staffs, Festac Town CDAs and private organizations.

A total of 22 interviews was acknowledged with various stakeholders/respondents within the study area. The interviews elicited information relating to the usability of the existing mobility infrastructure, other alternatives explored in the years past and the possibility of eco-mobility within the state whilst using Festac Town as pilot phase. The study employed majorly qualitative approaches and sampling size of the major mobility corridors and streets from 1st to 7th Avenues and major street roads with available open spaces for recreation/social events were taken and their coordinate imported into ArcGIS (ArcGIS Version 10.5, Environmental Systems Research Institute (ESRI) (See Plate 5&6) for various analysis. A comparative data analysis was also done with the previous research carried out by Eco-green Research Team (Festac Town Bicycle Masterplan Project, 2016) on the bike-ability of the streets using geodesign framework. Geodesign is the process of integrating geographic and geo-spatial data into design process to generate alternative designs and make good decisions (Lee, 2014).

Table 1: Selected major road networks with open spaces, medians, bike lanes and sidewalks.

| Streets Selected | Street less than (<) 0.5km | Street between 0.6-1.5km | Street more than (>1.5km | Total (km) |
|------------------|----------------------------|--------------------------|--------------------------|------------|
| Streets Selected | 3(1.5km)                   | 7(6.5km)                 | 5(13.1km)                | 21.10      |
| Percentage (%)   | 7.1%                       | 30.1%                    | 62.8%                    | 100%       |

Source: Field survey, 2019.

Table 2 shows the selected streets through the 1st-7th Avenues with Class II bike lanes and the street with more traffic congestion in terms of usability by commuters has an approximately 13.1km (62.8%) of the identified roads along 3rd Avenue, 5th Avenue and 23 Road (See table 2) all have Class II bike lanes which are completely separate from the usual traffic. The Class II bike lanes (the ones constructed in Festac Town) are on-street bike lanes.

Table 2: Selected major road networks with open spaces, medians, bike lanes and sidewalks.

| S/n | Major Street Names | Bike lanes & Sidewalks | Median barriers /strip (Average) (M) | Road widths (Average) (M) | Length (Km) |
|-----|-------------------|------------------------|--------------------------------------|--------------------------|-------------|
| 1   | 1st Avenue        | Existing               | 0.6                                  | 13                       | 0.7         |
| 2   | 2nd Avenue        | Existing               | 0.6                                  | 13                       | 0.5         |
| 3   | 3rd Avenue        | Existing               | 0.6                                  | 13                       | 3.8         |
| 4   | 4th Avenue        | Existing               | 0.6                                  | 13                       | 1.5         |
| 5   | 5th Avenue        | Existing               | 0.6                                  | 13                       | 3.3         |
| 6   | 7th Avenue        | Existing               | 0.6                                  | 13                       | 1.7         |
| 7   | 21 Road           | Existing               | Nil                                  | 10                       | 1.9         |
The 22 oral interview respondents were asked to rate the quality of the existing mobility infrastructure from various parameters as shown in Table 6, 7 & 8. The table shows the study parameters which involves 12 questions across the selected locations. The first, second and third stage focuses on the impact factors of the existing street mobility facilities on the users followed by; maintainability of the mobility corridors along the avenues to provide safe alternatives to automobile travel, mode of road share by all users, quality of sustainable support given to transit facilities to complement the mobility infrastructure, evaluation of the road infrastructure and urban mobility policies enforcement.

4. Discussion of Findings
This section presents the respondents’ demographic data using frequency distribution tables. It also revealed the presentation of respondents’ demographic characteristics within the study area. The respondents were basically selected based on request by the researcher and timely invitation and availability as at the time field work. Table 1 below reveals that 5(58.0%) respondents were between the ages 15-30 years of age, 7(32%) respondents are within the age bracket of 31-60 years, while 10(45.3%) respondents are within the age brackets of 61-above years. This table shows that mostly young adults that are between 15-30 years of age granted the least interview will aged citizens who knew the situation of the town 43 years ago (four decades) granted the most interviews.

| Table 3: Respondent’s age demography. |
|--------------------------------------|
| Ages                | Frequency | Percentage (%) |
| 15-30               | 5         | 22.7          |
| 31-60               | 7         | 32.0          |
| 61-Above            | 10        | 45.3          |
| Total               | 22        | 100.0         |

Source: Field survey, 2019.

