Making Lagos a Cool City: A Study of Transport System and Travel Behaviour

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1. Introduction

Transport plays a pivotal role in the socio-economic and political development of nations all over the world. It is a catalyst which facilitates access to various services and opportunities. Scholars (Alade, 2009, Daramola and Adeniji, 2009, Fadare, 2010, Badejo, 2011 and Filani 2011) have recognized the role of transport in the efficient performance of cities. However, urban transportation systems in most developing cities are far from ideal with congestion being the most visible and frequently mentioned transport problem which results from high level of motorization and other factors such as poor road infrastructure and inefficient traffic management.

According to UNEP (2010), transport is the second largest sector contributing to global carbon dioxide (CO2) emissions from fossil fuel combustion and of the 23 per cent of global CO2 emissions from the transport sector, road transport accounts for 73 per cent, followed by international shipping and international aviation. However, the transport sector is not receiving enough attention in global climate change mitigation efforts, even though, according to UNFCCC (2011) it is the sector where emissions have increased the most (by 14 per cent from 1990-2008) and, in a business-as-usual scenario, are expected to grow by 25.8 per cent by 2020 compared to 1990 levels.

The impact of transport on the environment cannot be underestimated. Mitigating the effects of climate change in the global north has been profound, however, not much has been done in the south. In Lagos, the largest city in West Africa, efforts are ongoing to respond to global action on climate change through investment in transport infrastructure with appropriate measures including policies to encourage more use of public transport and non-motorized transport options. This study examines the transport system and travel behaviour in Lagos and the efforts of the government in promoting environment-friendly transport with a view to using the outcomes to make policy recommendations that will make Lagos a cool city.

2. Literature Review

2.1 Urban Transportation System: An Overview

Transportation can be broadly categorized depending on what is being transported, the mode of transportation, and the governing regulations and other institutional dimensions. In relation to what is being transported, three subsectors in transportation-moving passengers, freight or information- make different demands on transportation systems (Mehrotra et al., 2011). The impact of greenhouse gas emissions as well as measures to mitigate or adapt these emissions can vary widely depending on how passengers, freight and information are transported. Again, transportation in terms of mode of travel can be broadly categorized as occurring by land, air and water. Land-based transportation systems are generally those with
the highest utilization in urban centres and can be sub-divided into rail and road-based transportation.

Kahn-Ribeiro et al., (2007) noted that road vehicle accounts for more than three-quarters of the total energy use in transportation and is consequently associated with greenhouse gas emissions. The combination of what (or who) is being transported and mode adopted for transportation is significant because it gives a measure of the amount of greenhouse emissions by modes and types of uses. As a result, the measures of emissions in turn helps to devise adaptation and mitigation strategies. Finally, the type of regulation and management of the urban transport system have a critical role to play in the reduction of vehicular emissions.

2.2 Transportation and Climate Change

The transportation sector accounts for 23% of global energy related greenhouse gas emissions in 2010 and some scholars project that emission levels for this sector could increase by greater than 70% by 2050 (Sims et al., 2014). Transportation, therefore, needs to play a pivotal role in efforts geared towards global climate change mitigation (UN-Habitat, 2009; Voukas and Palmer, 2012; IEA, 2013). However, the importance of the transportation sector goes beyond carbon emissions. Transport networks connect people with employment opportunities, health care and education, shapes communities and provides means of bringing goods and services to the market. In other words, efficient and accessible transport is not just sine qua non to economic growth, but also fundamental to the well-being of humans.

Historical low investment in public transport infrastructure and low capita incomes epitomised by low and middle-income countries in Africa have resulted in dependence on walking, bicycle and motorbike (Oyesiku, 2001; Abduhamoud et al., 2011; Voukas and Palmer, 2012). The implication of the foregoing is that car-centred transport systems require more land, promote urban sprawl, increase congestion, raise expenditure on energy and generate air pollution that causes respiratory illness, particularly among vulnerable groups such as infants, the elderly and physical labourers (Goodwin, 2004; Litman, 2004; UN-Habitat, 2009).

UN-Habitat (2009; 2010b) observed that dependence on private vehicles can also contribute to the development of two-layered transport systems, where those without access to vehicles are forced to depend on non-motorised transport (NMT) modes and informal public transport options, often resulting in greater exposure to air pollution and risk of traffic accidents. This compounds social and environmental inequalities. On the other hand, multi-modal transport networks that include well-connected mass transit infrastructure (buses, trams and trains) and NMT options (pedestrian walkways and cycling lanes) are less energy and emission-intensive, promote more compact forms of urban growth and are socially inclusive (Kenworthy, 2006; Rode et al., 2014). However, these transport networks require substantial upfront capital investment, strategic urban planning and sophisticated technical and management capabilities, which at times are beyond the capacity of governments in low and middle-income countries.

