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School of Transportation Sciences

Master of Transportation Sciences

Master's thesis

Sustainable Event Mobility: A Case Study of Religious Events in Lagos, Nigeria

Kofoworola Modupe Osunkoya

Thesis presented in fulfillment of the requirements for the degree of Master of Transportation Sciences, specialization Transport Policy and Planning

SUPERVISOR :

Prof. dr. Elke HERMANS

MENTOR :

Mevrouw Lieve CREEMERS



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Preface

My experience from this research has exposed my understanding of sustainable event mobility in a developing city like Lagos, Nigeria. Studies on transportation mainly focus on transport type, mode choice, infrastructure, transport policy, and contribution to a country's economic activities in developing countries. With this research, I have a different perspective on sustainable event mobility.

First, I would like to thank the following stakeholders for their contribution of knowledge towards the success of the research: Mr. Seyi Osiyemi, a former Chief Operating Officer for Lagos Bus Service Limited, formerly called LAGBUS; Mr. Obafemi Tayo, the current Head of Operation for a BRT bus service provider, Primero transport service limited; and a representative from the RCCG Redemption Transport Unit that organizes 'The Holy Ghost Congress' event annually.

Secondly, my promoter Prof. Dr. Elke HERMANS, and Supervisor, Mrs. Lieve CREEMERS, for their feedback, patient advice, and guidance throughout the research, allowed me to express my knowledge towards sustainable event mobility in Lagos. Lastly, my parents, family, and friends supported me with love and understanding.

Thank you all for your unwavering support.

Disclaimer

This master thesis was written during the COVID-19 crisis in 2020-2021. This global health crisis has had an impact on the writing process, the research activities, and the research results that are at the basis of this thesis because:

- There was limited access to relevant data like road crashes*
- I wasn't able to do my field research as initially planned*
- The necessary data collection from the Experience Lagos event organizers and ride-hailing companies was difficult/impossible.*

Summary

Striving towards sustainable event mobility in a developing country like Nigeria comes with challenges of existing transport problems. In the Western region of Nigeria lies the smallest State by land area but the busiest commercial hub and the business engine of Nigeria, Lagos State. Lagos attracts and accommodates different local and international event audiences, rural-urban migration, diverse ethnic groups, and social classes across Nigeria, increasing traffic flow and movement. This research studies two religious events, 'the Experience Lagos' and 'the Holy Ghost Congress', both annual events held in December. The 'Experience Lagos' is a day event that occurs on the first Friday in December with a maximum of 500,000 people in attendance and thousands of people from all over the world join online. The 'Holy Ghost Congress' is a one-week event from Monday to Sunday in the first week of December and accommodates more than 200,000 people per day, with thousands joining the live stream from all over the globe. Yearly, on the day both events occur and account for traffic congestion, overflow of people around the event locations, noise & air pollution, high volume of car dependency, and road networks vulnerable to road crashes.

Therefore, this research analyzed the current use of transport networks and modes in Lagos, the type of transport networks and modes used during the religious events, the current measures for sustainable transport, and Lagos' existing transport policies. Secondary data collection methods like literature review from international journals, websites, books, newspapers, Lagos State Government Transport Agency website, and Road Traffic Crashes (RTC) from the Federal Road Safety (FRSC) Corps Statistics road traffic crashes have been applied. The primary data collection consisted of an online survey free and open among inhabitants of Lagos and a semi-structured interview with the event organizers (the Holy Ghost Congress) and BRT bus service providers (Primero, LAGBUS) in Lagos.

The analysis recommends sustainable mobility solutions for a congestion-free large event in developing countries, most importantly African cities. Informal transport modes drive the transport system in a developing country, therefore integrating them into the transport plan while providing a coexistence environment of the formal and informal transport system to meet the demand for transport during and after large events is essential for the sustainable economic growth of an African city.

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1. INTRODUCTION

A mega-event in a country can set the country worldwide, and urban transport can be a significant determinant in this mega-event's success or failure. Installation and maintenance of transport infrastructures can be a high investment prior, during, and after the event. Therefore, without global planning (before, during, and post-occasion), urban transport can become a burden instead of an advantage to the host city and the resident population (De Menezes & de Souza, 2014). This form of transport economy has generated competition among cities globally to achieve the title of global cities. One international business strategy is the mega event strategy, which has successfully won the Olympic Games in Barcelona 1992 (De Menezes & de Souza, 2014). "The Barcelona model" explains the utilization of a mega-event that has influenced urban transformation and urban marketing, reflecting its image as a world city and tourist route (De Menezes & de Souza, 2014). After the mega-events, there are usually fewer benefits left for the host community, while the high government investment in infrastructure and maintenance generates post-event loss to the government and, therefore, the resident population. The two main actors are answerable for completing mega-events with different needs, being the owners of the international event (FIFA, IOC, and others) and native government; all determine the method of urban transformation necessary for the event and visitors. In most cases, there is a conflict concerning the extent that the event owner is concerned with the immediate need for the short term, while local authorities aim to meet the expectations of those who need these benefits permanently (Kassens, 2009).

Not all 'mega-events are 'mega' depending on the focus, different dimensions, and degree of events. Various scholars defined if and how an event is a mega-event. Muller (2015) described mega-events as occasions of a fixed duration that (a) attract a large number of visitors, (b) have an extensive mediated reach, (c) come with high costs, and (d) have significant impacts on the built environment and the population. Examples are Expo, Summer and Winter Olympics, Football World Cup, European Football Championship, Asian Games, Commonwealth Games, Pan American Games, Universiade. Other scholars included political summits, conventions or festivals, sports events, while others focus on sports events only (Muller, 2015). For example, the Winter Olympics is a mega-event like single-sports events such as the Rugby World Cup or the Super Bowl. Some have suggested a minimum of one million visitors to make an event qualify as a mega-event by directly using the number of visitors. For example, tickets sold during the event estimate the number of attendance even though there could be an overestimation of unique visitors (Muller, 2015). Conversely, using urban transformation to define a mega-event, there must be a long-term consequence for the city's significant and/or permanent urban effect. An event that does not intervene to a considerable degree in its host city, region, or country would not qualify as a mega-event (Muller, 2015).

Furthermore, to plan a large event, mega-events, or Giga events, sustainability is essential. Cities are growing daily, and infrastructures are overstressing. For

example, the host communities' mobility pattern faces congestion due to a lack of unplanned sustainable event mobility. According to the United Nations Environment Program (UNEP, 2012), "a sustainable event is defined as an event that designed, organized and implemented in a way that minimizes potential negative impacts and leaves a beneficial legacy for the host community and everyone involved thereby balancing Environmental, Social and Economic responsibilities. During such an event, environmental responsibilities are remarked as low-emission transport and mobility, waste reduction, reuse and recycling, water and energy efficiency, exclusion of dangerous and unsafe substances and material, climate targets" (UNEP, 2012).

Consequently, achieving a sustainable event poses a big problem in Lagos, the largest city in Sub-Saharan Africa, by population. Nigeria's economic and commercial capital has an estimated population for 2021 of 14,862,111 and a growth rate of 3.44% per annum (World Population Review, 2021). It has a complete area of 3,577.28 square kilometers, of which 779.56 square kilometers (representing about 22% is wetland (Lagos Government, 2013) and a population density of 6,871 residents per square kilometer (17,800 per square mile), according to (World Population Review, 2021). Compared to other African cities like Kinshasa, Congo, and Cairo in Egypt, Lagos is the highest population density (Appendix A). The road network's poor condition and the public transport system affect the city's working and living needs, particularly the foremost vulnerable.

In Nigeria, many large free religious events occur annually, with more than 500,000 people in attendance physically, given the strong influence of religion in the culture and beliefs of Nigerians. The increase in church population has led to the expansion of Church auditoriums to mega auditoriums, especially in Nigeria, one of the countries with Africa's highest Christians (Opera, 2019). These religious organizations have their headquarters in various parts of the country, with Lagos as a central commercial hub accommodating events, and its neighboring State (Ogun State), the western part of Nigeria (Figure 1a), among other States. The commercial hub of Nigeria, Lagos, accommodates two religious events, and each event holds either from the evening to the following day of the event day, making it all night, while another has a maximum of four hours each day for a week. Once a year, these events are organized simultaneously, usually the first week in December, which is an additional challenge for the city. These events affect the movement of residents and visitors in Lagos and outside Lagos, thus generating lots of traffic and environmental pollution within the host communities and to users of the road. Two events pose similar attributes irrespective of their location, i.e., 'The Experience Lagos' and 'The Holy Ghost Congress.' The Experience Lagos event is organized in a large open square located in the heart of Lagos, while the Holy Ghost Congress expanded their campground and relocated 20km away from Lagos to accommodate more worshippers. Each event uses Lagos' road infrastructure (Figure 1b) that connects and distributes traffic from outside and within Lagos to its neighboring state.



FIGURE 1(a) Map of Nigeria Showing Ogun State and Lagos State (Author).



(b) The Two Religious' events (Author).

'The Experience Lagos' is an annual free all-night gospel concert with a sitting capacity of 50,000 in Tafawa Balewa Square in Lagos Island launched in December 2006 with over 70,000 attendees. The event has recorded over a million people attendees from within and outside the country since it began (The Experience, 2020), including live streams on all social media platforms like YouTube, Facebook Live, Periscope, Mixlr from around the world as described in details in chapter 3. This attendance includes 500,000 people as recorded in 2019 at the Tafawa Balewa Square in Lagos, Nigeria, with more watching online from all over the globe, creating a digital footprint in all seven continents of the world. It is the most prominent gospel musical concert in Africa. The event organizers must manage thousands of people coming in for the event simultaneously, which is a real challenge for these organizers, public transport operators, and local authorities. The unique characteristics of travel demand for such a special event pose significant challenges to the event's transportation system managers. In 2020, the 15th edition of the event took a different experience, from physical appearance to virtual global Experience due to the Covid-19 pandemic. The Experience Lagos is a worldwide concert that showcases artistic, musical performances, goodwill messages, and intercessory prayers by internationally recognized artists, Icons, and Luminaries uniting under Christ's banner to amplify the gospel and share his universal message of peace and goodwill to all (The Experience, 2020). For the

past 14 years, the one-day all-night event has contributed to the traffic congestion, noise, and air pollution, environmental waste felt on the day of the event and the next day within the city of Lagos, which means the event has a significant impact for (at least) 2days per year.

On the other hand, the Redeemed Christian Church of God (RCCG), a Pentecostal megachurch and denomination founded in Lagos, with an average church attendance of 100,000, organizes the Holy Ghost Congress event (Thumma & Bird, 2015). The religious organization conducts other events as described in chapter 3. Still, the research will focus on '**The Holy Ghost Congress**', an event that holds in December, which brings people together at the Redemption Christian Church of God National Camp Arena, along the Lagos-Ibadan expressway from different parts of the world physically and virtually. The Holy Ghost Congress event is a one-week event that holds on the first week of December, with over 200,000 people for physical gathering per day, including thousands of people on the live streams of the church social media platform and church-owned TV and Radio stations (Bird, 2020). The first virtual convention took place in December 2020 because of the global pandemic. The event contributes massively to the traffic congestion and transport degradation within Lagos state and outside even though basic infrastructure is regenerated and reconstructed. The capacity of the transport network and transport modes within and outside Lagos overstretches every time the two events take place on the same day, usually the first Friday in December of every year.

Currently, there is about 2,600 km of often congested roads with more than 1.6 million vehicles and 226 cars on Lagos roads per km compared to the National average of 16 vehicles per km every day (Olasunkanmi, 2019), which is significantly higher than that of cities like London and Singapore, with 172 vehicles/km. The public transport bus density is about six buses per kilometer and 80 cars per 1000 people. Lagos is the only city globally with over 10million without a functional mass transit system (Osiyemi, 2019). The Federal and State government put in place policy reforms to improve the country's transportation infrastructure. They include; Economic recovery and growth plan, Non-Motorized Transport policy, Infrastructure and Network, Built Environment Regulation which will provide a functional and sustainable transport network.

Therefore, the research will combine two religious' events, 'The Experience Lagos' and 'The Holy Ghost Congress,' to investigate and develop a transport policy for a sustainable congestion-free event in Lagos. The need for a consistent transport network strategy that ensures safe, effective, and healthy conditions during the events cannot be overemphasized. Hence, improving accessibility by sustainable transport modes and temporary event transport plans is worth the effort in Lagos Nigeria, it allows more people to visit the event, avoids large traffic jams, offers more comfort for all visitors, is safer, and contributes to a greener image of the event (Muller, 2015). Road traffic congestion is still a problem for the State to solve when there are no events, coupled with a low road network density to achieve sustainable event mobility. The monetary exchange rate of the Nigeria

currency Naira (₦), Euro Currency (€), and America Dollar (\$) as at the time of conducting this study is ₦560 to €1.

The research uses the analysis from the survey data to recommend sustainable transport measures for sustainable congestion-free events in Lagos. Chapter 1 introduced the background and continues with the objectives, problem statement, research questions, and methodology brief. Chapter 2 describes the transport situation in Lagos. Chapter 3 & 4 deal with the transport situation during religious events and the existing transport policy in Lagos. Chapter 5 & 6 discuss the method and results in detail. Chapter 7 explains the limitation, conclusions, and recommendations for the research questions.

1.1 Objective

This research aims to analyze mobility solutions and set up an event transport policy for sustainable, congestion-free Lagos events. The specific objectives are:

- a. Analyze the current use of the transport network and modes in Lagos.
- b. Analyze the transport network and modes during 'The Experience' and 'The Holy Ghost Congress' events in Lagos.
- c. Examine the current measures for sustainable transport modes in Lagos.
 1. Access the existing transport policies in Lagos
 2. Examine the transport policy and regulatory frameworks that can adapt for sustainable event mobility.
- d. Determine and assess sustainable mobility solutions for a congestion-free large event.

1.2 Problem Statement

Organizing a large event in a densely populated environment can be a real challenge. In literature, urban transport is a significant determinant in such an event's success or failure. In a city like Lagos, Nigeria's most populace city in Sub-Saharan Africa, organizing a sizeable sustainable event has been nearly impossible due to an insufficient transport network with pressure on the existing transport infrastructure and transport modes. There is, therefore, a need to develop more sustainable mobility recommendations for events. In this research, 'The Experience Lagos' and 'The Holy Ghost Congress' events are taken as case studies to inspire other significant events in African cities.

In 2020, the state government purchased 80 BRT environmentally friendly buses for the BRT Reform project worth N3.9billion (€6.9million). Unfortunately, the buses were destroyed by political violence in October 2020 because of a nationwide peaceful protest against police brutality on Nigerian youth. This incident will create a setback in the supply and installation of mass public transport buses for sustainable transport modes. Also, due to a lack of data, there might be a restriction in understanding the impact of road crashes or accidents on motorized traffic for sustainable mobility.

1.3 Research Questions

The preceding has prompted several questions regarding the transport network and transport modes, sustainable mobility solutions, and an event strategy in Lagos. The research formulated the following set of relevant questions to enable the study to attain its stated objectives:

- a. What are the current use of transport networks and transport modes in Lagos?
- b. What type of transport network and modes are used during the 'The Experience and The Holy Ghost Congress' Lagos event?
- c. What are the current measures for sustainable transport in Lagos?
 - i. What are the existing transport policies in Lagos?
 - ii. What are the transport policy and regulatory frameworks that can be adapted for sustainable event mobility?
- d. Which sustainable mobility solutions could be considered for a congestion-free large-event?

1.4 Methodology

The research uses primary and secondary data collection: literature review from international journals, websites, books, newspapers, Lagos State Government Transport Agency website, and Road Traffic Crashes (RTC) from the Federal Road Safety (FRSC) Corps Statistics road traffic crashes. Response from the online questionnaire survey and semi-structured interviews from the event organizers (The Holy Ghost Congress) and BRT bus service providers (Primer, LAGBUS) in Lagos. The data sources provided information about the current use of transport networks and transport modes in Lagos, the type of modes used during religious events, as explained further in chapter 5.

Furthermore, the research used secondary data published by regulatory bodies and agencies of Lagos State Government Transport Agencies to understand the current transport policies in Lagos. The information was further interpreted to provide sustainable mobility solutions for congestion-free events, as described in chapter 6.

2. TRANSPORT SITUATION IN LAGOS

2.1 Transport Networks and Transport Modes in Lagos

Transportation networks are a framework of routes linking locations that determine any region's economic and social interactions. The section describes the existing transport networks and modes in Lagos, which include road types, the Bus Rapid Transit (BRT), Lagos Rail Mass Transit (LRMT), Lagos State Waterways (LASWA) and, informal transport systems. Rodrigue (2020) defined a network as the framework of routes within a system of locations identified as nodes, where a route is a single link between two nodes that are part of a more extensive network such as roads and rails or air and sea corridors. The setting of networks is the outcome of various strategies, such as providing access and mobility to a region, reinforcing a specific trade corridor or technological developments, making a particular mode, and its network more advantageous over others. Most importantly, the relevance of a network is related to its connectivity.