Table 4 below shows the distribution of the respondents by gender. 59% of the respondents were male, while the remaining 41% were female. Indicating that the dominant the male folks make use of the mobility infrastructure and commutes more that the female folks. The majority of the cyclist seen were males.

| Table 4: Respondent's gender demography. |
|-----------------------------------------|
| Gender     | Frequency | Percentage (%) |
| Male       | 13        | 59            |
| Female     | 9         | 41            |
| Total      | 22        | 100.0         |

Source: Field survey, 2019.

| Table 5: Respondent’s physical appearance demography. |
|------------------------------------------------------|
| Gender     | Frequency | Percentage (%) |
| Physically fit | 19       | 86            |
| Physically disabled | 3       | 14            |
| Total      | 22        | 100.0         |
The physical appearance of the respondents were also considered with regards to their physical abilities and disabilities which determines their ability to commute within the town. Physical disabilities like; blindness, handicapped, age-related diseases (Stroke, Arthritis, Dementia, Parkinson's disease etc.). Only 3(14%) (See table 5 above) suffers any form of seen physical disabilities. This further shows that the mobility needs of the aged and disabled folks must be taken into consideration and integrated into the road infrastructure within the context of both the community and urban settlements.

After collating and analyzing the data and interviews, half of respondents were affected by chaotic neighborhood streets mobility with incessant accident and social crimes almost on a daily basis (no records) as shown on the table 6 below. The older and folks suffering any physical disabilities appeared to be the most affected, suggesting that the local authority might need to investigate further and make policies that will revitalize the existing mobility infrastructure. The sustainable mobility framework will identify a comprehensive, safe and logical approach to fix the street connectivity and road networks that will support sustainable eco-mobility and non-motorize facilities.

**Table 6: User’s perceptions of the neighborhood streets infrastructure.**

| S/n | Activities                          | Description                                                                 | Locations visited | Remarks |
|-----|-------------------------------------|-----------------------------------------------------------------------------|-------------------|---------|
| 1   | Shopping destinations               | Availability of corner shops, services, groceries and food outlets.          | 15                | Inadequate |
| 2   | Recreation facilities               | Availability of fitness centres, parks, gyms and recreation centres.         | 15                | Inadequate |
| 3   | Residential density                 | Proportion of different dwelling types and housing density.                   | 15                | Mixed-use |
| 4   | Commercial activities               | Accessibility of different places for commercial activities.                 | 15                | Mixed-use |
| 5   | Streets/roads connectivity signage  | Existing street network typology (e.g., cul-de-sacs, block size, route availability). | 15                | Inadequate |
| 6   | Walking facilities                  | Pedestrian access infrastructure and road quality.                           | 15                | Inadequate |
| 7   | Availability of cycling facilities  | Cyclist environment quality and the state of the existing bike lanes        | 15                | Underuse |
| 8   | Streetscape aesthetics              | The attractiveness of neighbourhood (e.g., street trees, road infrastructure and nice building architecture). | 15                | Inadequate |
| 9   | Traffic safety                      | Safety from traffic (e.g., slow speeds/speed breakers, lighting, crosswalks) | 15                | Inadequate |
| 10  | Mobility crime safety               | Stranger danger along the streets and neighbourhood?                         | 15                | No records |
| 11  | Social danger perception            | Presence of social incivilities and micro-crimes (e.g., illicit drug use, robberies, hoodlums). | 15                | No records |
| 12  | Neighbourhood social relations      | Any neighbourhood social cohesion?                                          | 15                | Inadequate |

Table 6 above shows some of our findings according to the various questions asked during the interview. The following remarks ensued like- ‘Inadequate’ (meaning the existing facilities cannot go
round the demand for the users), ‘Mixed-use’ (meaning that the different categories of dwellers cuts across commercial, administrative and residential all make use of the common facilities, ‘Underuse’ (meaning that the facilities are existing but due to ignorance over the years, it has not been optimized) and finally ‘No records’ (Meaning that at the time of this study there were no access to past or present records of crimes made public by the agencies/security personnel involved.

The study established that there is a poor social cohesion within the neighborhood due to inadequate access. Some of the parameters for any mixed-use community should be one with an ideal population size, which determines to the provision of needed road infrastructure and services. Table 3 shows the user’s perceptions of the neighborhood streets infrastructure and in further analyzing the quality of selected roads, the physical appraisals of houses, commercial activities and diverse activities going on within the area and it was deduced that there was a general lack of maintenance. Poor maintenance is one of the major factor adduced to be responsible for the current deteriorated state of mobility corridors and the existing infrastructure. Added with the continuously increasing population and the economic size of Festac Town. The town was designed and built about four decades ago and the numbers of dwellers as at that time is not comparable to the present overpopulation condition of the town. Overpopulation exerts pressure on infrastructure, thereby accelerating deterioration.