3.0 Materials and Methods

The study is both qualitative and quantitative in approach. The qualitative approach examines the transport system in Lagos by reviewing the Strategic Transport Master Plan and other transport study reports of Lagos Metropolitan Area Transport Authority (LAMATA) to highlight the character and challenges of the city’s transport system and government’s investment in transport infrastructure that aligns with climate change mitigation. The survey of travel behavior covers 1953 households in 32 neighbourhoods in three contrasting residential density areas using systematic sampling technique. Structured questionnaire was administered on household heads to obtain information on their previous day travel characteristics. Data were analysed descriptively and the results were used to highlight the climate change implication of urban travel in the city.
4.0 Results

4.1 Lagos Transport System

The transport situation in Lagos reflects its megacity status. It is estimated that some 6 million passengers' trip are recorded daily within the city. About 70% to 77% of these trips are bus based public transport, while the rest is largely by cars. The rail and water transport accounts for less than 1% of the trips (LAMATA, 2014). Organized public transport services exist in the form of Bus Rapid Transit (BRT), the LAGBUS and the corporate Taxi scheme which were introduced a decade ago as part of government efforts to make Lagos a global and competitive megacity. The BRT was introduced to replace the private sector driven mini-buses known as Danfo and Molue. It was estimated that there are between 75,000 and 90,000 such buses in Lagos metropolitan area.

The BRT Scheme came into operation in 2008. It is expected to operate along eight routes using specially designated BRT lanes running through the city, with the aim of expanding to other routes in the future. The BRT scheme is estimated to transport about 10,000 passengers in each direction per hour during the peak travel times. The Lagos Metropolitan Area Transport Authority (LAMATA) is the government agency established to deal with the multitude of transport problem in the state and oversees the BRT scheme. The LAMATA BRT corridor covers about 22 kilometres in length. The system is run by two operators, Nigerian Union of Road Transport Workers (NURTW) Cooperatives and LAGBUS, a Lagos State Government owned Asset Management Company which contributes about 180 high capacity buses for the implementation of the first phase Mile 12 to CMS BRT Lite system.

Motor parks or public transport garages abound all over Lagos Metropolis. These facilities are poorly designed, badly maintained and poorly located. In some cases, bus stops are located too close to interchanges or at a point difficult to access from primary corridors. The bus stops that are commonly utilized are operated inefficiently, because bus drivers maintain no order and there are no pre-designed bus stops serving destinations. This results in large number of bus passengers milling about, searching for buses and the opportunity to board a bus before it has entered the bus stop. The operation of the Lagos State Traffic Management Agency (LASTMA) has impacted positively on traffic situation in Lagos. Total time wasted in traffic is estimated at 3 Billion hours annually. Saving just 20% is equal to 1 Billion USD of economic benefit to Lagos (ROM Transportation Engineering, 2010). Activities of LASTMA has reduced the excessive total travel time on journeys being made on major corridors in Lagos metropolis.

The transport situation in Lagos is expected to get better with the expansion of the BRT scheme and the completion of the light rail transit. The rehabilitation of inland water ways and introduction of private sector ferry services with the new taxi scheme are also efforts directed to enhance urban mobility in Lagos. To consolidate these efforts, some agencies and institutional framework were put in place. These include the establishment of LASTMA, State Traffic Safety Advocacy Programme, Lagos State Drivers Institute and Motor Vehicle Administration.

4.1.1 Lagos Transportation Challenges

Lagos is rapidly expanding and is expected to have a population of over 30 million people by 2030 and overtake Cairo as the biggest city in Africa. Unfortunately, Lagos does not enjoy the privilege of adequate urban and transportation planning it deserved in its initial stage of urbanization. Consequently, the city has experienced proliferation of slums, degradation of urban areas and facilities, and transportation problems affecting all modes manifesting in the form of congestion, poor accessibility and mobility, inadequate road and terminal infrastructure, distressed public transport system, weak traffic management and safety and security challenges among others. Congestion is a major challenge in Lagos megacity and occurs daily along major corridors.
In a report submitted to LAMATA by ALG Transportation & Logistics (2013), it is documented that the public transportation system in Lagos state is inadequately regulated and structured. Besides, the public transport system is highly fragmented comprising many un-regulated routes and dominated by the use mini-buses (Danfos) leading to an inefficient public transport service which compels people to depend on private transport, resulting to a chaotic transportation which aggravates congestion.