There are critical elements linked with transportation networks such as nodes, links, flows, hubs, or corridors (Figure 2). Network structure ranges from centripetal to centrifugal regarding the accessibility they provide to locations (Figure 3). A centripetal network favors a limited number of areas, while a centrifugal network tends not to convey any specific locational advantages (Rodrigue, 2020). Lagos transport network possesses such qualities; the transport services along the flow network are determined by the activities, place, and time. According to the research question on the current use of transport networks and transport modes in Lagos, the constant movement from Lagos features and economic activities, it is hard to know its specific network pattern and flow. Although with the trip pattern, early morning rush generates traffic by people going to their workplace while at noon, traffic is light, and at evening it is heavy. Traffic is collected from federal roads and state roads and then distributed to inner roads to link flows. This type of network is point-to-point where a direct connection occurs without interruption of services that reflect users' preferences. Therefore, the efficiency of a network represents its ability to support flows that depend on nodes and links. The nodes indicate how it is possible to access connected links as an entry and/or exit node.

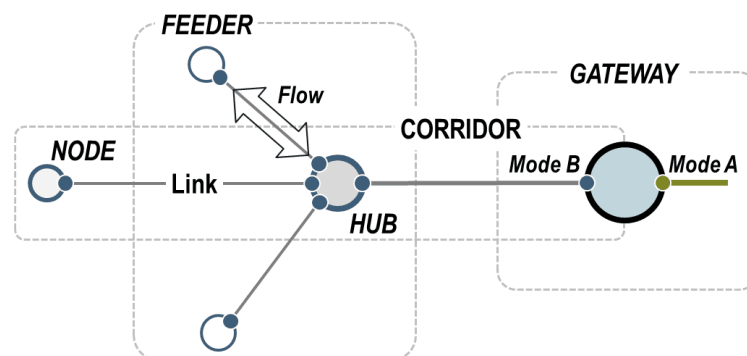


FIGURE 2 Structural Components of Transport Networks (Rodrigue J. P., 2020).

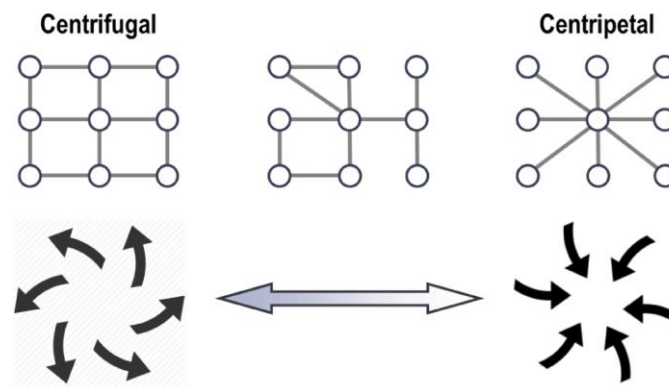


FIGURE 3 Centrifugal and Centripetal Networks (Rodrigue J. P., 2020).

In general, a functional transport system in a well-designed human settlement provides adequate, reliable, safe, and affordable transport systems that increase socio-economic growth and development. It can also play a significant role in promoting regional cooperation through the flow of people and goods along the import and export corridors of neighboring countries and providing a healthy economy. However, other sectors influence transport and make up the urban system and the entire human settlements system (Atubi, 2013). Road transport forms essential means of transportation throughout Lagos State and its extension to a different state with different mode types (Table 1). In Nigeria, there are three categories of the **road network**, Trunk A (Appendix B) roads maintained by the Federal Government; Trunk B sustained by the State Government; (Appendix C) and Local roads maintained by the Local Governments (Appendix D) with aids from the State Government (Lagos Urban Transport Project, 2002). Over the years, the state government has repaired the federal roads within the state. For example, Apapa Wharf road, the largest and busiest port in Lagos, and the nation is a Federal road. It is of economic importance to the country that generates heavy traffic experienced on highways within the State (Akintayo, 2011).

However, the primary road network (Federal and State Roads) links the major population centers and covers 4,921km, three lanes, and two lanes of 1.32meters width. One-third of the road surface is a concrete deck, and 43.0% are asphaltic concrete, while some 23.2% are bituminous (Atubi, 2013). The metropolitan Lagos network structure runs through the Lagos mainland urban area's central section on a North-South axis (Figure 4) and distributes transport inward using the secondary roads circulated east to west and collect traffic from access roads (inner roads). The roads provide a connection from different sub-urban areas within Lagos (see chapter 4.3.2).

million in 2009 toward building a 13km extension of the BRT corridor (worldbank.org). The pilot corridor, BRT-Lite, runs along Ikorodu Road, Western Avenue, and Eko Bridge through a 22-km highway stretch between Mile 12 and Lagos Island (the traditional central business district). The corridor is 65 percent physically segregated and 20 percent separated by road markings (Figure 5). The operation and commercial risks of over 300 buses by private operator serves the route on a 10-year contract with the Lagos Metropolitan Area Transport Authority (LAMATA) (Figure 6). The bus services include suitable mobility for people with special needs to ease boarding, where the buses have lower floors and ramps. According to a world bank assessment in 2017, the journey times have reduced from 45 to 30 minutes for over 200,000 daily commuters, and the number of people who can access Lagos's most significant market area within 45 minutes has grown by 65%. Public transport expenditure by poor households along the route in real terms has fallen by 31%; CO2 emissions on the corridor have declined by 8.5%, even while overall traffic has increased by 43%, road accidents have reduced significantly (Lagos Metropolitan Area Transport Authority (LAMATA), 2019).

Lagos Bus Service Limited (LBSL), formally called LAGBUS and Primero transport service limited, is one of the BRT Bus service providers. In 2015, Primero commenced an operation that provides a high-quality bus-based transport scheme that delivers fast, convenient, and affordable services at metro-level capacities (Primero, 2020). The buses also enjoy the government infrastructure of dedicated lanes for buses to move from point A-B and modern fare collection modes. The BRT operation is cheaper, more reliable, convenient, and faster. Even with that, BRT operation is often affected by traffic congestion and ongoing road repairs when necessary, leading to delay and increased waiting times for commuters at different shelters. The project is gradually changing Lagos city's narrative with its iconic architectural design of the bus terminals that might become well-conceived and well-implemented infrastructure, with state-of-the-art system management and security monitoring equipment, alongside techniques that monitor traffic along the corridor. Much to be done in implementing a successful urban transport project comprehensive enough to address land use-transport integration and promote multi-modal integration in Lagos is gradually moving from paper to reality.

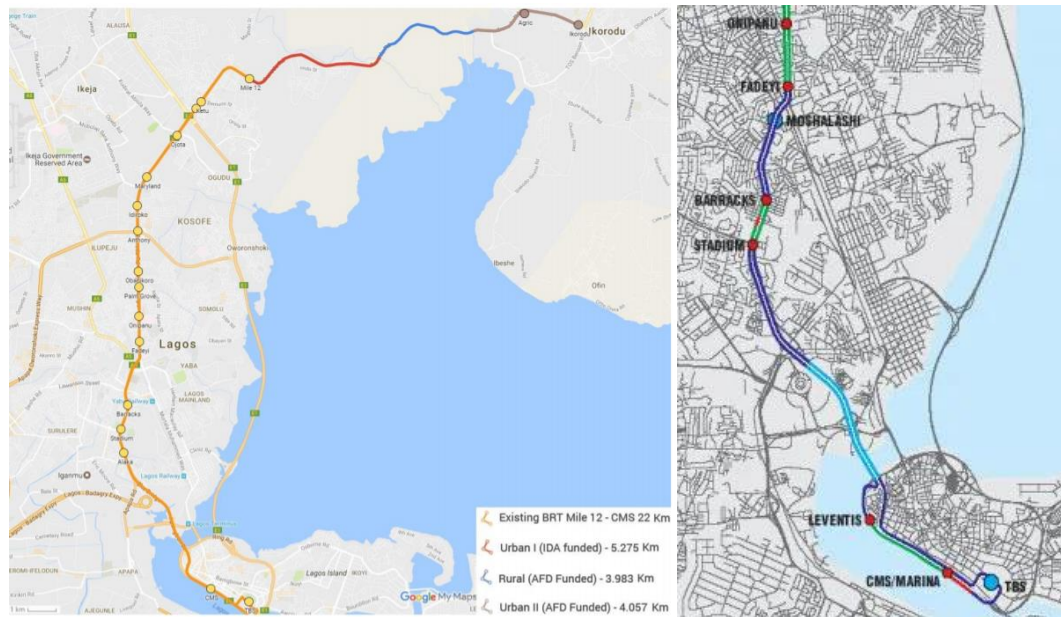


FIGURE 5 Lagos BRT Corridor (Lagos State Government, Metropolitan Area Transport Authority (LAMATA), 2017).



FIGURE 6 Lagos's first BRT bus stop (Lagos Metropolitan Area Transport Authority (LAMATA), 2019).

Nonetheless, with the state government's help to continuously rehabilitate and reconstruct the state roads, reduce traffic congestion on the island and mainland, and strengthen the state's economy, local and international construction companies commenced implementing road projects (Razaq, 2019). For example, ongoing rehabilitation works on the BRT corridor of Ikorodu Road, a busy road on the mainland. This road collects traffic from the Island and distributes it to the mainland. The project is coordinated by Lagos State Transport Management Authority (LASTMA) in collaboration with other law enforcement agencies for vehicular movement during the entire period of construction work.

Another transport infrastructure is the **Lagos Rail Mass Transit (LRMT)** network under the Strategic Transport Master Plan (STMP), operated by the Lagos Urban Rail Network (LURN). It is a network of urban rail-based systems covering seven major corridors of high commuter traffic demand within and beyond metropolitan Lagos. A 27 km blue line projected to carry over 200 million passengers in a year is under construction and will commence operations in 2022

(Gil & Msulwa, 2015). The Apapa railway corridor is receiving the finishing touches to start the process in late 2021. It will improve the transportation of heavy goods from the central port Apapa port to other neighboring states, reduce traffic congestion and road accidents on major roads.

To further decentralize traffic and provide an integrated transport network, the **Lagos State Waterways (LASWA)** was established in 2008 to monitor and ensure compliance for all marine-related matters. Lagos State Ferry Services (LFSC), Lagferry, responsible for Water Transportation services within Lagos State, is the leading service provider with other private service providers like Uberboat, Metroferry. Currently, Lagos is running water transport on 12 routes on various terminals and 30 jetties with more than 20 boats (Figure 7) which are: (A) Ikorodu-Marina/CMS; (B) Marina – Mile 2; (C) Ikorodu – Addax/Falomo; (D) Ikorodu-Ebute Ero; (E) Marina-Ijegun Egba-Ebute-Ojo; (F) Mile 2 – Marina/CMS-Mekwen-Falomo; (G) Badore – Ijede; (H) Badore – Five Cowries; (I) Marina – Oworonshonki; (J) Ebute Ojo – Ijegun Egba; (K) Oworonshonki – Five Cowries (L) Baiyeku – Langbasa. The local construction of the Lagferry boat includes state-of-the-art technology and a capacity to ferry 40 to 60 passengers per trip, which provides comfortable seats, in-built Wi-Fi, and modern technological devices that will aid smooth operations and safety (Olasunkanmi, News, 2020). In June 2020, Lagferry recorded its highest passenger ridership on a single day of ferry operations, with its 12 passenger boats commuting a total of 1,175 passengers, covering a cumulative distance of 1422km across strategic routes in Lagos state (Theresa, 2020). Private service providers like Metroferry Marine Services Limited (MMSL) commenced commercial operations in 2009 and ferried over 18,000 passengers a day (MetroFerry Marine Services Limited, 2020). Earlier, transport infrastructure and services were at levels that supported a population of no more than 6 million. As a result, levels of efficiency and productivity in the metropolitan area had been adversely affected by a growing weakness in the physical infrastructure required to support the population's basic needs (Lagos State Government, Metropolitan Area Transport Authority (LAMATA), 2017).

Apart from the mass public transport BRT, the on-going rail construction, and the ferry services (Appendix E), there exist **informal transport systems** known as paratransit modes (Appendix F) provided by a fleet of 75,000 privately operated minibus services (danfos), tricycles (Keke Napep), motorcycles (Okada) and shared-taxis (The World Bank, 2016). According to mode split data, 70 percent of motorized trips are by paratransit modes, characterized by their lack of safety standards, limited regulation, poor maintenance, inadequate security, and frequent violation of traffic laws that were not enough to transform the mobility and efficiency of the city (UN-Habitat, 2012). The lack of sufficient mass public transport gave rise to traffic congestion, poor-quality public transport outlook, the deterioration of the existing roads, rising road accidents, and increasing air pollution rates. With the rising population, increasing population density, and over 70% of Lagos in the form of slums or informal settlements, the future transportation systems in the city without solid bias for land use planning and a sustainable integrated mobility system will not lead to the envisaged significant

transformation of the town (Lagos Metropolitan Area Transport Authority (LAMATA), 2019).

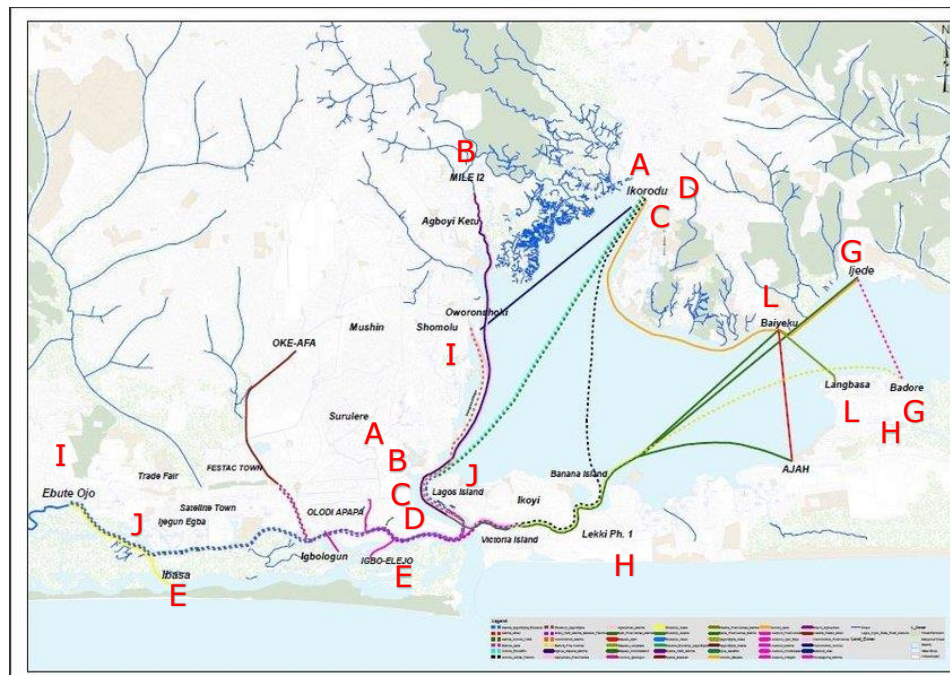


FIGURE 7 Map of waterways route in Lagos (Ogunbajo, Akinpelu, & Odubela, 2017).

The integration of **two-wheelers** into the transportation masterplan of the city is taking longer than expected. On-demand motorbike hailing companies and private motorcycle owners have diversified by meeting the needs of Lagos's delivery services. Since the ban of two-wheelers for commercial purposes on Lagos major roads (Jake B. , 2020), on-demand motorbike hailing companies provide delivery services of all kinds within the city and neighboring states. They are safe, reliable, and fast without having to worry about traffic congestion and travel time. They offer delivery services, pick up and drop off; this has led to the increased demand of dispatch riders on the transport network system. The categories of road users on the transport network include the Motorist (including private); the Pedestrian consisting of children, the elderly, adults, the Hawker, traders; and the Cyclist consisting of bicycles, motorcycles, and tricycle even though there is less pedestrian and bicycle infrastructure for this category of road users.

2.2 Sustainable Transport Modes in Lagos

Sustainable transportation is the capacity to support a society's mobility needs in a manner that is the least damageable to the environment and does not impair future generations' mobility needs (Rodrigue J. P., 2020). In developed and advanced technology countries, advances in car-sharing technologies and self-driving vehicles' potential highlight a much more sustainable car asset usage that could remove a high number of cars from the streets. Also, vehicle emissions will reduce but contradict public transit and non-motorized transport to promote sustainable transportation (Rodrigue J. P., 2020).

In Africa, Nigeria is the most populated country with the largest road network in West Africa and the second largest in Sub-Saharan Africa (Udoji & Szpytko, 2020). It comprises 36 states, Lagos state with the smallest land area (1,171 km²) and the most populous state in southwest Nigeria. Therefore, to address the research question on the sustainable transport modes in Lagos, climate change, environmental pollution, the State Transport Master Plan, the Bus Reform Initiative (BRI), the ban of motorcycle-hailing companies, land-use change, and the reconstruction of transport infrastructure is explained. Lagos, the economic capital of Nigeria, with enormous infrastructure challenges and increasing demand for transport, experiences unreliability of bus services, inadequate transport infrastructure like damaged roads that constantly result in automobiles' breakdowns, thereby causing heavy, uncontrollable traffic. Lagos roads are damaged mainly by water from sea-level rise caused by **climate change** resulting from excessive population growth and increased human activities (Ede & Oshiga, 2014). Climate change increases the rate and intensity of extreme weather events in different parts of Nigeria; they include but are not limited to desert encroachment in the northern part of Nigeria, drying up of rivers, gully erosion in the southeastern part of the country, rising sea level and flooding in various parts of the coastal areas of the country including Lagos (Ede & Oshiga, 2014). Lagos lies 6m above sea level and has a tropical climate. Most months of the year have significant rainfall with an average temperature of 26.7 °C and an annual rainfall of 1783 mm (70.2 inches) (Appendix G). The least amount of rain occurs in January with an average of 39 mm (1.5 inches), while the intense rainfall occurs in June with an average of 302 mm (11.9 inches) (Lagos Climate (Nigeria), 2020). Over the years, this has led to damages to few existing infrastructures and threats to the populace's safety and health. For instance, floods encroach the streets due to the dysfunctional disposal of the 6,000-10,000 tons of rubbish generated daily in the city. After a downpour, garbage piles up in open gutters and makes moving around the streets difficult (Ayodele, 2021). According to research led by marine physicist Svetlana Jevrejeva of the UK's National Oceanography Centre, if global warming exceeds 2°C, the city is predicted to see 90cm of sea-level rise by 2100 greater risk of flooding (Ayodele, 2021).