The study did an overview of the recreation facilities in the study area and it was discovered that it has suffered a lot of neglect from the Federal Housing Authority (FHA) who are the original owners of the town. There are predominantly a mixed-use activities going on within the study area but the earning power of some of the residents could not allow maintenance as it can be clearly observe a growing weed along the sidewalks, bike lanes and porthole were regular sight on all the identified major collector roads. It was also observed that the toilet system of some of the neighborhood were discharge into the open drains and most times overflows into the paved road and due to the effect of continuous dampness the impact lead to portholes (see plate 14&15).

Plate 8(left) & 9(right): Pictures showing existing open spaces along 2nd & 3rd Avenues.
Source: Researcher’s photo, 2019.

Plate 10(left): Pictures showing the road setbacks with different business activities.
Plate 11(right): Pictures showing traffic situations along the existing road (23Road).
Source: Researcher’s photo, 2019.
Plate 12(left) & 13(right): Pictures showing existing bike lane along 2nd & 3rd Avenues with grown weed and refuse in dumps. Source: Researcher’s photo, 2019.

Plate 14(left) & 15(right): Pictures showing 7th Avenue bike lane with portholes in some places. Source: Researcher’s photo, 2019.

It was also gathered from the interviews conducted that the planning authority responsible for the management of the area is doing very little in the management of Festac Town. The physical development control and management is very poor as there were records of ongoing commercial shops development especially along the statutory residential setbacks and these illegal shop developments obstruct the visibility of commuters and it can cause vehicular accidents. Table 7 below, reveals that the record of mobility crime safety and social danger perception were not kept and most of the respondents were not satisfied with the Federal Housing Authority (FHA) managements’ attitudes towards the general wellbeing of lives, properties and the existing road infrastructure.

| Activities                          | Description                                                                 | Avenue visited | Remarks |
|-------------------------------------|-----------------------------------------------------------------------------|----------------|---------|
| Destinations and commercial hubs   | Quality of shops, services, and food outlets.                               | All Avenues     | 2+      |
| Recreation Facilities              | Quality of parks, gyms and recreation centres.                              | All Avenues     | 1*      |
| Residential Density                | Proportion of different dwelling types and housing density.                  | All Avenues     | 2+      |
| Land-use Mix Access                | Accessibility of different places                                          | All Avenues     | 2+      |
| Street Connectivity                | Street network typology (e.g., cul-de-sacs, block size, route availability).| All Avenues     | 2+      |
| Pedestrian(Walking) Facilities     | Pedestrian environment quality.                                             | All Avenues     | 1*      |
| Cycling Facilities                 | Cyclist environment quality.                                                | All Avenues     | 2+      |
| Aesthetics                          | Streetscape attractiveness of neighbourhood (e.g., trees, road infrastructure).| All Avenues     | 0"      |
| Traffic Safety                     | Safety from traffic (e.g., slow                                             | All Avenues     | 0"      |
speeds, lighting, crosswalks).  

| No | Crime Safety | Social Danger Perception | Neighbourhood Social Relations |
|----|--------------|--------------------------|--------------------------------|
| 10 | Community road users’ danger. | Presence of social incivilities and micro-crimes (e.g., illicit drug use, robberies, strange people). | Neighbourhood cohesion (e.g., stopping to talk to neighbours, social exchange with neighbours). |

All Avenues 0”  

Table 7 and 8 shows the perception of the residents on the street quality and infrastructure respectively. The rating of the aesthetic, serenity, traffic safety, crime safety and social dangers were rate very poor (0”) due to the array of poor facilities that were not only moribund but also dilapidated and the daily increase in crime rates within the town. In table 6 above, both recreation and walking (pedestrians) and recreation facilities were rated bad (1*) as there were no provision for such facilities within any of the neighbourhoods. Fairly rated are the few destination spots, residential density, mixed-use activities, street connectivity, obvious cycling facilities and the overwhelming neighbourhood social relations.