It is further noted in the 2013 report that the industrial status of in Nigeria accounts for the growing number of freight vehicles along the main transport corridors in city and the freight vehicles share the existing road infrastructure with passengers. Similarly, the absence of an organised non-motorised transport (NMT) infrastructure, the lack of integration of transport and land use, weak regulatory mechanism among others are factors that worsen the transportation challenges in Lagos. The 2013 report concludes that, there is need for an urgent urban and transport development plan in Lagos, to address the continuous degradation and congestion of the transport system. The report also emphasizes that the results of “No action” will not only lead to the extension of the current congestion levels of Lagos but will also result in the loss of a unique opportunity to develop the Mega-city as the key-economic hub of Africa.

4.1.2 Non-Motorized Transport (NMT)

NMT, especially walking, is the most common form of mobility in Lagos, particularly for low-income households. According to the Lagos STMP (2004), around 30% of Lagos mobility is on foot or by bicycle. The interaction between pedestrian and vehicles in Lagos is unplanned and dangerous. In other to achieve an inclusive and sustainable transportation system in Lagos city, there must be recognition of importance of NMT. This does not seem to be the present situation as there are few segregated traffic facilities for pedestrians (e.g. walkways, zebra crossings, footbridges, underpasses and signs) and no pathways for bicycle riders. As a result, pedestrians are frequently forced to walk on the carriageway sharing roadway with motorised transport, which implies a low level of road safety.

Furthermore, the use of junctions as non-regulated commercial areas has been identified as one of the critical issues of urban mobility in Lagos. The encroachment on the roadway available for pedestrians by commercial activities represent a general challenge in all of Lagos urban core. The inadequacy of space for pedestrians is also a challenge in Lagos public transport system. There is a perceived lack of provision of proper accessibility to bus stops/terminals. Invariably, this results in increased rate of traffic accidents involving pedestrians in relation to unsafe bus stops.

A close examination of Lagos urban transport system also reveals restrictions to pedestrian mobility. For instance, highways and primary roads represent significant obstacles to pedestrian movement due to the absence of proper infrastructure facilitating the crossing of such barriers. The absence of road infrastructure also leads to poor pedestrian mobility. For instance, the present lack of East-West connections within the Mainland Central area isolates neighbourhoods and restricts the efficient movement of people and goods. A close examination of current improvements in road infrastructure shows that provision for NMT in being neglected. The absence of a comprehensive transport policy in favour of NMT may be responsible for this trend.

4.1.3 Vehicular Emissions in Lagos Metropolis

The urban transport system in Lagos metropolis is a significant source of environmental pollution. In terms of industrial activities and economic development, Lagos is one of the fastest growing megacities in the world (Kotin and Cox, 2013). Over 70% of the industries in Nigeria, consisting more than 7,000 medium and large-scale manufacturing industries are located within the city. Lagos is the most industrialized city in the Economic Community of West African States (ECOWAS) sub-region (Komolafe et al., 2014) and is home to about 60% of total non-oil enterprises in Nigeria. Consequent upon the agglomeration of these
industrial infrastructure, Lagos city is the highest consumer of energy, which is predominantly fossil-based, thus making it one of the largest contributors to greenhouse gas emissions.

The industrial profile of Lagos is noteworthy in view of the close relationship between industrial activities and transportation, especially freight transportation. Manufactured goods from the industries and raw materials for production are transported to and from industrial complexes through an inefficient road transport system that involves the use of trucks and heavy-duty vehicles. This method of conveyance, largely due to the poor transportation system and lack of credible alternatives to road transportation, has resulted in more vehicles on the road and greater environmental pollution from diesel engines. According to Lagos Air Quality Monitoring Study (2008) vehicular emission is the major source of pollutants in Lagos, contributing approximately 43% of ambient air pollution. This study also recognizes that vehicles in Lagos contribute to over half of the greenhouse gas emission from the transport sector in the country.