Climate changes highly impact the Lagos transport system in sea-level rise, submerging low-lying road networks and seaports. Devastating effects of increased hurricanes and flooding on all civil built facilities, strong wind, and higher storm surges will put more land and transportation facilities at significant risk and affect the economy's diverse areas (Ayodele, 2021). Another important factor is **environmental pollution**, majorly noise and air pollution from public transportation caused by carbon monoxide, hydrocarbons, and nitrogen emission from vehicle exhaust pipes; they threaten Lagos' residence and the environment. The unfriendly noise from vehicle horns, bad vehicle engines, and motorists calling the next destination contributes to an unpleasant environment. Motorist shouting the next terminus is a traditional method used by the informal public transport mode to notify passengers of the following bus routes. The popular approach within the state's transport landscape is commonly around the minibusses 'danfo,' where

the driver is in charge of driving the bus while his assistance hugs at the bus's entrance and amplifies his voice to call in passengers (Figure 8).



FIGURE 8 Minibus services (danfo) calling passengers (Iju, 2017).

In 2016, Nigeria was on the West African countries list to import dirty fuel for vehicles and individual power generators. The World Health Organization ranks Sulphur particles from vehicle engines and generators as one of the top global risks causing heart disease, lung cancer, and respiratory problems (Martin, 2017). Rodrigue (2020) pointed out that a sustainable transportation system should encourage rapidly growing transport demands where the expansion of transportation supply is improved. Other transport modes will have alternatives, especially for road users, and balance the supply of transport modes and motorized transport. By rehabilitating, constructing, and expanding public transit infrastructure, improving existing public transit services, and making cities friendly to pedestrians and non-motorized vehicles.

In this regard, Lagos state designed a **State Strategic Transport Master Plan** to meet travel demand by 2032. The plan developed by the Lagos Metropolitan Area Transport Authority (LAMATA) is aimed at transforming the Lagos transport sector beyond its current challenges, supports the establishment of a modern integrated multimode transportation system that matches the standards of a world-class mega-city, and improves the operations of the Lagos freight transportation system (Hoelzel, 2018). The Lagos State Development Plan 2012-2025 includes laws guiding the agency to deliver transport services by different Lagos state modes. Some emphasize the need to implement an integrated transport system built from existing successful initiatives where the various transport methods (buses, trains, ferries) are brought together in location, timetabling, ticketing, and information (Hoelzel, 2018). One of the laws cited as Lagos Road Traffic Law 2012 expanded the responsibility of the Lagos State Traffic Management Authority (LASTMA) on control and management of vehicular traffic in the State to include general regulation of traffic on public highways, the prohibition of a particular mode of transportation on specified areas and code of the conduct of operators primarily drivers. In the process of using the law to outlaw the operations of motorcycle taxis (okadas) and tricycles (Keke Marwa), the

situation becomes a keen struggle between a policy's declared illegality and the livelihood of the citizens. The demand for trips in Lagos Metropolitan Area by all transportation modes is approximately 24 million per day, and the market is likely to grow to over 40 million visits by 2032 (Lagos State Government, Transportation Sector Deal Book, 2018). In 2019, minibusses (Danfo) conveyed about 72% of passengers in the Lagos Metropolis, and cars account for 65% of the road usage while minibusses account for only 28% of road usage (Osiyemi, 2019). The result shows an increasing demand for formal public transport to meet the supply of transportation in Lagos State.

Conversely, to complement the existing BRT system, the Lagos State government embarked on a **Bus Reform Initiative** (BRI) in 2019 that focused on revamping the bus mass transit system (Figure 9). This new initiative upgrades bus infrastructure, including depots, terminals on strategic routes network, bus shelters, and bus stops (Figure 10). Additionally, this initiative will acquire 20 high and medium-capacity passenger buses (Osiyemi, 2019). The BRI also included high-speed, high occupancy vehicles, dedicated bus lanes, priority signals, parking controls, and traffic management (Figure 11) that is affordable and convenient, reduces travel time and cost with real-time information that brings changes to regulation, standards, and frameworks with substantial political influence (Otinola, Kriticos, & Harman, 2019). With this new development, there is still a high demand for public transport within the State. **Primero BRT service providers** thus far purchased 434 buses in 2015 and introduced a modern, technology-driven transportation system in Lagos, intending to increase its fleet of buses to 2,000 and transport one million people daily across Lagos (Primero, 2020). Primero uses technology to deploy and monitor its buses in Lagos, air-conditioned and fitted out with free Wi-Fi, making it a comfortable and convenient alternative to traveling by private car. Primero is doing all it can to ensure Lagosians, especially its commuters, enjoy a fast, modern, cheap, and convenient transportation system around Lagos.

In 2016, **Lagos Bus Services Limited** (LBSL) started operations with the name LAGBUS to improve and deliver intelligent and sustainable bus transportation solutions to meet Nigeria's transport sector's needs and be a reference point in Africa's transport industry (Lagos Bus Services Limited, 2021). In March 2021, a contactless payment system for commuters, "Cowry card," was launched. Lagos Metropolitan Transport Authority (LAMATA) brought this to ease transportation payment and make daily commuting pleasurable and stress-free. Also, Lagos Bus Services Limited (LBSL) deploys the card to reduce traffic congestion in Lagos State, indirectly reducing private vehicles on the road (Ndubuisi, 2021).



FIGURE 9 (a) New BRT for Bus Reform Initiative (b) Primero BRT (c) Oshidi Bus depot (LAMATA, 2020).



FIGURE 10 Ikeja Bus terminal and Oshodi Intercity Terminal 3 (ecogreennews.com).



FIGURE 11 Pedestrian overpass(a), and Oshodi-Abule Egba BRT Corridor (b) (ecogreennews.com).

Furthermore, **motorcycle services** (Okada) are one of the easy and traffic-free modes of transport because they are fast and can ride through traffic. They extended their services into bike-hailing companies, bus-pooling, and ride-sharing companies that provide on-demand mobility. Some of them are Max.ng, ORide, Lara.ng, Shuttlers.ng, Gokada.ng, Bolt (Taxify), Uber, Ekocab, SafeBoda, and others (Appendix H). In March 2020, Ekocab Nigeria, in partnership with the Lagos state government and the Lagos State Taxi Drivers and Cab Operators Association, launched an e-hailing platform that will feature yellow taxis and interested private car owners (Yomi, 2019). The state's government excluded three modes in February 2020 (Okada), tricycles (Keke), and **motorcycle-hailing companies**, from 475 roads, including major highways and bridges. They provided a means of transport that mitigated Lagos' transport challenges due to the chaotic traffic situation. They had a unique role in the transportation system because they could carry customers to places other public transport could not reach. They were time-saving and flexible. Even with the proposed enforcements of regulations on ride-hailing services such as Uber and Bolt to reduce traffic and road accidents as recorded by hospitals caused mainly by motorcycle(okada), the government banned them without fulfilling its mobility integrated approach as discussed during the transport planning strategy (Nduka, 2020). As a result, no response to the online survey question 'current transport modes in Lagos' was recorded (see chapter 6).

2.2.1 The effect of Land-use changes on sustainable transport modes

Lagos is currently experiencing extreme **land-use change** thus, increasing the need for a workable intermodal transport system. Udoji & Szpytko (2020) explained that by improving and upgrading existing public transit services, the service coverage and quality, increase in frequency where and when it is most needed (during peak hours) will recover. Generally, the average Lagosian uses non-motorized transport modes for short-distance trips within the neighborhood, mostly walking and less cycling. This mode provides access to shopping, schools, and work. Lagos Metropolitan Area Transport Authority (2018) proposed a non-motorized transport as an alternative in Lagos because it is not struggling with traffic congestion and air pollution but complements private vehicles while serving as a crucial link integrated public transportation system (see chapter 4). Generally, all road transport vehicles in Lagos state do not have a permanent route except the government's Bus Rapid Transit System (BRT). The increasing urban population and the number of road users continue to grow exponentially, affecting the buses' efficiency. Factors like heavy traffic delay causing uncertainty of the arrival time of the buses; lack of power supply in the bus station to power the telematics devices; lack of internet connection; poor maintenance of the telematics devices; unavailability of transport devices due to technical failure of buses are the shortcoming of a sustainable transport mode (Udoji & Szpytko, 2020).

Alternatively, to accommodate the high demand for transport because of land-use change in the State, Lagos Metropolitan Area Transport Authority (LAMATA) developed a policy that includes the Urban Morphology and Lagosian

transport culture to achieve sustainable transport. These local transport policies influence **personal motor vehicles** (PMVs) and moderate the demand for motorized travel. Lagos recognizes walking, cycling, and the use of public transport as important modes to enhance accessibility and improve mobility. As further explained in chapter 4, the Lagos state government will expand these means (cycling and walking) to be safe and attractive for users also provide high-quality public transport.

2.2.2 The Reconstruction and Rehabilitation of Infrastructure

The Lagos State Ministry of Transportation's recent development started with **removing and reconstructing roundabouts**, reducing Lagos traffic congestion for road expansion (Oluwatosin, 2019). The criteria for choosing which roundabout for reconstruction was the volume of traffic the infrastructure acquire. The selected road networks collect and distribute traffic within the city and the religious event's location ground—examples like Ikotun, the 2nd roundabout on the Lekki-Epe Expressway, Allen Avenue roundabout, and Maryland. Additionally, in 2017, the state government removed six roundabouts along the Lekki-Epe expressway, replaced them with traffic lights, expanded the road, provided dedicated turning lanes, additional lay-bys to reduce the time spent in traffic and increase health benefits (Appendix I). The rehabilitation and expansion of the Lagos-Ibadan Expressway, a project sponsored by the federal government, contribute to traffic reduction generated by 'The Holy Ghost Congress' events and the opening of inner roads within the axis to collect and distribute traffic to the Redemption Campground.

Nonetheless, constructing a **rail transport** will improve a sustainable and integrated transport system: the Ebute Metta Railway Station, one of the stations on the Lagos-Ibadan railway route, billed for completion, receives finishing touches to start operation in 2021 (Chigozie, 2021). When completed, the station will boost the \$1.6 billion Lagos-Ibadan railway projects' logistic profile and divert cargo and passenger traffic away from the highways, thus reducing traffic and accident caused by the logistics vehicles (Figure 12).



FIGURE 12 Apapa Port railway under construction (Chigozie, 2021).

2.3 Road accident trend and car dependency in Lagos

The Federal Road Safety Corps (FRSC) and the National Bureau of Statistics (NBS) keep the record of road safety in the country; Lagos state accounted for 419 total

cases, 721 people suffered injuries, and 84 died in 2019 (Yusuf, 2020). Cumulatively, from 2016 to September 2019, as shown in figure 13, road accidents killed 462 people, injured 3,356 people, and 3,818 total casualties, with 1,644 cases (Yusuf, 2020). Also, the **road accident** data report sourced from Primero showed the decline and rise of road accidents in figure 14. Although there is still a miscommunication between the Federal and State government on road traffic statistics, as seen in figure 15, there is a mismatch in the data recorded.

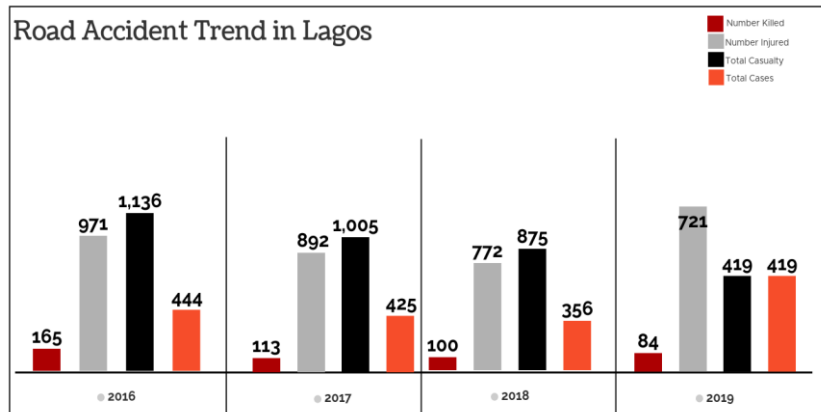


FIGURE 13 Road accident trend in Lagos 2019 (Yusuf, 2020).

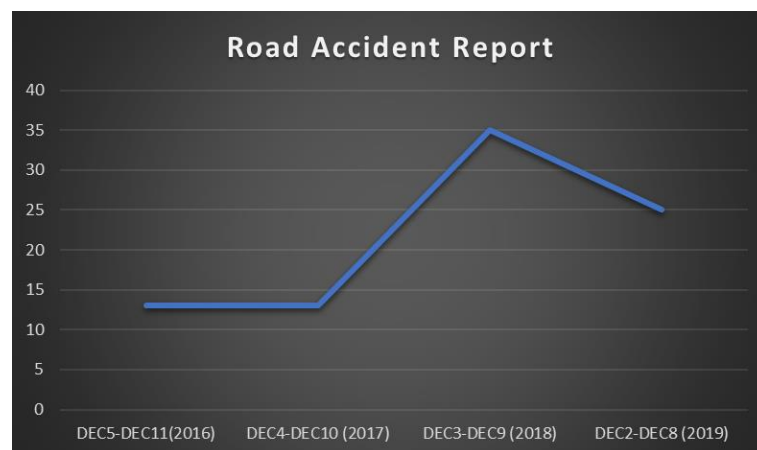


FIGURE 14 Lagos road accident report for December 2016, 2017,2018 & 2019 (Primero, 2020).

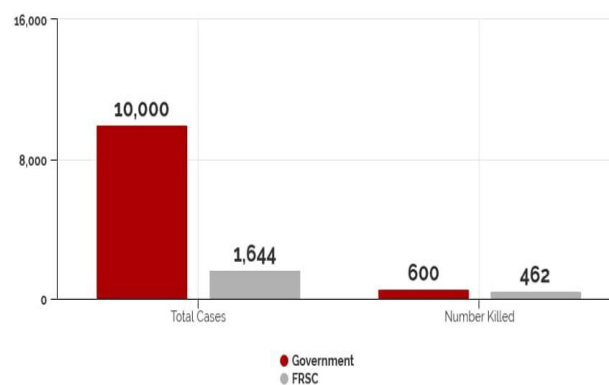


FIGURE 15 Lagos Government's claim versus FRSC figures (Yusuf, 2020).

In the absence of sufficient Non-Motorized Transport and public transport improvements, trends and forecasts point to increased vehicle growth. The number of motor vehicles registered in Lagos tripled from 2002 to 2012, growing from approximately 300,000 to 1,000,000 cars (Figure 16). Motorcycles have grown at a much slower rate due to sustained government policies restricting their commercial use (Lagos Metropolitan Area Transport Authority, 2018). The analysis used the number of registered driver licenses to estimate the rate of car ownership. In Q4 2018, 42,402 driver's licenses representing 22.8% of the total permits, were produced in Lagos (Table 2), making it the highest driver's license-produced. Furthermore, the **vehicle population** is multiplying, and if continued, unabated threatens to aggravate Lagos' transport problems (Lagos Metropolitan Area Transport Authority, 2018).

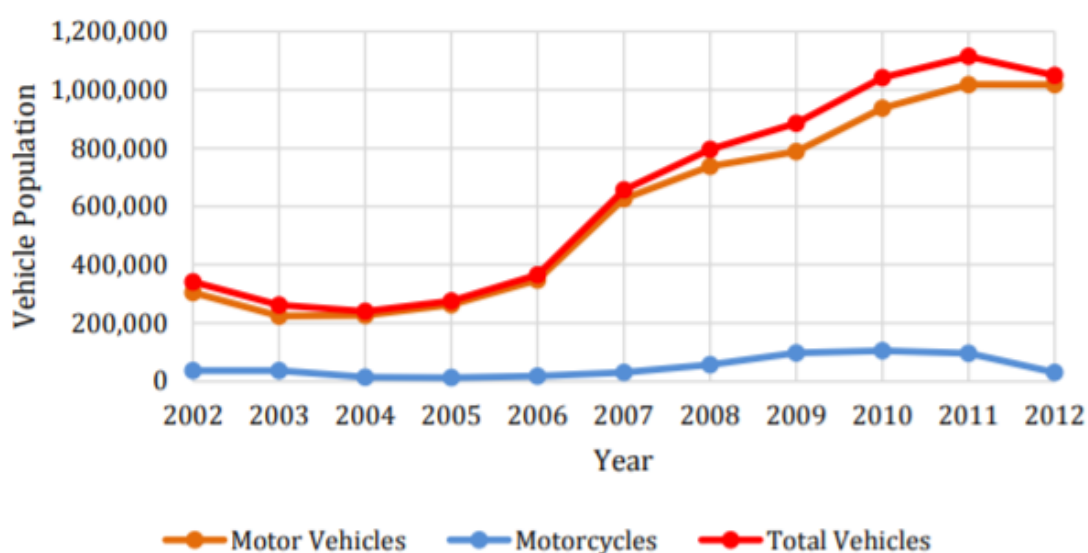


FIGURE 16 Number of motor vehicles registered in Lagos (2002 to 2012) (Adesoji, 2019).