**Table 8: Description of user’s perceptions on the condition of existing infrastructure.**

| Infrastructure                  | Rating | Remarks                  |
|---------------------------------|--------|--------------------------|
| 1 Security/CCTV                 | 1*     | Not available             |
| 2 Housing unit                  | 2+     | Needs repair              |
| 3 Car park/lay-bys              | 2+     | Not adequate              |
| 4 Refuse management             | 2+     | Not adequate              |
| 5 Roads networks                | 2+     | Needs repair              |
| 6 Drainages networks            | 2+     | Needs repair              |
| 7 Sewage management             | 1*     | Not inadequate            |
| 8 Water supply networks         | 1*     | Not inadequate            |
| 9 Health facilities             | 1*     | Not inadequate            |
| 10 Primary schools              | 2+     | Not adequate              |
| 11 Secondary schools            | 2+     | Not adequate              |
| 12 Electricity supply networks  | 2+     | Repairs needed            |
| 13 Open markets                 | 2+     | Not adequate              |
| 14 Shopping centres/shops       | 2+     | Adequate                  |
| 15 Recreational facilities      | 1*     | Not inadequate            |
| 16 Public transportation services| 2+     | Not efficient             |
| 17 Public toilets               | 2+     | Not adequate              |
| 18 Outdoor open spaces          | 1*     | Not inadequate            |

Source: Field survey, 2019.  

Note: 4* (Very good), 3# (Good), 2+ (Fair), 1*(Bad), 0” (Very bad).  

Table 8 above rated the perception of the people according to the usage and condition of the existing road infrastructure that has made them unattractive/unsuitable to users. According to the ratings the following remarks came up with the levels of availability, adequacy, efficiency and deterioration which might require immediate repairs or total reinstallation as the case may be. The study further reveals that the aforementioned anomalies related to lack of effectiveness in the administration of transportation infrastructure within the town and the entire Amuwo-Ofin Local Government Development Area.

It is therefore adduced that it may be due to poor interrelations or the prevailing nonexistence of communication channel within the community and the council. The present road infrastructure within
the city can be integrated with eco-mobility strategies. Eco-mobility gives priority to walking, cycling, electric vehicles, shared mobility and light green vehicles (ICLEI, 2020). From the above findings and discussions, the following five factors need to be considered in other to have a sustainable neighbourhood streets mobility within a mixed-use community and they can serve as eco-friendly alternatives for commuting around the city as stated below:

4.1. Climate Change and Sustainable Transportation Systems

There is a connection between climate change and sustainable transportation systems. The transport sector is one of the main sources of emissions, many countries and cities have set their goals and taken steps to mitigating emissions and adapting to climate change. The transport sector produces 26 percent of global energy-related carbon emissions [30]. Despite ongoing technological and fuel-economy improvements the figure is projected to increase by 50 percent by 2035 and almost double by 2050 because of increasing demand. A special report from the Intergovernmental Panel on Climate Change (IPCC) underscores the urgency of reducing emissions significantly and rapidly achieving the 1.5 degree Celsius scenario called for in the Paris Agreement. However, there is need for the introduction of electric cars and green vehicles for both intra and inter-city transportation.

4.2. Health and Wellbeing

The dominant urban mobility within any city influences the public safety and public health. Air pollution is a major environmental health problem that affects everyone in the world and contributes to 4.2 million deaths every year [30]. Over dependence on conventional use of motorized vehicles over the years has worsen the quality of air, increasing the risk of respiratory illnesses. Cities can improve residents’ health and safety by redesigning streets and public spaces, improving public transportation and prioritizing pedestrians and cyclists. Improved urban open spaces and sustainable transportation options encourage an active lifestyle and reduce exposure to air pollution, resulting in health, environmental and economic benefits.

4.3. Walkability and Bike-ability

Walking and cycling are non-motorised means of transportation. They are forms of exercise and it is affordable, efficient and sustainable mobility alternatives. These active mobility modes have also been recognized for providing a wide spectrum of positive health benefits [1]. There is need to take good advantage of transportation by walking and cycling. Cities now have to follow a community participatory framework that make use of the geodesign approach for urban design and landscape planning. Having facilities that supports walkability and cycling within the city and neighbourhood should be to create an environment that allows people to move either be walking or cycling safely, efficiently, sustainably and affordably.

4.4. Public Transport

The public transport network that is both efficient and effective is a foundation of the economic success and also key to making any city resilient in it mobility system and is crucial in creating a healthy and livable city. Cities around the world are finding ways to improve the public transport capacity and efficiency. New emerging mobility trends that some developed cities have seen in recent years such as shared mobility systems, present new opportunities to reduce individual ownership and usage of rickshaws, bicycles, tricycles and private vehicles (ICLEI, 2020). The study reveals that most of the residents of Festac Town make use of the shuttle service and tricycle within the town, very few resident go about the neighbourhood with their private cars.