In the past ten years (2001-2009), the number of vehicles in Lagos State has increased to 234% (LAMAMTA, 2014) without commensurate increase in roadways which further compounds congestion in the city. The increasing traffic congestion in Lagos also makes driving conditions more polluting. The two main reasons for this growing congestion is the lack of a good network between the hinterland and ports and inadequate transport planning in new areas. The former leads to freight movement within the city and attendant friction with passenger traffic while the latter complicate commuting trips thereby resulting in the adoption of private transport as an alternative in most cases.

According to LAMATA (2009) over 70% of the vehicle fleet in operation within Lagos are 15 years old or more (see figure 1). Most of these vehicles comprising of cars, buses and trucks, are second-hand imported vehicles that do not meet the emission standards of their countries of origin. Furthermore, the general vehicle maintenance culture is often poor and is usually limited to essential maintenance and repairs to keep the vehicle on the road. Inadequate or non-existent vehicle maintenance result in gradual decline in engine performance, leading to less efficient fuel combustion, thereby increasing emissions.

These old poorly maintained vehicles are known as “super emitters” which are responsible for about two thirds of the CO₂ emissions in Nigeria coming from transport activity. According to the Assessment of Emissions from Road Transport (AERT), around 85% of the “Lagosian” vehicle fleet works with old engines. A finding of this study is that an average car plying on the roads of Lagos approximately meets the EURO-II emissions standard which was already in place in 1996. EURO-II emissions standard are 3 to 4 times higher than the current standard in the continent.
### Table 1: Comparison between emission factors for vehicles using petrol as measured in 2008 and Euro standards (g/km)

<table>
<thead>
<tr>
<th>Vehicle type</th>
<th>Cars</th>
<th>Buses</th>
<th>Euro 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New</td>
<td>Used</td>
<td>New</td>
</tr>
<tr>
<td><strong>CO</strong></td>
<td>3.00</td>
<td>14.95</td>
<td>8.07</td>
</tr>
<tr>
<td><strong>HC</strong></td>
<td>0.006</td>
<td>0.22</td>
<td>0.006</td>
</tr>
<tr>
<td><strong>NOx</strong></td>
<td>0.07</td>
<td>1.2</td>
<td>0.15</td>
</tr>
<tr>
<td><strong>CO₂</strong></td>
<td>22.92</td>
<td>165.9</td>
<td>107.9</td>
</tr>
</tbody>
</table>

4.1.4 Lagos Climate Change Adaptation Strategy

Lagos is not taking the back seat in respect of climate change. The Lagos Climate Change Adaptation Strategy (LAS-CCAS) recognizes multimodal transport - the introduction of mass transport system comprising a combination of bus rapid transit (BRT), rail and water transport services - in Lagos a key measure for climate change mitigation and adaptation (Lagos Strategic Transport Masterplan, 2014).

The rationale for the introduction of multimodal transport is hinged on their larger passenger capacity and lower emission rate than those of private vehicles. As shown in the table below, the private car is the major emitter per passenger-kilometre when compared to other means of transport. The emission levels of motorcycles are close to the Danfos level and more than the BRT, rail transit and bus, the most environmentally efficient modes of transport. The table below further reveals that the BRT is the most efficient of these means of transport, considering emissions per passenger. Private vehicles prove to be high pollutants in comparison with mass transit buses, due to their low occupancy rate. Furthermore, less buses are required to move large populations when compared to private vehicles. Thus, the total emission per passenger in public transport is lower than in private transport.

Additionally, the AERT (2009) proposes that current emission standards are set at Euro 2 (for used vehicles) and Euro 4 (for new vehicle), as well as a series of law enforcement measures concerning inspection, maintenance and certification, including a change in fuel use from diesel/petrol to CNG which will yield substantial environmental benefits from cars and buses. These represent feasible objectives for long-term transport planning in Lagos megacity. AERT recommendations can serve as basis for defining an environmental policy geared towards mitigating environmental impact of transport.

- Transport planning and demand management to implement:
  - Substitution of 20% of cars/SUV (Sports Utility Vehicles with enhanced bus services like BRT.
  - One-way streets
  - Establishment of certification centres for vehicles on emissions
  - Encouragement of Non-Motorized Transport (NMT)

- Promotion of NMT facilities, which could produce a 10% reduction in motorized trips.
- Switching buses to operate with CNG (can reduce the Emission Factor for CO₂ by 28.7%, 30.4% for CO, 0.06% for NO, and HC and 100% for PM10)
- Limiting the age of second-hand vehicles imported into Nigeria.
- Setting emission standards to EURO-IV to limit emissions from vehicles.
4.2 Travel Behaviour

Five trip characteristics were analysed to present the travel behaviour in Lagos. These include trip frequency, trip purpose, trip mode, trip time and trip length. These are presented to highlight the travel behaviour implication for climate change in Lagos.