TABLE 2 Infographic by Author (Adesoji, 2019)

Total Number of Licensed Car in Nigeria	
Number of Licensed cars 2017	11.6 million
Number of Licensed cars 2018	11.8 million
Q4 2018, Nigeria	
Commercial cars	41%
Diplomatic cars	0.05%
Total national driver's licenses produced	185,883
Recorded fresh licenses	75,446
Renewed and reissued licenses	14,802
Number plate production	135,505

As a result of increased motorization, pedestrians are the primary road users and are vulnerable populations involved in road accidents, including high risk to public health. Crash statistics (Figure 17) show an increasing trend in traffic deaths between cyclists and pedestrians, even though they often have little or no access to the mobility benefits from motorization. There is a significant drop in the rate of persons killed between 2010 and 2015, which seems unconvincing; there might be some inaccuracies in collecting road safety data; also, no recent data available to compare the data.

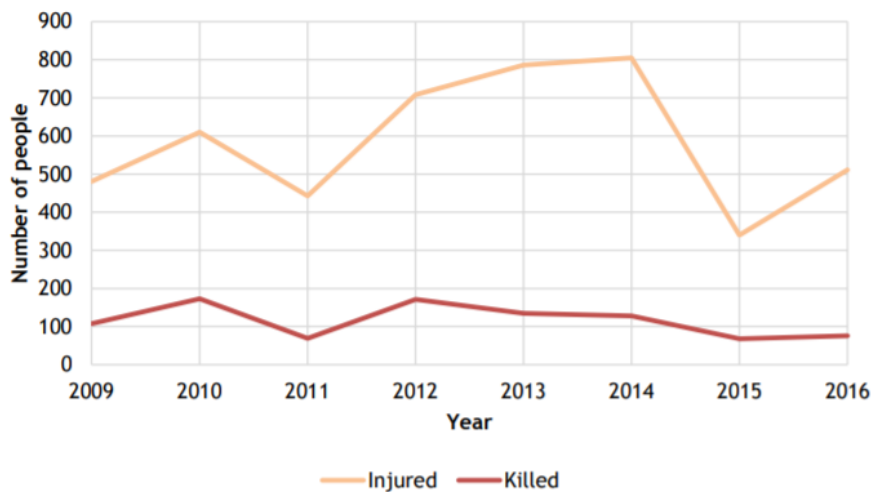


FIGURE 17 Number of people killed or seriously injured in road accidents (2009-2016) (FRSC, 2020).

According to the National Bureau of Statistics, the Lagos State road traffic crash data for the second quarter (Q2) and third quarter (Q3) of 2020 show more injured people in Q3 than Q2, as shown in the info graph below.

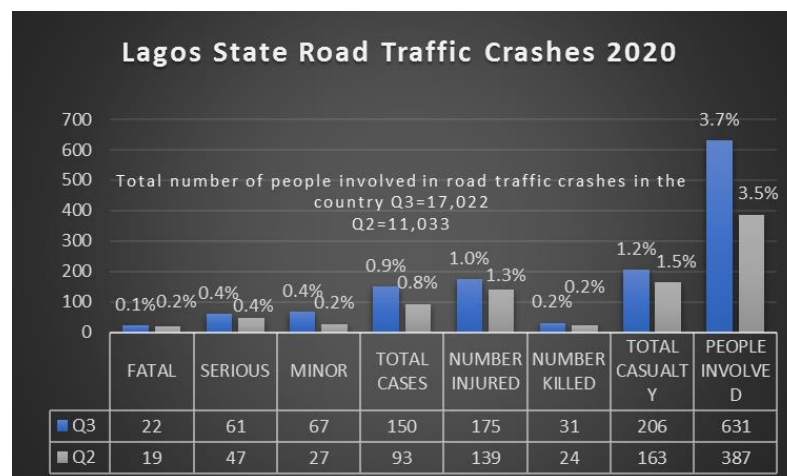


FIGURE 18 Lagos State Road Traffic Crash (Q2-Q3) (National Bureau of Statistics, 2020).

3. TRANSPORT SITUATION DURING THE RELIGIOUS EVENTS IN LAGOS

3.1 The Experience Lagos

This chapter explains the background, the transport situation, and the mobility pattern during the two religious' events. The Experience Lagos event is a free annual gospel music concert held at the Tafawa Balewa Square (TBS) in Lagos Island, Nigeria (Figure 19). The concert is a faith-based gathering of hundreds of thousands of praise worshipers offering a bonafide sacrifice of praise, and it reunites people irrespective of their race, creed, or gender (Inemesit, 2017). Over the years, the concert has featured numerous local and international artists, making it one of Africa's most significant musical events. In 1972, TBS's construction took place over a defunct rack for horse racing, bounded by Awolowo Road, Cable Street, Force road, and Catholic Mission Street. The square has a capacity of 50,000 people. Facilities at the court include a shopping center, Airline's Travel Agencies, restaurants, car parking, and a bus terminal. It is on a land area of about forty-seven (47) acres in Lagos Island's commercial district (Figure 20). The square entrance has gigantic sculptures of four white horses hovering above the gate and seven eagles, symbols from the national emblem signifying Strength and Dignity. Other monuments in the square include the Remembrance Arcade (with memorials to World War 1, World War II, and Nigerian civil war victims) and the 26-story Independence House, built-in 1963, which was for a long time, the tallest building in Nigeria (Hannah and Beyond, 2017). The square has historic national events where Nigeria celebrated its first independence on 1 October 1960, known as the ceremonial ground (called initially "Race Course") (Hannah and Beyond, 2017). One will think that a square with such capacity can host a large event like the Experience Lagos over the years; as the attendance grew, the square's seating capacity increases with extra seating provided by the event organizers (Figure 21).

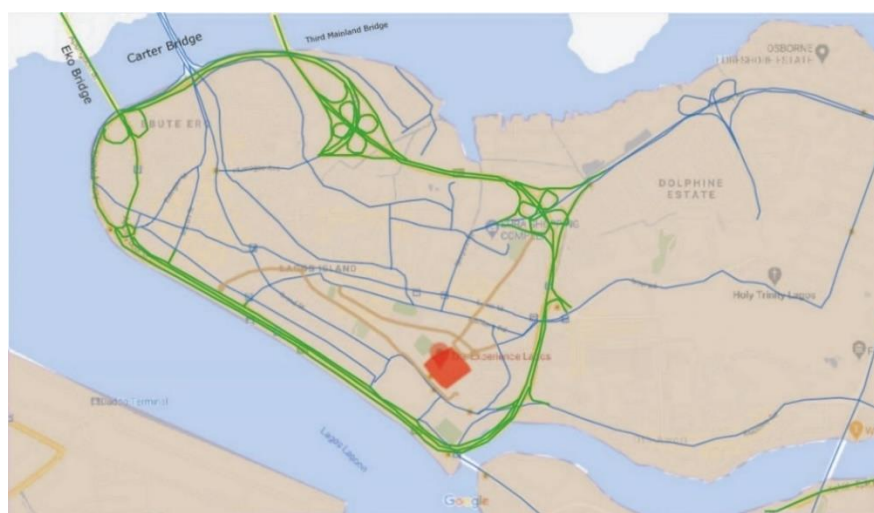


FIGURE 19 Adjoining roads to the event venue (Author).

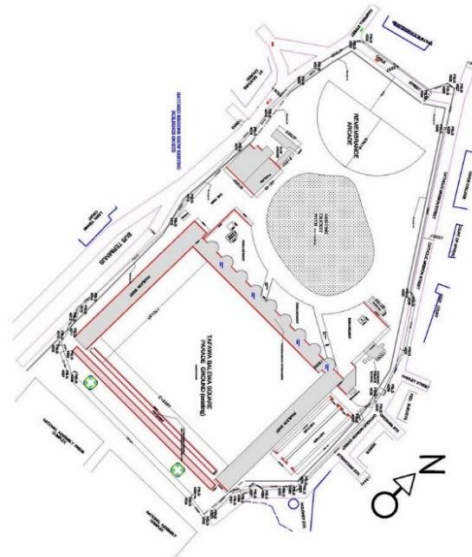


FIGURE 20 Tafawa Balewa Square (TBS) Layout (Hannah and Beyond, 2017).

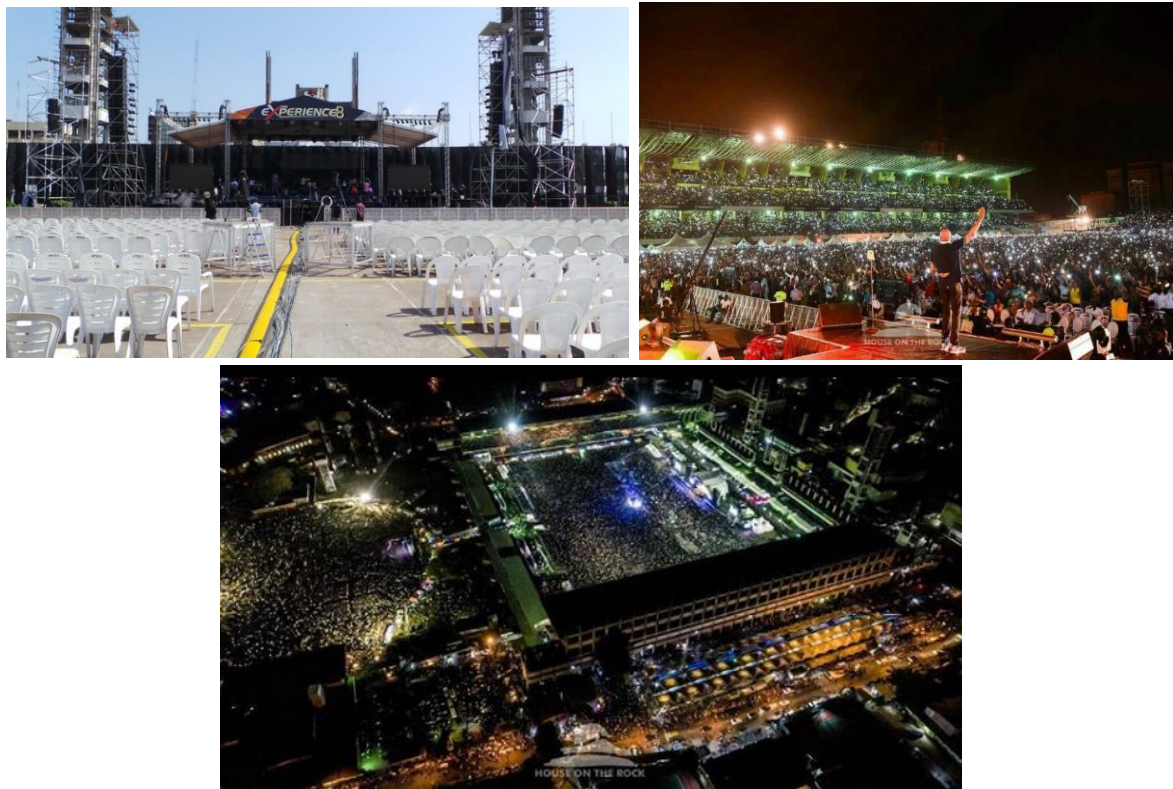


FIGURE 21 Extra seating on the ground floor (The Experience, 2020).

3.2 The Holy Ghost Congress (HGC)

The Redeem Christian Church of God (RCCG) is a religious organization that coordinates the annual **Holy Ghost Congress**. RCCG is a church in Nigeria established in 1952 and a member of the Pentecostal Fellowship of Nigeria (PFN), the umbrella body of Pentecostal churches in Nigeria. RCCG's founder and first leader, the Reverend Josiah Olufemi Akintayomi, died in 1980. In 1981 his

successor Dr. Enoch Adeboye took over office as the leader; since then, the church has expanded beyond Nigeria. The church had a rapid growth between 1981-2000 during the globalization era (Ukah, 2003). The Redemption Camp, an outpost of the Redeemed Christian Church of God (RCCG) located on Kilometer 46 of the 120-km (75-mile) Lagos–Ibadan Expressway (Figure 22). In 2008, it had 14,000 churches and 5 million members in Nigeria and 80 countries (Cherry & Ebaugh, 2016) structured in different areas throughout the world while local churches are in other geopolitical zones of the country grouped into regions, with 25 Regions in Nigeria, for example, RCCG REGION 1, LAGOS PROVINCE 45, LAGOS ISLAND, LAGOS. Like the Holy Ghost Congress, the church has events that played essential roles in making the church known in and outside Nigeria. They conduct notable special spiritual programs like i) Annual Convention; ii) Holy Ghost Service; iii) Holy Ghost Congress; iv) Campus Holy Ghost Service; v) Divine Encounter, and vi) Ministers' Conference.

The Holy Ghost Congress was initially called the 'Holy Ghost Festival' and changed to reflect the true nature of the celebration. The establishment of HGC is for the world's people to get personal miracles of regeneration and prosperity (Ukah, 2003). The first event took place at Lekki beach, in the outskirts of Lagos, with the first edition of over four million people in attendance. Since its relocation to their permanent site at the Redemption Camp, every year, the event is given a tag, usually a catchphrase. The pattern of activities ranges from the performance of songs and praise, teachings, and preaching, collection of offerings, call to the altar, prayers, testimonies, laying on of hands (for anointing and healing), thanksgiving collection, and performance of drama sketches and songs. Ever since 1999, the President of the Federal Republic of Nigeria sends a delegation to present speeches during the events and other high influencers. Furthermore, essential dignitaries and guests come in from other countries, especially the United States of America and the United Kingdom.

Outside the Holy Ghost convention, Redemption Camp has the peaceful surroundings and conveniences of a retirement village. For example, constant electricity generated from the power plant, fed by its gas pipeline from Lagos, removes the need for diesel generators' steady thrum, which often build to make a loud noise. The Redemption Camp has 5,000 private homes, 500 of them created by the church construction company, roads, rubbish collection, police, supermarkets, banks, a funfair, a post office, and a 25-megawatt power plant that provides basic needs for millions of worshippers any of the church convention (Ruth, 2017). Also, education from creche to university level, health center with the emergency unit and a maternity ward, among other things. The church is a city within a city, where they rely on little from the government because of their slow response to basic needs. The camp builds its road, collects its rubbish, and organizes its sewage system; the camp security provides a small army of private guards that direct traffic and deal with crowd control (see base map in Appendix J).

The event's evolution began as a one-night event in December of 1998, moved to a three-day program, and now a week-long celebration of 'what happens

when and where God and man meet.’ Organizing a mega-event such as HGC is a cost-intensive enterprise. The provision of electricity for the one-week event held in 2002 was said to have consumed 40million Naira (€71,430.) (Ukah, 2003). Much of this sum came from corporate bodies, federal and state governmental organs, and wealthy individuals. In a week, the church host millions of worshippers with thousands of volunteers and guests. The campsites accommodate various auditoriums with two mega arenas (Figure 22). According to a report from daily advent Nigeria, they compared the six largest church auditoriums in Africa. The Redeemed Christian Church of God has the world’s biggest arena, which accommodates 1million capacity at once (Figure 23). The overall construction cost is \$60 million (about N7.7 billion), with a current worth of 200billion Naira (Opera, 2019).



FIGURE 22 Aerial View of Redemption Camp (Author).



FIGURE 23 Aerial View of Redemption Camp shows 3km by 3km New auditorium (Opera, 2019).

The influx of population heading towards these types of event gathering in their increasing numbers and several hundred thousand on the major road network that

stretches northward out of the city to different parts of the country contributes to economic and environmental impacts. Pilgrims heading to the Redemption Camp are more likely to cross paths with worshippers traveling to other religious sites camps along the expressway. These massive camps are only one symptom of the advent and popularity of Pentecostal Christianity in this part of the world. These sites and their immense congregational capacity have a relationship with Lagos' challenging urban conditions. They increase traffic flow and generates a continuous flow of people over a specific time and space, especially during the week of the event.

3.3 Mobility pattern during the events

Mobility is about how people and goods move from one place to another, usually walking and cycling, public transport, and cars from private vehicles to trucks. A sustainable **mobility pattern** requires a change in mobility need, share transport modes, integrating different modes of transportation, and adapting to other users that should be affordable, accessible, safe, and easy to navigate. The geographical setting of each city varies considerably, generating different sets of activities at other times and spaces within a specific urban area. Cities can be structurally polycentric or monocentric, and significant flows are organized or disorganized (Figure 24). Cities with a higher level of reliance on public transit tend to be monocentric with a higher level of organized flows, while cities depending more on the automobile tend to be polycentric with a more disorganized flow structure (Rodrigue J. P., 2020).

The mobility landscape of Lagos is a complex and interconnected system because of the rapid urbanization, daily increase in private car ownership over public transportation, and slow regeneration of transport networks. Lagos State is car-dependent, generating a disorganized structure of the flow. Even though BRT and shared transport modes are increasing, they are slowly beginning to be monocentric in an organized way, especially for organized events. Also, congestion, noise, and air pollution threaten the city's ecosystem, economy, and health, affecting the mobility flow of people.