4.5. Road Infrastructure Maintenance

In mixed-use settlement like Festac Town, good road infrastructure not only influences the economy but also dictate the wellbeing of the residents. Proper planning, construction and maintenance is therefore necessary. Every action needs careful planning as it is highly complex and socially sensitive. Adequate routine maintenance of the road infrastructure to prevent hazards to road users by way of accidents.

5. Conclusion

The findings of this study indicates the issues as it affect Festac Town and the entire Amuwo Odofin LGA that has most of the road infrastructure/networks deteriorated and fast degenerating into a
urban slums in some areas. Therefore, the results of this study calls for improvement in the quality of the ageing road infrastructure. Hence, the urgent need of bike lane restoration and the introduction of sustainable eco-mobility facilities to complement the existing infrastructure in the neighbourhood. This will invariably improve the quality of life of the people. There is also the necessity for the review of the township masterplan of the study area which will then serve as a benchmark for further developments. The new masterplan will assist the authority to monitor the streets connectivity and also control the usage of the non-motorise road infrastructure. There is also need for the review of the transport policy that will emphasis sustainable urban or neighbourhoud mobility which underpins socio-economic activities that are socially inclusive, improves social cohesion and provides alternative travel choices. The mobility options should consider integrating walking, cycling, public transport and other climate and people friendly green innovative modes of transportation. The residents, business owners, religious organization who are the stakeholders, must work with the Federal Housing Authority (FHA), Festac Town Residents Association (FTRA), Amuwo-Odofin Local Government Councils authorities. Developing compactly and investing in public transit and other transportation options make it easier for people to drive less, lowering greenhouse gas emissions. These approaches can also help reduce carbon monoxide, sulfur dioxide, particulate matter, and other pollutants emitted by motor vehicles and this will help to mitigate against climate change towards achieving one of the 17 United Nation’s Sustainable Development Goals (UN SDGs). The eco-mobility approach through proper urban renewal of the mobility corridors should seize this opportunities to create sustainable green mobility solutions; good connectivity that will encourage people to travel, walk or cycle through a careful urban design and layout that includes biodiversity corridors, sustainable drainage networks; serene public outdoor open spaces, that attracts social cohesion.

It is therefore recommended that both local, state governments and every concern stakeholders have to strategies an action plan and address the public health and climate impacts of environmental pollution through motorized transportation and replace them with eco-mobility infrastructure. The Local Government Council of Amuwo-Odofin and the Federal Housing Authority (FHA) should undertake monitoring and assessment of safety conditions of the existing road infrastructures. Integration of sustainable transportation system with the aim to enhance commuters experience by making sustainable transportation a convenient option and allowing individuals to navigate through different modes efficiently so as to improving environmental air quality. The Lagos State government should give the private industries and experts opportunity to explore green innovative ideas to harness the positive benefits of automated vehicles and new eco-mobility services. The public-private partnerships should be explored for new and innovative ideas in transportation that help enhance the integration of different eco-mobility alternatives that can be locally acceptable by everyone. The residents have to work alongside with the local authority to anticipate and respond to the current mobility challenges while epitomizing the needs of commuters. General maintenance of the existing road networks, outdoor open spaces, bike lanes, sidewalks should be done regularly and the open drains cleared (see plate 12-15).

The outdoor open spaces and community centres facilities including pocket parks, plazas, playgrounds, football fields, sport courts and picnic areas that serve as recreational destinations for the community should be reopened for use (see plate 8&9). These outdoor amenities attract individuals, families and the local residents. Awareness must be created in order to engender proactive maintenance of the road infrastructure to prevent any setback it might cause to the socio-economic activities due to its continuous deterioration. This study further recommends that due to the traffic volume, commuters speed and lack of proper/visible road signage’s which poses a lot of road hazards and accidents since most of the cyclist and other road users are typically confident cycling all around the streets without the safety kits, speed bumps should be installed at regular interval and the road signage’s should be installed visibly and boldly strategically along the roads and various junctions (see plate 11&12). Community-based participatory urban renewal and landscape planning that carries the people of the community (commuters/users) along in every decision making are more important than just emphasizing environmental benefits such as energy efficiency and climate change mitigation/adaptation of the proposed eco-mobility networks. An environmental impact assessment and solution that involves today’s production, use and for the future urban settlement of Lagos State.

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