4.2.1 Trip Frequency

Analysis of trip frequency in this study covered all purpose trips. Further, “a trip” was defined as a journey made to a destination for a purpose notwithstanding the number of modal interchange. As shown in Table 2, majority of the respondents (97.0%) made at least one trip in a day, while 3.0% made no trip. Those who made just a trip represent just 1.0%. Further, 51.1% of respondents made two trips, 31.3% made three trips, 11.9% made four trips while 2.6% made more than four trips in a day. This implies that apart from the trip originating from homes and home bound trips, respondents usually take an additional trip different from the major trip purpose for the day. Such trips may include shopping, social and religious. The aggregate of all trips made by the respondents was 4565 trips. Thus, the average number of trips made by a respondent per day is 2.6 trips. This is approximately three trips per respondent per day. This figure is like what obtains in other major cities across the world.

<table>
<thead>
<tr>
<th>Number of Trips (a)</th>
<th>Frequency (b)</th>
<th>Percentage</th>
<th>Total Trips (a x b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18</td>
<td>1.0</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>913</td>
<td>51.1</td>
<td>1826</td>
</tr>
<tr>
<td>3</td>
<td>541</td>
<td>30.3</td>
<td>1623</td>
</tr>
<tr>
<td>4</td>
<td>213</td>
<td>11.9</td>
<td>852</td>
</tr>
<tr>
<td>5</td>
<td>36</td>
<td>2.0</td>
<td>180</td>
</tr>
<tr>
<td>6</td>
<td>11</td>
<td>.6</td>
<td>66</td>
</tr>
<tr>
<td>No Response</td>
<td>53</td>
<td>3.0</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>1785</td>
<td>100.0</td>
<td>4565</td>
</tr>
</tbody>
</table>

4.2.2 Trip Purpose

Six major trip purposes were identified in this study and they include work, shopping, school, social, religious and others. Others as a trip purpose include those trips made to obtain services like medical, banking, auto repairs and so on. Work and school trips are regarded as non-discretionary trips while others are regarded as discretionary trips. As demonstrated in figure 5.4, 67.0% of respondents made non-discretionary trips (work and school), 30.0% of them made discretionary trips (other types of trips apart from work and school) while only 3.0% of the respondents had no trip purpose since they made neither discretionary nor non-discretionary trips. It is further revealed in figure 6.1 that 56.1% of the respondents made work trips, 7.8% made shopping trips, 10.9% made school trips, 11.4% made social trips, 6.3% made religious trips and 4.4% made other trips. This implies that majority of the respondents made non-discretionary trips than discretionary trips.

4.2.3 Trip Mode

This study reveals that different modes of road transport were used by the respondents for all the trips recorded. Table 3 shows that 97.0% of respondents used one mode or the other for their daily trips while just 3.0% made no trip during this study. Further, the table revealed that car and bus were dominantly used by respondents for their various trips, 44.0% of respondents used car while 33.2% used bus. It is further revealed that 6.7% and 7.7% of
respondents used walk and motorcycles/3wheelers respectively for their daily trips. Only 3.9% and 1.5% of the respondents used taxi and the newly introduced bus rapid transit respectively. The use of rail by respondents was low as less than 1.0% used the mode. These results suggest that car and bus are the two major modes of travel in Lagos. The implication of this is that the proportion of respondents who rely on public transport (motorcycles, 3-wheelers, taxi, bus and rail) for their daily trips (46.4%) is almost the same with those who rely on private transport (44.0%). The predominance of low occupancy vehicles (car and bus) and near absence mass transit (bus and rail) in Lagos are pre-conditions for traffic congestion.

### Table 3: Trip Mode

<table>
<thead>
<tr>
<th>Trip Mode</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk</td>
<td>119</td>
<td>6.7</td>
</tr>
<tr>
<td>Motorcycle/3 wheelers</td>
<td>136</td>
<td>7.7</td>
</tr>
<tr>
<td>Car</td>
<td>786</td>
<td>44.0</td>
</tr>
<tr>
<td>Taxi</td>
<td>70</td>
<td>3.9</td>
</tr>
<tr>
<td>Bus (Danfo/Molue)</td>
<td>593</td>
<td>33.2</td>
</tr>
<tr>
<td>Bus Rapid Transit</td>
<td>26</td>
<td>1.5</td>
</tr>
<tr>
<td>Rail</td>
<td>1</td>
<td>.1</td>
</tr>
<tr>
<td>No Response</td>
<td>53</td>
<td>3.0</td>
</tr>
<tr>
<td>Total</td>
<td>1785</td>
<td>100.0</td>
</tr>
</tbody>
</table>