During the events, the flow of people depends on the event time, worshipper's origin to the event, and the event's location seen as the center and attraction point, making it a monocentric or polycentric flow depending on the direction of flow. People travel to the event from a pick-up location in an organized movement, usually with planned transport services like BRT, minibusses (danfo). Trips to the event are either from home to the event or from work to the event's location. For example, the Holy Ghost Congress event generates monocentric and polycentric movements where the campground is the center of attraction. The movement of people (pick-up) is from different church provinces and regions from Lagos, within the country and outside in an organized direction (Transport Team RCCG, personal communication, 29 April 2021).

On the other hand, informal transport modes, private cars, unplanned chattered services, and walking from nearby neighborhood settlements generate a disorganized pattern. In addition, worshippers with private cars make multiple

trips before getting to the campground or the experience Lagos location. The continuity of flows and movement patterns contributes to and increases traffic congestion on the transport network leading to the event venue and its environs (Figure 25).

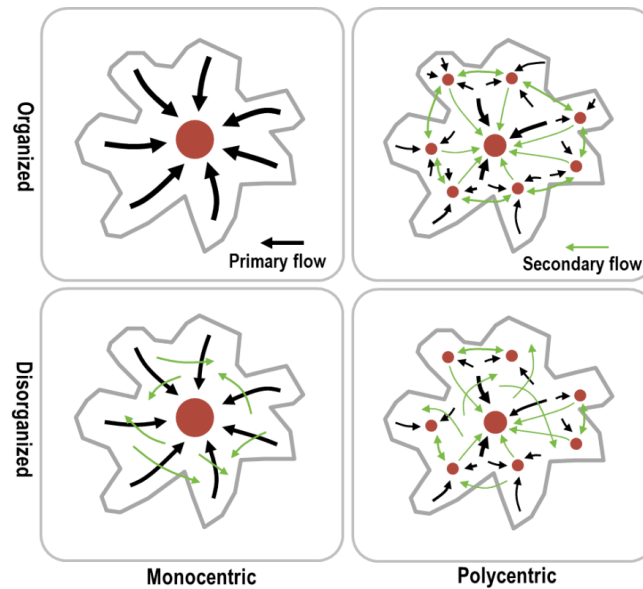


FIGURE 24 Possible urban movement patterns (Rodrigue J. P., 2020).



FIGURE 25 Traffic along Lagos-Ibadan Expressway (transportday.com.ng).

There are two major BRT service providers used during the events, Primero transport services and Lagos Bus Service Limited (LBSL), formally called LAGBUS, contributing to the bus reform initiative (Mutiu, 2020). The BRT operation is cheaper, more reliable, convenient, and faster. Even with that, BRT operation is often affected by traffic congestion and ongoing road repairs when necessary, leading to delay and increased waiting times for commuters at different shelters.



FIGURE 26 Lagos Bus Services Limited (LBSL) (Lagos Bus Services Limited, 2021).

A public transport system must accommodate a large number of individual trips. It is not possible to provide direct public transport routes to meet all requirements, but it is possible to go a long way towards achieving this by providing a network of roads to make complex journeys using a combination of roads. In an ideal planned situation, a transport system consists of routes planned in isolation rather than parts of coordinated networks, which is usually unsatisfactory for meeting a significant proportion of travelers' requirements. Poor route planning may result in inadequate route coverage, an excessive interchange between routes, and varying frequencies.

According to the semi-structured interview conducted for both events, The Holy Ghost Congress event uses the planned public transport bus services to move worshippers prepared from the initial stage of route operation to improve service efficiency and convenience. For example, the organizers of 'the experience Lagos' collaborate with Primero Transport Services (BRT) on the number of trips and capacity to convey for that day. In contrast, 'the holy ghost congress' collaborates with all neighboring state-owned public transport (Ogun, Oyo, and Lagos State). The planned public bus services use the bus routes system of the end-to-end route along the BRT corridor, operating between two points following the same roads in both directions that lead to the event venue. This type of service is a one-day free bus service for passengers attending the experience Lagos event or commuting to nearby areas along the BRT corridor or connecting to other modes for integrated transport, such as BRT and motorcycle (okada). Over 7000 passengers are conveyed to 'the experience Lagos' event (Figure 27) when the planned bus services are used (Primero, personal communication, 6 March 2021).

Conversely, the Holy Ghost congress routing is organized in collaboration with church provinces and regions to convey worshippers with mass buses of 60 passenger capacity on a minimum of 15 buses per day to the RCCG camp ground Lagos in collaboration with other states' public mass transit. Worshippers are scheduled during the one-week event from Monday to Wednesday because light traffic generated during the first two days is low. Also, a minimum of 5 mass buses

transport people from other neighboring countries like Cameroon and the Benin Republic. These trips are made at night to avoid traffic congestion (Transport Team RCCG, personal communication, 29 April 2021).

On the other hand, the unplanned public bus services for 'the experience Lagos' are regular transit buses along a route calling at agreed bus stops according to a published public transport timetable. This type of assistance meets the demand for public transport on the day of the event. Ticket payment for the BRT is either passenger cards or paper tickets purchased at designated bus shelters and are subject to validations at the point of entry and routine checks during the journey by trained Inspectors (Primerio, 2020). A fare collection is pinned to this service by passengers along the BRT corridor commuting to the event venue in total; over 20,000 passenger's trip journeys are conveyed to 'the experience' event venue with this type of service. Over the years, the bus services have transported a large population to the venue, thus reducing vehicular congestion within the corridor and axis with a parking system that allows the buses to be a walkable distance from the event's location for easy access to the bus services going to their specific places. In addition, the Holy Ghost Congress event has similar unplanned public bus services but more from the informal transport plying towards the event venue. They contribute to at least 60% of the transport services to the redemption camp, with a dedicated bus park for informal modes (danfo) and a large parking area of A to F of 5000 cars maximum capacity available in the campground. Camp shuttle services further transport passengers into the campground by informal transport modes (Figure 28).

Furthermore, the continuous road closure caused by road works at the Lagos-Ibadan Expressway at a different time of the year improved the accessibility to the camp through the opening of the alternative inner road to accommodate other routes. With this, traffic along the major highway is decongested as low as possible (Transport Team RCCG, personal communication, 29 April 2021).



FIGURE 27 Passenger queuing at TBS BRT bus stop at The Experience Lagos (The Experience, 2020).



FIGURE 28 Worshippers at The Redeem campground for the Holy Ghost Congress (News, 2020).

3.3.1 Road Network

Managing and dealing with a high volume of traffic congestion poses a problem for 'the experience Lagos' and 'the Holy Ghost Congress' and comes with issues that affect the transport network and transportation in the city; one is the route network. Three significant bridges link Lagos mainland to Lagos Island, where 'the experience Lagos' event is located (Figure 29); the BRT route and corridor connect to one of the bridges, Eko Bridge, while one access road leads to 'the holy ghost service.' Thus connecting both events with one major road, 'third mainland bridge' and other road classes. All road classes such as highway, main street, and street are in the road network typology that collects traffic and distributes it towards the event venue.



FIGURE 29 Major road network around the religious events (Author).

This road distributes traffic from the mainland to the Island and allows all vehicle types, including BRT buses, to use the road. The other two bridges, the Carter bridge, and the Third mainland bridge, also collect traffic from other States, including 'the redemption campground,' into Lagos and within Lagos from the mainland. The BRT route network (see chapter 2.1) only has one corridor

connected to the Island. With this, the influx of people from this axis contributes to public transport and private vehicle use, causing inadequate coverage and less congestion-free network flow. The BRT bus providers can reduce passengers and vehicular traffic during and after the events if the road network and routing are improved (Primerio, personal communication, 6 March 2021). It will reduce traffic congestion and sometimes road closure on the day of the event, causing a delay in worshipper's movement, increasing long walks to the event venue, and traffic at the early hour. Similarly, it generates local traffic that impacts businesses located around the axis of the event area.

The road network allows for a showcase of the event within the city through the BRT Transit Advertising method. Generally, the event generates revenue indirectly to the bus services through the unplanned transport services rendered on the day of the event and delay business. The events convey information within the city (Figure 30) by providing awareness to commuters about the event, usually for a minimum of 60 days. BRT Transit Advertising is an effective and cost-efficient form of media that offers a great way to reach the urban audience and get messages throughout a city all day and all night, especially along a busy road network.



FIGURE 30 Branded BRT for Advertisement (nairaland.com).

4. TRANSPORT POLICY IN LAGOS

This chapter explains the policy guiding the BRT bus service providers, the organizers in Lagos, and the existing transport policies. In a mega-city like Lagos, urban transport services should be safe, fast, effective, and efficient. In line with the **Bus Reform Policy** (BRP), the Lagos State Transport Sector Reform Law 2018 aimed to create sanity. One of the policies that helped to restore sense and reduced congestion at various major road junction is the reconstruction of motor parks (bus-stop) across the State (Figure 31) to provide a safe and continuous operation of minibusses (danfos), okadas (motorcycles), and Keke Napeps (tricycles) on Lagos roads and prosecute transport offenders. Lagos Metropolitan Area Transport Authority (LAMATA), who is in charge of reforming the transport system in Lagos, develops a policy to reduce the number of passengers on motorcycles (Okada) to 2 people rider and driver must wear a standard protective helmet. Osiyemi (2018), a one-time Chief Operating officer for Lagos Bus Services Limited (LBSL), suggested that the Lagos transport policy for effective decision-making on allocating transport resources must include management and regulation of existing transportation activities.



FIGURE 31 Reconstruction of bus-stop across the state (LAMATA, 2020).

4.1 Policy between the event's organizers and the BRT bus services

Transport policy deals with developing a set of constructs and propositions established to achieve specific objectives relating to social, economic, and environmental conditions and the functioning and performance of the transport system (Rodrigue J. P., 2020). Therefore, it is essential to develop policies with direct planning implications that will provide adequate solutions. There are critical approaches between public service providers and the Lagos transport sector for seamless transport services to offer large events mobility. The binding policy between the state and the bus service providers allows the state's public bus to provide public chartered services to the client's final destination that is unrestricted and requires feedback from the client as an agreement for improved services (Primero, personal communication, 6 March 2021). This service is known as **Service Level Agreement**; it strengthens the agreement between the service

provider and the service users on the quality, availability, and responsibilities. Likewise, there are policies for **traffic management** that coordinate mass outdoor events like the popular famous Lagos Marathon and the Eyo Festival. During this event, the coordination of traffic is by Lagos State Traffic Management Authority (LASTMA), Road Safety, in collaboration with a private traffic organization.

In the Redeem campground, they control traffic with the help of a private traffic squared team (Team Nehimahiah) in collaboration with transport teams from other church provinces and regions (Transport Team RCCG, personal communication, 29 April 2021).

4.2 Economic recovery and growth plan

The priorities are to improve the country's **transportation infrastructure** by restoring degraded sections of the Federal highway network to enhance the connectivity over 4,000km. An example is the rehabilitation and reconstruction of the Lagos-Ibadan Expressway, which involves expanding the highway within 2years to three lanes in both directions with the maintenance and construction of several bridges and flyovers along the route (Figure 32). The Lagos-Ibadan Expressway is a 127.6kilometer-long (79.3 miles) expressway connecting Ibadan, the capital of Oyo State, and Lagos, Nigeria's largest city, and primary route to the northern, southern, western and eastern parts of Nigeria. Also, the road is the direct linkage to 'the holy ghost congress' events from within and outside Lagos. This Federal road network collects a high volume of traffic from other states into Lagos state, leading to unbearable traffic.

The construction of strategic rail projects to connect economic centers across the country, emphasizing the Lagos-Kano and Lagos-Calabar rail projects, will help reduce the traffic caused by Articulated vehicles carrying logistics products. The Lagos-Ibadan railway project is almost completed and will divert cargo and passenger traffic away from the Lagos- Ibadan expressway (Chigozie, 2021).



FIGURE 32 Reconstruction of Lagos-Ibadan Expressway along 'The Holy Ghost Congress' redemption campground (Julius Berger, 2019).

4.2.1 Informal Transport

In Lagos, informal public transport is an essential component of its overall transport services. In many Asian, African, and Latin American cities, it is perhaps even the most common and widely used form of urban public transport. **Informal**

transport services like motorbikes and tricycles can be more accessible, faster, at times cheaper, and reliable. However, the strong presence of informal transport in the Lagos metropolis indicates that the transport needs are not being met sufficiently by formal public transport services. Therefore, informal transport providers meet the gap between demand and supply, which provides an essential income source for many people and the economy. It is necessary to understand that better coordination and integration within these services is crucial to provide much-needed and complimentary services that threaten public safety and welfare (Osiyemi, 2018). Following the Lagos State Government transportation master plan, there are plans to replace motorcycles(Okada) with blue ones called 'First and Last-Mile Buses' (Figure 33). The blue buses are environmentally friendly buses that are part of the bus reform project conducive to a mega-city like Lagos (Nigeria Ripples, 2021). This implementation will include a parking strategy known as Lagos State Parking Strategy, with a parking authority set to regulate parking on the roads, contributing to congestion on road networks caused by the yellow buses.



FIGURE 33 Proposed New bus to replace motorcycles(Okada) (www.channelstv.com).

4.3 Non-Motorized Transport Policy (NMT)

The Lagos Metropolitan Area Transport Authority (LAMATA), on behalf of the Lagos State Government (LSG), has initiated the process of creating a **Non-Motorized Transport (NMT) Policy** to guide the implementation of high-quality transport systems. It aims to create a policy environment that supports increased accessibility by prioritizing walking, cycling, and public transport (Lagos Metropolitan Area Transport Authority, 2018). The interaction between pedestrian and motorized vehicles within the State is not correctly planned, unsafe, and most times dangerous. Pedestrians and motorcyclists are frequently forced to ride and walk on the same carriageway sharing the same road with motorized transport (Monsuru, 2019). The new policy will aid clean urban public transport systems.

The policy will include the following components.

1. The roll-out of NMT infrastructure across the State and increase the use of NMT over the next 15 years.
2. Street design that includes principles and standards with emphases on safety, convenience accessibility for pedestrians and cyclists.
3. To ensure that private development contributes to the standards for built environment regulation and the public realm, creating a safe, attractive, and animated walking and cycling environment.
4. Street network planning guidelines encourage a fine-grained network of streets to reduce walking distances and expand public transport access.
5. Provisions for street management that priorities NMT users.
6. Measures to enhance funding for NMT improvements and infrastructure.
7. A more robust institutional framework for project implementation.
8. Communications initiatives to build support for NMT initiatives and gather public input during the planning process.
9. Performance measures to monitor the effectiveness of the policy.

Moreover, transport planning has concentrated on infrastructure, traffic costs, and benefits. The policy seeks to focus on mobility planning that pays attention to the people, not vehicles, to achieve a more equitable allocation of road space by concentrating on NMT and public transport (PT) in the planning, design, managing, and budgeting stages the transport projects. The approach aims to improve health, safety, environmental quality and enhancing social equity and economic activity (Lagos Metropolitan Area Transport Authority, 2018). The policy includes joint effort from stakeholders, representatives from the state and federal governments, private sector, non-governmental organizations, education institutions, and development partners. Lagos's landscape is consisting of a host of users and vehicles, including pedestrians, cyclists, okadas (motorcycle taxis), tricycles (Keke Napep), cars, danfos (minibusses), and heavy trucks. The diverse mix of transport services helps meet critical mobility needs and creates a challenging environment for walking and cycling (Lagos Metropolitan Area Transport Authority, 2018). The general aim of the Lagos State government on Non-motorized Vehicle is to.

1. Enable equitable access for all by improving access and mobility for all residents, enabling gender equity, including persons with disabilities, promoting social and economic empowerment through improved low-cost mobility, and facilitating safe access for children.
2. Optimize the use of resources such as space, funds, time, and energy by investing in NMT and public transport modes, by encouraging dense, compact, and mixed-use development that contributes to shorter trips and allows more people to live and work close to PT facilities.
3. Improve road safety and personal security by managing traffic conflicts, reduce road crashes and deaths, and creating public spaces safe at all times of the day for all users.

4. Reduce Lagos's transport system's local and global environmental impacts by expanding the use of zero-pollution NMT modes and low-pollution motorized modes, improving the city's air quality.
5. Enable community participation by involving residents, businesses, and other stakeholders in the preparation of designs to foster the community's active use and sense of ownership of these spaces


CONSIDER	MODE	
First	Walking	
	Cycling	
	BRT/buses	
	Paratransit (danfos, shared kekes)	
	Taxi services: kekes, okadas, taxis	
	Economic activities (Regulated > Informal)	
	Freight movement (Light > Heavy)	
	NMV goods carriers	
	Personal motor vehicle movement	
	Last	Personal motor vehicle parking

FIGURE 34 Transport framework priority by mode (Lagos Non-Motorised Transport Policy, 2018).

4.4 Infrastructure and Network

Implementing transport infrastructure policies like street design and street network will help improve the efficiency and function of the road network by different users. Although, the construction, maintenance, and operation of transportation infrastructures have five significant constraints; physical and environmental; demand; financing; construction; maintenance; and regulations (Figure 35). These constraints need to be considered before the construction of transport infrastructure (Rodrigue, 2020).

The transportation network and connectivity have low physical conditions in Lagos, but **climate constraints and weather disruptions** increase construction and maintenance costs. Even though the demand for this infrastructure is high, the peak periods of traffic activity are above the design capacity of the supporting infrastructure, creating delays, especially on most Lagos roads. Also, road projects are capital intensive with expected economic and social benefits. Sometimes it takes months to complete a road project in Lagos because of the lack of funds and currency exchange rate. Due to this, the reconstruction and repair of the existing road are achievable but disrupt activities during operations. Since 2008, roads owned by the Lagos state government are under construction and maintenance thus, birthing new road regulations and design approaches to accommodate all road users, modes, and activities.

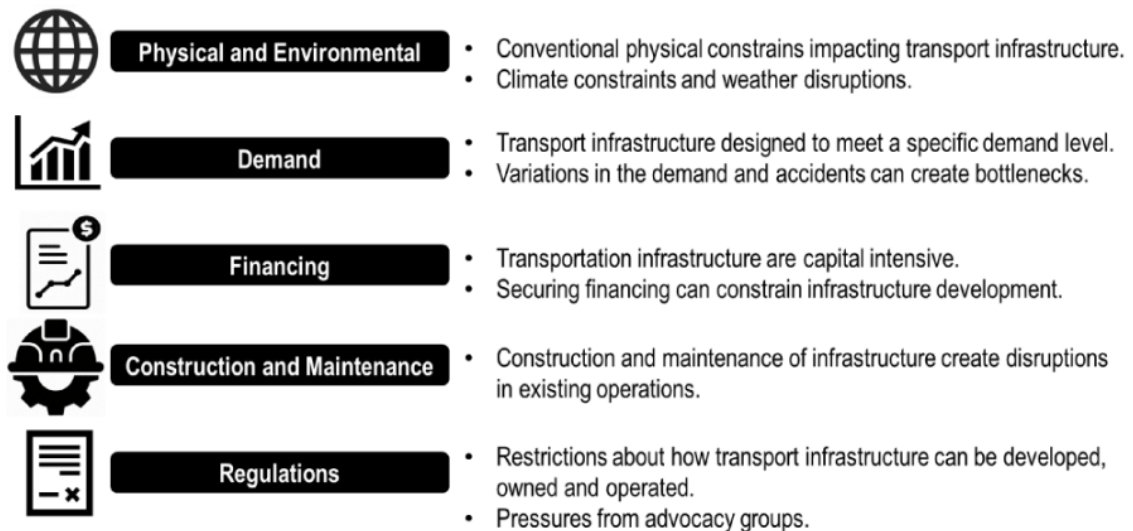


FIGURE 35 Transportation Infrastructures and their Constraints (Rodrigue J. P., 2020).

4.4.1 Street Design

The street element determines the efficiency and function in the space within a limited right-of-way, from sidewalks to travel lanes and transit stops. Since 2019, the government has started to redesign the streetscape at essential traffic points to fulfill its non-motorized transport mandate. Below are the following principles used for street design and management in Lagos State;

- i. The design and maintenance address watersheds' characteristics and challenges for stormwater flooding, sewer overflow, planting of street trees, and avoiding impermeable surfaces.
- ii. To design and place signs, signals, utility structures, and related elements to minimize visual clutter.
- iii. To balance the street's impact, experience the management and signalization of vehicle traffic for pedestrians, cyclists, public transport users, and operators for safety.
- iv. Provide incentives for all non-motorized transport users to restrict private vehicle usage.

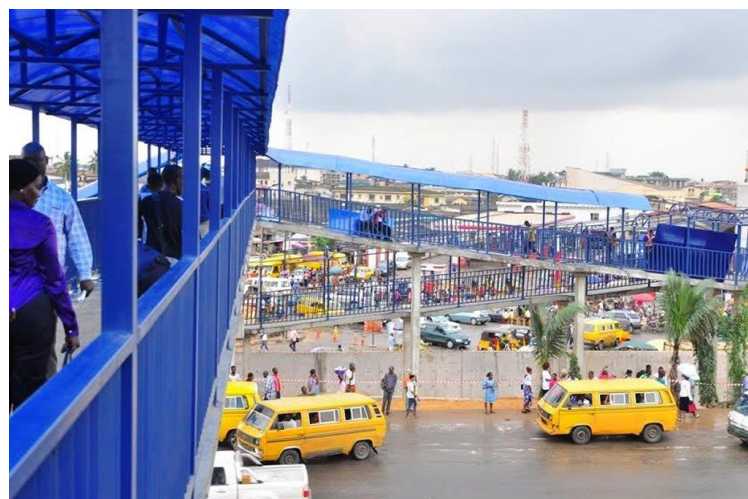


FIGURE 36 Pedestrian footbridge (nigeriatalks.com).**4.4.2 Street network**

The dense network of complete streets and paths will give priority to NMT modes. To achieve this, the Lagos state government will collaborate with stakeholders to identify and develop selected roads as particular streets that limit access to motor vehicles (aside from emergency vehicles). There are **four streets**, classified into local streets, minor collectors, major collectors, and arterial streets by their function, surrounding land use, and other characteristics.

1. **Local streets:** are majorly for local activities and access to properties with a primary function for local activities and a Right of way (ROW) of less than 12 m. The design will not include a dedicated footpath on such streets but a shared space that prioritizes NMT modes. The Vehicle speeds will be below 15 km/h and are safe for pedestrians, cyclists, and motor vehicles.
2. **Minor collector streets:** They serve local traffic and connect local roads to arterial streets, designed with dedicated footpaths and a carriageway for vehicle movement with a vehicle speed of 30 km/h.
3. **Major collector streets:** These are meant for local traffic movement and connect local roads to arterial streets. They will have adequately sized footpaths, street furniture to cater to the adjacent land uses, and frequent pedestrian crossing opportunities. Public transport feeder buses and medium frequency mainline buses may operate on such streets. The carriageway speed limit is 40 km/h and can implement cycle tracks to form an extensive cycle network.
4. **Arterial streets:** They are for motorized movement across the city. They will have adequately sized footpaths and street furniture to cater to the adjacent land uses and pedestrian crossing opportunities at intervals of 200m, 50 km/h speed limit, and restrictions for on-street parking.

4.5 Built Environment Regulation**4.5.1 Planning and Implementation**

A regular **update on Non-motorized transport** (NMT) plans will help report the existing scenario, evaluate the past and current initiatives, identify available funding resources, and implement strategies.

1. Compensation to business owners will be made available to affected business owners during the infrastructure project's activity.
2. Interventions in areas with a high frequency of traffic crashes, particularly school zones, locations with high NMT volumes, for example (figure 25), the famous Allen Roundabout in Ikeja, one of the traffic-prone areas in Lagos, has been demolished to ease traffic, with a new intersection, road signal, and marking.
3. The street design guidelines are Lagos Street Design Manual (LSDM) that addresses policy, street design elements, and standards details. The design

will include signage and road marking, various street typologies, design guidelines for the intersection.

4. All transport-related planning, plans, and studies (including surveys, projects, forecasts and models, and implementation plans) are planned by professional staff, consultants, and international agencies.



FIGURE 37 Street design at the intersection (Nairaland.com).

4.5.2 Planning Management

The implementation of **planning management** will improve the enforcement of no parking zones and keep personal motor vehicles from obstructing NMT facilities. The policy will control parking supply by allocating on-street parking after providing adequate space for pedestrians, cyclists, trees, and street vending. Also, charging a parking fee will be proportional to the duration of parking and the level of demand. The revenue collected from the parking management program will fund and improve public transport and NMT.

4.5.3 Traffic management

Traffic light and right-of-way allow pedestrians, cyclists, and emergency response vehicles with enforcement to enhance fines for speeding violations to user right-of-way in school zones. The entry of heavy vehicles into urban areas (especially central business districts) during the day will be managed during the loading and unloading of goods in urban areas to minimize disruption for other transport system users.

4.5.4 Street maintenance and Utility Management

There is a **repair and maintenance program** to keep all footpaths and cycle tracks in a good state of repair and cleanliness; provision for trash collection, zero-tolerance approach for managing encroachments on pathways, removal of obstructions that force pedestrians to walk on the carriageway. Service utility providers will ensure access points for stormwater, sewage, electricity, telecommunications, and other services designed to not conflict with NMT user movements.

4.5.5 Public Awareness and Funding

Relevant federal agencies will carry out a **public information campaign** through traditional media, social media, and other channels to build support for the NMT Policy, emphasizing essential areas like the benefits of NMT and the Policy's goals. Regular events support active commuting such as monthly car-free days and cycle-to-work days, an educational curriculum covering road safety and the benefits of walking and cycling for primary and secondary school students, alternative programs with the local business community to promote and encourage NMT use, etc. The Lagos State Government will provide sufficient **budgetary support** to build and maintain the necessary NMT infrastructure and prioritize street infrastructure. They will channel foreign loans, grants, and investments with public-private partnerships toward projects that improve NMT users' conditions, deposit 50% of parking fees, and outdoor advertisement revenues in the Transport Fund.

5. METHODOLOGY

5.1 Methodology and Measure

This section provides the data collection methods used to answer the research questions. The research utilized two types of data collection methods (Figure 38). The **primary data** was collected from **semi-structured interviews** and questionnaires using Qualtrics software to create, share, and analyze survey questions and Opinions. At the start of the research, the questionnaire was built in Qualtrics to collect information about 'The Experience Event,' the study further used the Opinion Stage software to gather information about people's attendance at 'The Experience event.' The online survey's sampling method is a link shared on Instagram, Facebook, WhatsApp, Twitter, and LinkedIn where those browsing through the site decide to participate in the survey ('opt in') or not. The survey is unrestricted and open to the public for anyone to answer. The **questionnaire** consists of questions about 'The Experience Lagos' on the use, trip characteristics, and perception of inhabitants on Lagos' transport network and modes. The trip characteristics include travel modes and travel time, alternative travel modes and satisfaction, and service quality that provides comfort and reliability of multiple modes, socio-economic, and personal information, including gender, age, occupation, car ownership, and income. Using an online survey is to reach a more comprehensive number of respondents and relatively fast responses among road users aged between 15 and 65 years who are between the age bracket that are physically present at the events.

The survey was published on **Qualtrics** on January 25, 2021 and retrieved for analysis on March 13, 2021. Qualtrics software records a total of 570 responses after data cleaning; 550 responses were used to analyzed single choice answers, while a maximum of 1050 responses for multiple choice answers. **Data cleaning** on Microsoft Excel to remove outliers that weren't recorded, for example, comfortability and frequency, of BRT(LAGBUS), Motorcycle (Okada), Tricycle (Keke Napep), Shared taxis (Uber, Bolt, Shuttlers), Bike hailing (Gokada, Opay, Bolt), LagFerry, Bicycle. In addition, some questions recorded a high count of 'no answer'; also, some questions were removed from the analysis because of fewer responses (20 responses). For instance, the question 'How satisfied are you with the service quality including the comfortability of Motorcycle (Okada), Tricycle (Keke Napep), Shared taxis (Uber, Bolt, Shuttlers), Bike hailing (Gokada, Opay, Bolt), LagFerry, Bicycle recoded a maximum of 13 response. The **Opinion stage** software recorded 110 responses. It was published on 4 April 2021 to collect information about attendance to the events, type of mode, if affected by the traffic generated by the event.

The second primary data collection method used semi-structured interview questions as a guideline to gather preliminary information from stakeholders that organize and manage religious events, also transport service providers within the public transport sector of Lagos State (see questionnaire in Appendix K). Three different online interview sessions were conducted on Google meet and Zoom to get information about existing transport problems in Lagos and the events. The

report won't mention the interviewee's name due to privacy reasons. On March 6, 2021, an interview with a representative of Primero transport services limited the operators of blue BRT Buses that carters to Lagos State residents was conducted. Also, an official from Lagos Bus Services Limited (LAGBUS) shared his view about the research objectives through an interview on March 12, 2021. A member from the Holy Ghost Congress's Redemption campground transport team shared essential and helpful information for the research on April 29, 2021. Every effort to get an interview session with a private ride-hailing company like 'Shuttlers' and the event organizers 'The Experience Lagos' event was abortive; however, relevant questions were added to the online survey questions.

A secondary data collection regarding the events provided helpful information that evaluates the existing transport policy and regulatory frameworks that support organized private sector-driven transport companies to operate and participate in the intra-city market despite the large population and substantial daily mobility demand. The research used information from articles, journals, websites, newspapers, records, and reports from the Lagos State Government transport agency like Lagos Metropolitan Area Transport Authority (LAMATA) and Road Traffic Crashes (RTC) from the Federal Road Safety (FRSC) Statistics on road traffic crashes and international data. Data extraction, interpretation, and visualization took place using Microsoft Excel, Adobe Illustrator, and Google Maps.

The research used **Microsoft Excel** to clean and interpret survey responses that contribute to the research objectives using standard two-dimensional data visualization tools such as bar charts and pie charts to convey clear and concise information. The interview response provided information on the current use of transport modes and networks, transport policies, and possible sustainable mobility solutions.

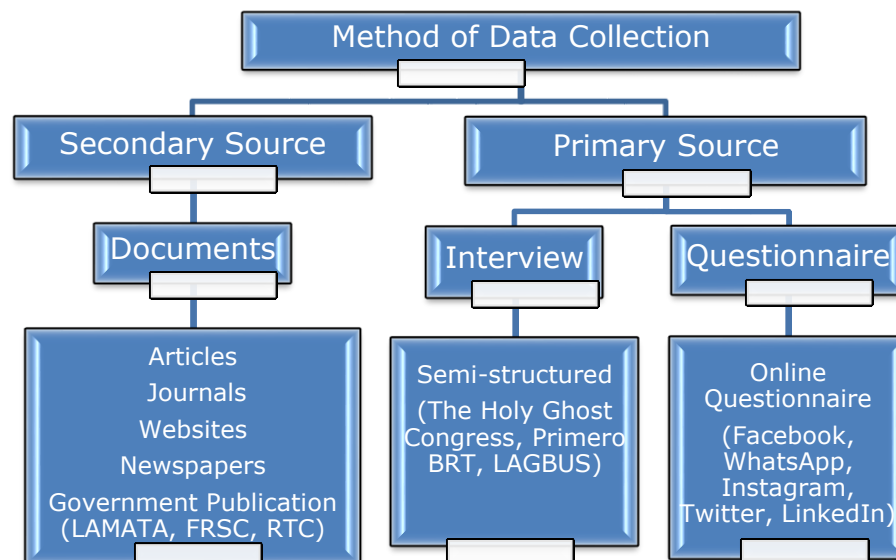


FIGURE 38 Data Collection Method (Author).

6. RESULT AND DISCUSSION

This section presents the survey results from the research questions on the current use of transport modes and networks, socioeconomic characteristics, and transport modes used during religious events. In total, 629 people agreed to take the study (Figure 39); a total of 496 responses are Lagos residents (Figure 40). In addition, there were multiple choice answers to some questions. The chapter shows Lagos' roads and the purpose of trips, average distance covered, transport modes owned, satisfaction level, and socioeconomic characteristics. The data makes it possible to observe meaningful variations of flows and mobility patterns, which significantly help understand how specific modes, trips, and mega-events contribute to Lagos spatial configuration.

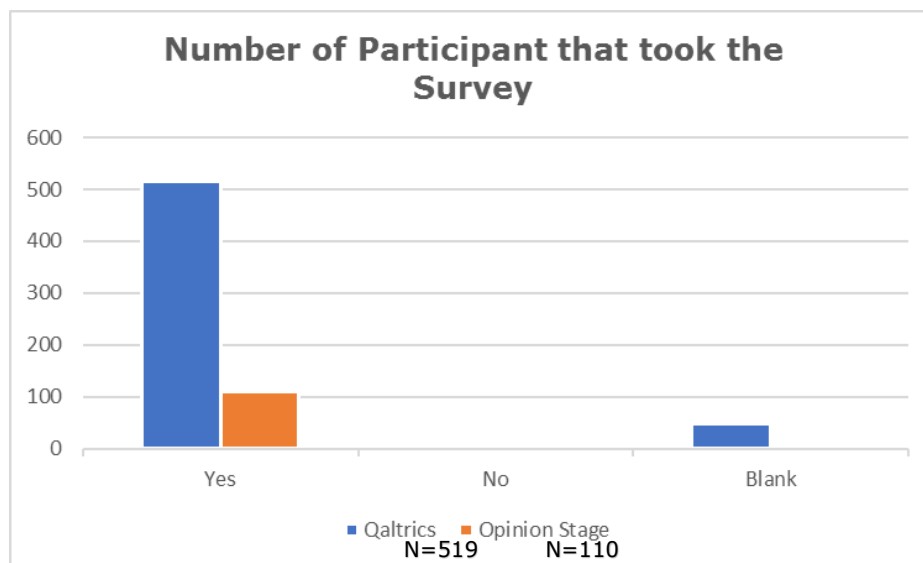


FIGURE 39 Number of Participants (Author).