#### 4.2.4 Trip Time

Analysis of trip time of respondents as shown in Table 4 revealed that majority (65.9%) of respondents made trips that were lesser than one hour while 31.2% of respondents made trips of one hour and above. Further, the table 20.0% made trips of between 1 – 2 hours. Respondents whose trip time was above 2 hours represent 11.2%. As earlier observed, 3.0% of respondents had no response. Consequently, the mean trip time for this study was 1.86 hour. This suggests that majority of households in Lagos spend relatively long time in traffic for most of their daily trips. Thus, this becomes a major travel challenge in Lagos and many other large cities where urban travel is undertaken by low occupancy vehicles.

### Table 4: Trip Time of Respondents

<table>
<thead>
<tr>
<th>Trip Time</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1Hr</td>
<td>1176</td>
<td>65.9</td>
</tr>
<tr>
<td>1-2Hrs</td>
<td>357</td>
<td>20.0</td>
</tr>
<tr>
<td>2-3Hrs</td>
<td>96</td>
<td>5.4</td>
</tr>
<tr>
<td>&gt;3Hrs</td>
<td>103</td>
<td>5.8</td>
</tr>
<tr>
<td>No Response</td>
<td>53</td>
<td>3.0</td>
</tr>
<tr>
<td>Total</td>
<td>1785</td>
<td>100.0</td>
</tr>
</tbody>
</table>
4.2.5 Trip Length

As shown in Table 5, 47.5% of respondents made trips lesser than 5km. Further, the table revealed that 18.3% made trips of between 5 -10km. Those who covered between 11-20km and above 20km represent 15.7% and 15.6% of respondents respectively. Thus, 49.6% of respondents travel above 5km on daily basis. The mean trip length from this analysis is 3.8km per person per day. This suggests a fairly-short trip length among residents although about 31% travel above 10km per day.

Table 5: Trip Length

<table>
<thead>
<tr>
<th>Trip Length</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5km</td>
<td>847</td>
<td>47.5</td>
</tr>
<tr>
<td>5-10km</td>
<td>326</td>
<td>18.3</td>
</tr>
<tr>
<td>11-20km</td>
<td>280</td>
<td>15.7</td>
</tr>
<tr>
<td>&gt;20km</td>
<td>279</td>
<td>15.6</td>
</tr>
<tr>
<td>No Response</td>
<td>53</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1785</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

5.0 Conclusion

This study has examined the character of transport system and travel behaviour in Lagos and concludes that Lagos is still far from being a cool city and may take a relatively long time to become one. This is because the socio-economic development of the rapidly growing city with a current population of about 20 million is driven by road-based transport. Public transport system in the city is dominated by informal services. Organised public transport system is relatively young and very limited in network.

Vehicle population has increased by 234% in the last 10 years and over 70% of the vehicle fleet in operation are 15 years old or more, thus, the transport system in Lagos metropolis is a significant source of environmental pollution. This situation is worsened by the fact that over 70% of the industries in Nigeria are located within the city. Analysis of residents’ travel behaviour reveals unsustainable travel pattern as more than 90% of daily trips is road based, average trip time is approximately 2 hours over an average trip length of 10km suggesting a high level of road congestion. Massive transport infrastructure is ongoing, but still largely road based. Development of rail transport is rather slow compared to the travel demand in Lagos.

The government is conscious of the climate change implication of the existing transport system and travel pattern and has made efforts to develop The Lagos Climate Change Adaptation Strategy (LAS-CCAS) which recognizes multimodal transport as a key measure for climate change mitigation and adaptation. The multimodal system will be mass transit driven (bus and rail). Other climate change adaptation strategies include setting current emission standards at Euro 2 (for used vehicles) and Euro 4 (for new vehicle), as well as a series of law enforcement measures concerning inspection, maintenance and certification and promotion of NMT. A major concern in all of this is the slow pace of policy and plan implementation. For Lagos to become a cool city, it is important that a workable transport policy is legislated with a strong political will to implement the strategic transport master plan. There is also the need to professionalize the transport sector for capacity building. There is the need to change the transport orientation of the people towards NMT.
References