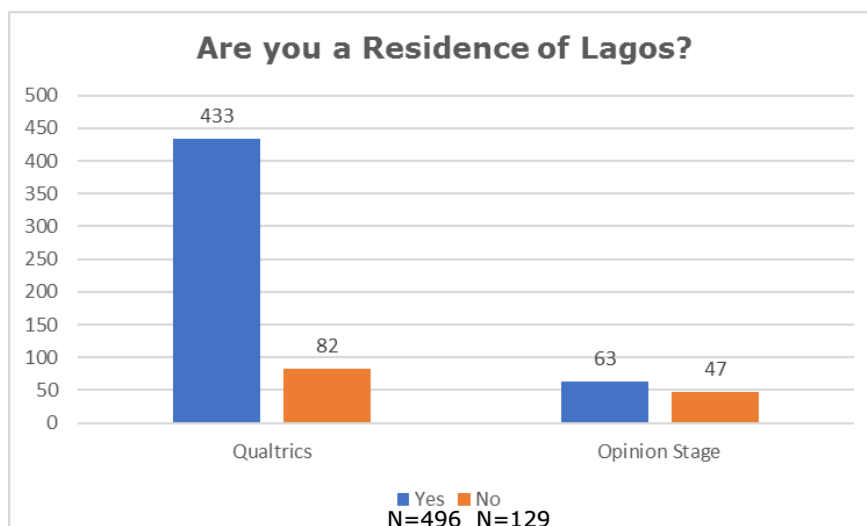


FIGURE 40 Total Number of Lagos residence that took the survey (Author).

6.1 Current use of transport modes in Lagos based on the survey

Transport networks are the spatial configuration of the structure and flow of a city. In Lagos, the number of daily trips by **private car** is higher than the formal public transport BRT(Lagbus), which is the least used transport mode, while informal transport commercial buses (Danfo) is the second most used mode in Lagos followed by shared taxis like Uber, Bolt, and Shuttlers (Figure 41a). The demand for public transport is increasingly growing with the rapid urbanization growth. However, transport users prefer to use their private car over other modes because of its convince, time spent in traffic, multiple trip journey while price difference, public transport demand, and supply gap, bus coverage services within the transport network will increase the use of informal public (commercial bus Danfo) over BRT (see chapter 6.2). Also, an average person uses more than **one mode to travel** within the city because of their coverage and accessibility, making them accessible to all transport networks (Figure 41b); thus, a daily increase in traffic congestion is inevitable.

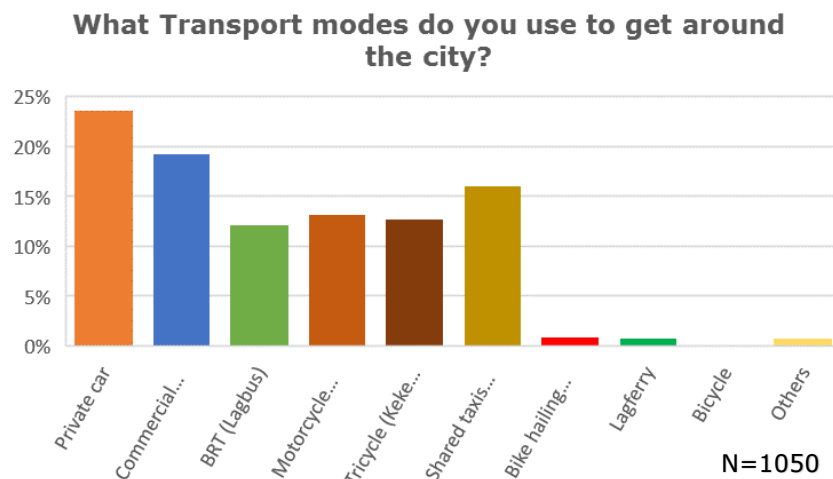
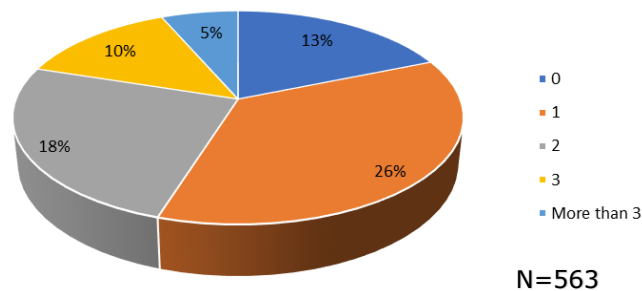


FIGURE 41 (a) Transport Modes in Lagos (Author).



(b) Number of Cars in each household (Author).

Similarly, the mode choice influences the **trip purpose** since respondents embark on multiple trips a day. Figure 42 below shows high home-to-work trips because of the work culture of Nigeria (Mondays-Fridays) while trips for leisure such as restaurants, sports, owambe (traditional ceremony), etc., and visiting someone is the second-highest trips made which is because most people use the

trip to relax outside of work, and also it's a weekend when no mega-events is happening.

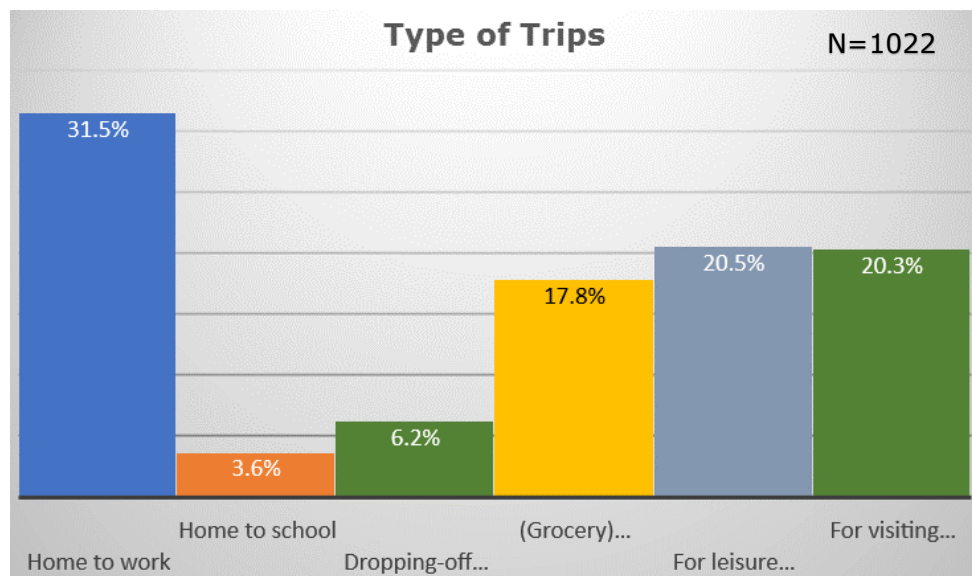


FIGURE 42 Purpose of Trip (Author).

The satisfaction level from various modes is dependent on service quality, price, and frequency. The frequency data got a low response which is not recorded in the analysis. In Figure 43 below, the satisfaction level for service quality written as 'service quality(S)' shows that 45.97% are more satisfied with their private car than the commercial bus (danfo) even though the dissatisfaction level 'service quality(D)' for the commercial bus (danfo) is 34.58% because they contribute to carbon emission, traffic, and lawlessness in the city. Likewise, motorcycles (okada) account for the highest 41.57% because of their contribution to road accident statistics, insecurity, and lack of policy controlling their services.

The impact of price in mode choice is an important indicator. The satisfaction level 'price(S)' indicates that 37.29% of BRT users are satisfied because of its fixed price for comfort and convenience. On the other hand, 37.23% of the commercial bus (danfo) users are also satisfied because of the service coverage at a walkable distance and their availability all day and time. Motorcycle (Okada) users (37.23%) enjoy this mode better because they serve as transport fillers (home to the bus stop) for smaller roads and journeys that serve as an alternative to walking or biking due to lack of such infrastructure. The price dissatisfaction 'price(D)' is expressed mainly by motorcycle(okada) users because when they ply restricted road networks, they put their job and live at risk. Instead, they risk increasing the price; this happens during heavy traffic, and users need to get to work early enough. They travel between vehicles until they get to their destination.

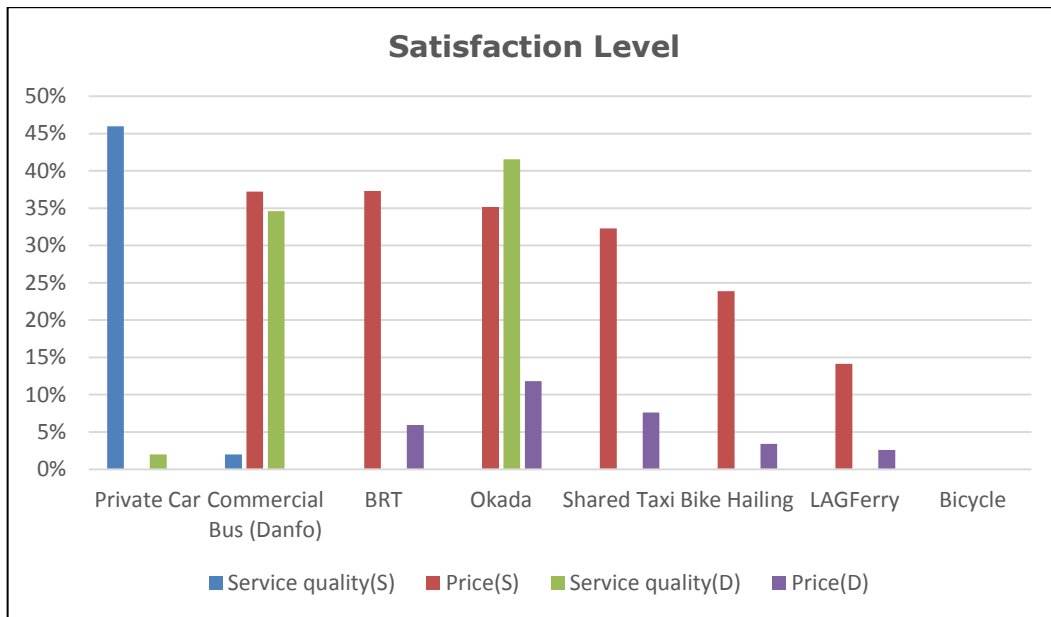


FIGURE 43 Service quality, Price, and Frequency (Author).

6.2 Current use of transport networks in Lagos based on the survey

The use of the transport networks in Lagos varies, especially during various religious events. According to the interview, The Holy Ghost Congress event generates flow from within and outside Lagos, from other states and neighboring countries. Traveling into Lagos State from the north, east, south, and central part of Nigeria, two different modes of transport are required; by air transportation from other far states and within or outside Lagos, by road transportation (Commercial bus (danfo), Bus, Motorcycle(Okada), and Private cars). During the week of the events, these hubs are usually busy because of domestic and international arrivals, with a large influx of people by road into Lagos.

Most people travel within Lagos using the four major Lagos mainland road networks (Third mainland bridge, Carter bridge, Ikorodu road, Eko bridge) that connect to Lagos Island (Lekki-Epe Expressway) (Figure 44b). Figure 44a showed that 36% of the respondent uses third mainland bridge road network to connect to Lagos Island and Lagos Mainland, 20% connects within Lagos using Ikorodu Road and, 17% of trips are from outside Lagos to travel within Lagos as a result of rural-urban migration, business purpose, job or visit family that lives outside Lagos.

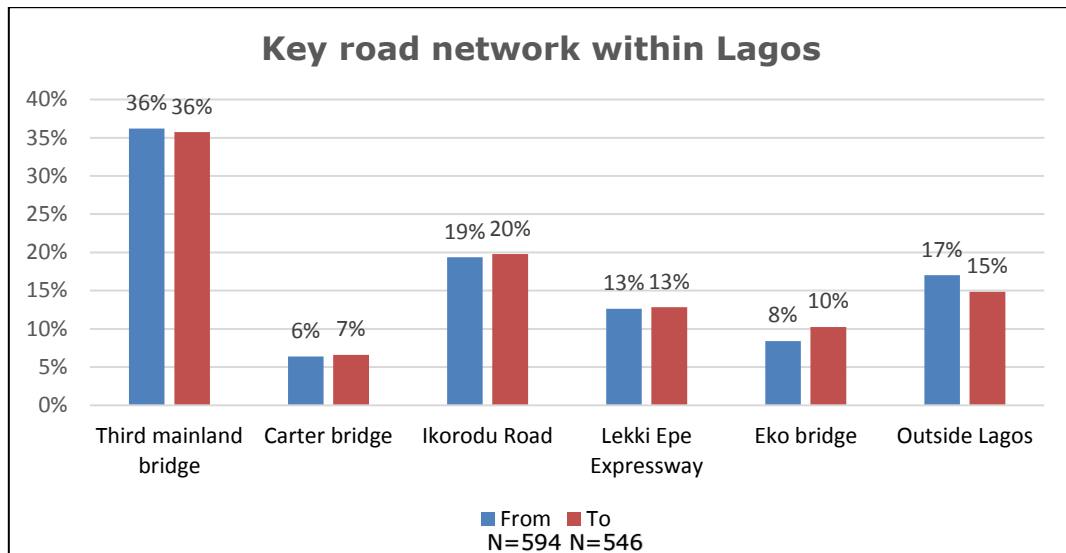


FIGURE 44 (a) ROAD network usage within Lagos (Author).

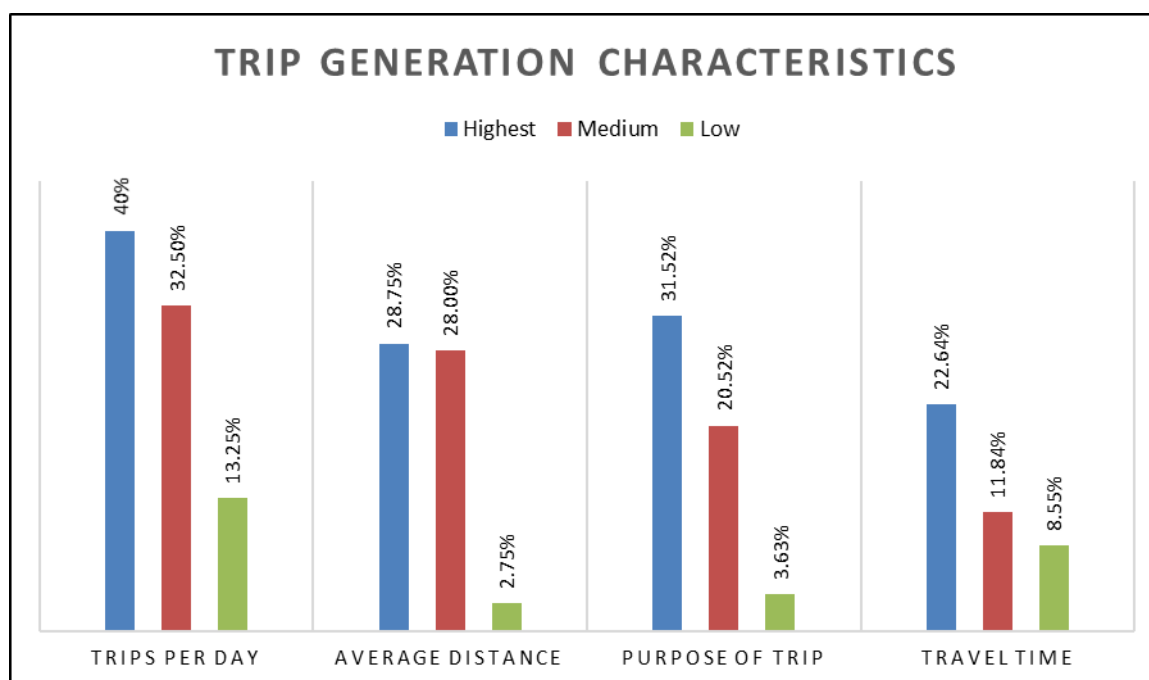


(b) Mobility flow within Lagos State major road networks (Author).

Furthermore, from the trip characteristics indicator chart in Figure 45, as categorized in table 3, many Lagosians use the road network for different purposes at a specific time. According to the survey, the highest percentage was classified to identify the highest, medium, and low response. 40% make two trips per day, and 32.50% more than three trips per day, while 13.25% make less than one trip per day with a maximum average distance of 11-50Km (28.75%) and a minimum of 0-1Km (2.75%). 31.52% is the home-to-work trip. Leisure generates 20.52% while home-to-school (3.63%) generates a minor trip because the survey age bracket (16-65) are university students that had/have their university in another state (chapter 6.4). Between 6-8 am, 22.64% of these trips are during morning rush hour while 11.09% during evening rush hour with less tip after 8 pm (8.55%).

TABLE 3 Trip characteristics indicators (Author)

Indicator	Trips					
	1	2	3	more than 3		
Trips per day	1	2	3	more than 3		
Response	13.25%	40.00%	14.25%	32.50%		
Average distance	0-1 km	2-5 km	6-10 km	11-50 km	51 - 100 km	More than 100km
Response	2.75%	19.75%	28.00%	28.75%	14.25%	6.50%
Purpose of Trip	Home to work	Home to school	Dropping-off/picking-up people.	(Grocery) shopping.	For leisure (restaurants, owambe, sports, going out).	For visiting someone.
Response	31.52%	3.63%	6.24%	17.80%	20.52%	20.29%
Travel time	Before 6 am	6 am to 8 am	8 am to 10 am	Between 10 am and 2 pm	2 pm to 4 pm	4 pm to 6 pm
Response	12.14%	22.64%	14.39%	11.84%	8.55%	11.09%

**FIGURE 45 Classified trip characteristics indicators(Author).**

6.3 Transport modes during the religious events

The survey answers the research question on the use of transport modes during religious events. 110 responded to the survey collected from Opinion Stage software for the Experience Lagos event published after the first questionnaire in Qualtrics was sent to the respondent. 57% said YES and, 43% said NO (Figure 46) to have attended the experience event. Due to the late addition of the 'the Holy ghost congress' case study to the research, the case study wasn't included in the questionnaire, but the response was gathered from the semi-structured interview conducted.

Have you attended the events in the past?

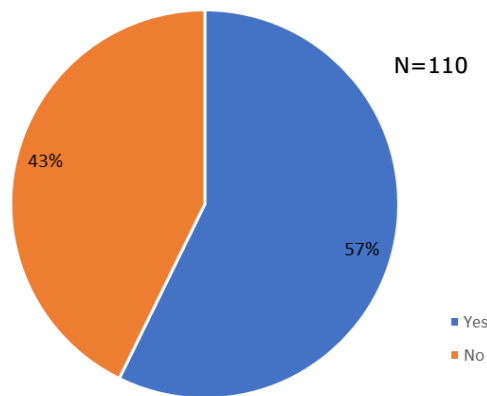


FIGURE 46 Have you attended the Experience Lagos event before? (Author).

According to the response from the semi-structured interview conducted, the holy ghost congress event attracts many worshippers from outside Lagos and Nigeria. However, the Experience Lagos event attracts 55.50% within Lagos, 8.20% from outside Lagos, and 5.50% from another State (Figure 47).

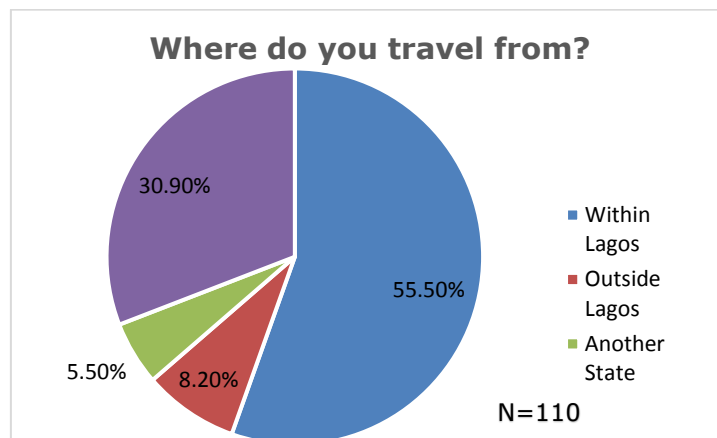


FIGURE 47 Where do you travel from to 'the Experience Lagos' event location (Author).

Furthermore, Figure 48 below shows the mode choice of the Experience event’s attendees, 22.7% travel by Lagos public mass transit (Primero BRT, LAGBUS) BRT organized as planned services of over 100trips a day, its fast services using a dedicated BRT corridor and the non-payment strategy. Commercial bus(danfo) generates 19.10% of the trips because of their extensive route coverage and availability. Even though they have a smaller capacity, they make a significant profit from multiple trips, thus increase congestion because of the high number of car operators. The private car generates 20.9% of the trips because of less parking space and dissatisfaction expressed in traffic congestion on the event’s road network. Motorcycle (Okada) would have been an alternative, but there is a decline in usage (0.9% trips) because of the ban on Lagos major roads for safety reasons. Private bus services like chartered services organized by churches record

4.5% of the trips as an alternative to a shared ride with high capacity. 30.9% of respondents didn't record their mode choice to the event.

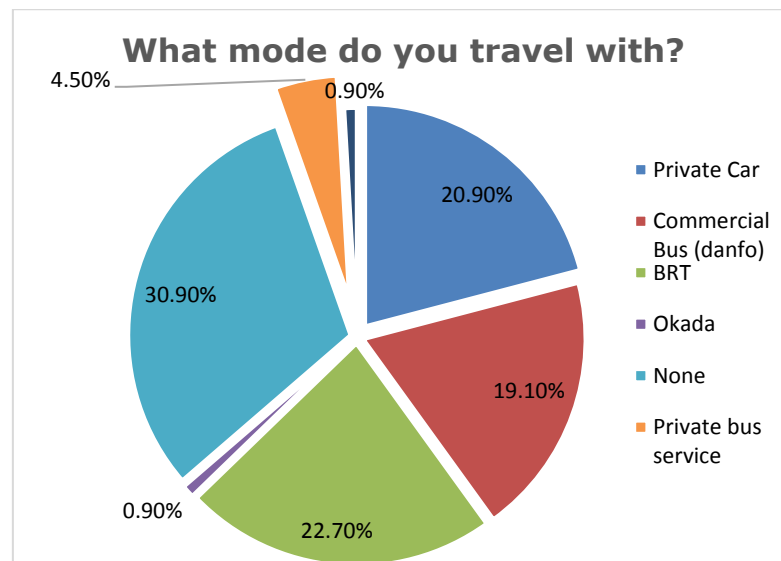


FIGURE 48 Modes during the events (Author).

On the other hand, the one-week Holy Ghost Congress event generates more traffic because of the length of days, and the mode choice varies each day. According to the response from the semi-structured interview, planned transport services of 60 capacity and a binding contract with the transport companies such as Lagos public mass transit (BRT, LAGBUS), neighboring state public transit (Oyo State & Ogun State) provides transport services. The RCCG camp mass public transport, RCCG church buses from different Lagos church parishes also convey worshippers to the campground. A maximum of 15 buses leaves the campground from Monday to Wednesday each day to transport worshippers from Lagos and a maximum of five buses to other neighboring countries on Thursday and Friday. The presence of adjacent settlements around the campground increases non-motorized modes like walking, cycling, and motorcycle (okada). Also, there are 5000 capacity car parks in six different places within the RCCG campground, which encourages worshippers to come with their vehicles. The availability of parking increases the use of private cars available for the one-week Holy Ghost Congress event. Using this mode is more convenient, comfortable, flexible, and easy to get back to the origin or other places after the event (home) without waiting to queue for the camp free bus services or depend on the public bus services, especially when there is an overflow of people. Usually, the demand for public transport is high after each day while those who can't go through public transport stress lodge in the campground.

Informal transport like commercial buses (danfo) is also a high mode choice because they provide maximum coverage and flexible price determined by the bus operators to the campground. There is a dedicated bus stop at the campground to ease drop-off of passengers and traffic at the entrance where their services end and continue with private shuttles organized and owned by the RCCG campground.

6.4 Socioeconomic Characteristics

A socioeconomic class comprises people with similar characteristics, including education, gender, age, occupation, and household size (Figure 49). The survey helped identify people involved in religious events, mobility flow, and road network usage in Lagos. In Nigeria, the largest population group, are between the age bracket 18-40 years classified as the youth. In the survey recorded, 32% of respondents are between 26-30 years, even though 45% did not answer the question. It is because Nigerians are private when sharing information about their age, income, and household. The survey shows more males than females because of the gender demand for economic activities in Lagos, even though there is a firm gender inclusive policy in the State. Generally, there are more females than males depend on the state, region, and target group in research.

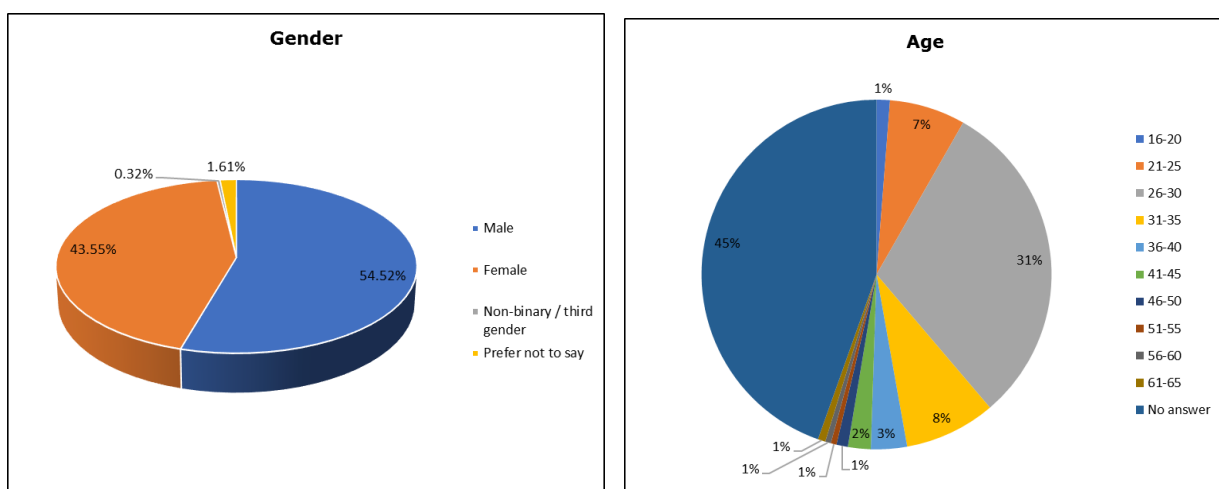


FIGURE 49 Gender and Age classification (Author).

There is 45% no response to the number per household size, but 11% records a minimum of five people (11%) with a minimum of 1 or 2 people (6%) with 45% records no answer.

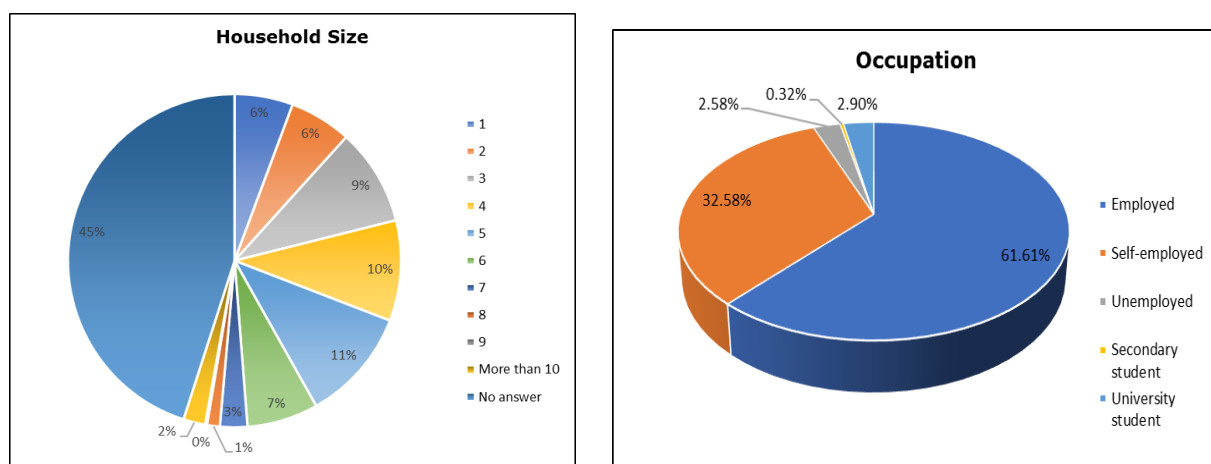


FIGURE 50 Household size and Occupation (Author).

Eight universities exist in Lagos State, of which two belong to the federal government, one belongs to the state government, while five are privately-owned.

Lagos is the country's economic engine with high profiles of intellect, educationists, and people of high integrity with a diverse multi-cultural group from across Nigeria. The survey (Figure 51) shows that 87.74% of respondents have a university degree culturally, acquiring the highest level of education is a part of the beliefs and tradition of Nigeria. However, the western region of Nigeria is perceived to have the most educated people because of its education colonialism history. The second category of qualification accounts for 7.10% of respondents with a Higher National Diploma (HND), followed by 2.26% of Ordinary National Diploma (OND) and 2.90% with Secondary education.

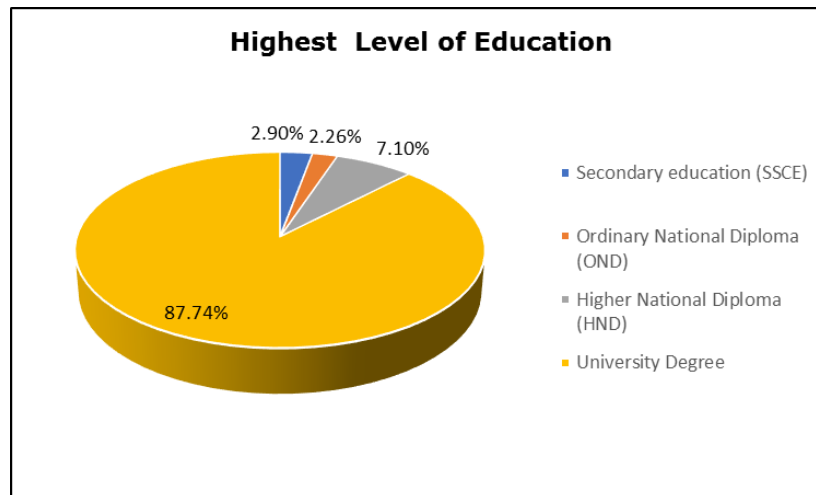


FIGURE 51 Education qualification in Nigeria (Author).

7. LIMITATION, CONCLUSION, AND RECOMMENDATIONS

7.1 Limitation

The main limitation encountered during this research to obtain the expected results is the unavailability of relevant data and access to specific information.

The following are the specific limitation of the research questions.

1. There was no physical gathering for the 'Experience Lagos' event due to the Covid-19 pandemic. Therefore, the research was based on the previous year's physical conference.
2. Not all the semi-structured interview responses were included in chapter 6 because it was out of the research questions.
3. Reaching out to a ride-hailing company (Shuttlers) for an interview session was impossible, likewise 'The Experience Lagos,' which added another case study to the research 'The Holy Ghost Congress.'
4. The research could not acquire time-series crash data, including recent road accident data for motorized transport modes, needed to understand the effect of non-Motorized transport suggested for a sustainable mobility solution in Lagos State.
5. The research depended on non-scientific articles because of the limited available scientific paper in Nigeria or similar topics. The study sourced information from international journals that contributed to the literature review.
6. The ban of ride-hailing companies from providing commercial ride services to Lagosian limited the research in getting information about commuter's satisfaction.

7.2 Conclusion

In this research, we explored sustainable events mobility in Lagos, Nigeria. In particular, two religious' events, 'The Holy Ghost Congress' and 'The Experience Lagos' as case studies. The main objective was to analyze the current use of the transport network and modes in Lagos, analyze the transport network and modes during the two religious events, examine the existing measures for sustainable transport policy, and suggest sustainable solutions for congested-free large events.

The study uses primary and secondary data collection to get information on the mobility situation.

The existing transport networks in Lagos are for different trips such as home-to-work, leisure, visiting friends, and groceries with different modes choice. Lagosian use multiple modes per journey to get around the city, such as private car, commercial busses (danfo), motorcycle(okada), BRT, Tricycle (Keke Nepep), Shared Taxis. Private vehicles account for the highest mode use in Lagos with one car per person, increasing traffic congestion caused by many cars on the road. People are more satisfied with the service quality of their private vehicles and the price of the commercial bus (danfo) and BRT per trip. The major transport networks such as Lagos-Expressway, third mainland bridge, Ikorodu road within

Lagos State accommodate various groups of people heading to the event venue using high occupancy buses, private cars, and BRT services.

The Lagos State government is currently implementing the BRT services' expansion project to provide sustainable rides and services that will integrate other modes like ferry services as a last-mile journey. For example, the reconstruction of the BRT corridor, the provision of more intelligent buses, and an integrated card system called 'Cowery card' to ease boarding and reduce waiting time at the bus stop, provide convenience and real-time information.

Furthermore, the State government's non-motorized transport (NMT) policy prioritizes walking and soft mobility within the city an upgrade of road infrastructure to impose this policy is ongoing. However, the bike-hailing company and users (motorcycle-Okada) are not allowed to ply some specific road for commercial purposes because of their contribution towards road accidents. It is still a debate to include the informal transport system into the State transport plan. In May 2021, the State government commissioned the First and Last-Mile Buses that are environmentally friendly to replace motorcycles (Okada).

Lastly, a well-organized transport system will provide better mobility for people who will attend the event without adding to the transport problem when the event is not occurring. Organizing a congestion-free large event should include alternative routes, awareness to people using a shared ride, BRT, high occupancy buses, and collaboration with informal public transport.

7.3 Recommendations

7.3.1 Transport Network and Modes for the events

The research explained the current use, the daily overflow of cars on road networks during and after the events. Thus, causing vehicular congestion within the BRT corridor and axis on 'The Experience Lagos' venue while 'The Holy Ghost Congress' contributes to the daily population and car increase during the one-week events. The following can help control such a crowd on the transport network and mode choice. The recommendation provides sustainable means of dealing with the causes of large event congestion.

1. **Scheduled transport** services will modify worshippers' movement and provide a parking system that includes a park and ride to reduce traffic along the venue area. Similarly, service perception, commuters' orientation to people living within a service area, Public Transport maintenance and user satisfaction will improve service delivery and discourage private vehicle use, indirectly increase PT along the route.
2. **Awareness to commuters** who are not attending the event but instead have a daily business to run should be intensified. Over the years, Lagosians are aware of the occurrence of the two religious' events. However, this does not reduce its impact on non-worshippers, commuters, and the environment even though it generates revenue for Lagos State and transport companies actively involved (informal and formal transport modes).

3. **Investing** more in road maintenance and Public transport buses will improve service perception, increase the satisfaction level of users, and the continuous orientation of road users during and before such events will prevent road traffic, accidents and improve safety.
4. **The continuous training of public transport drivers** (bus- 60capacity) on the safety measures for both passengers and the road, such as road signs, speed limits, will improve the safety and security of road users. Even though there is no record of road accidents over the years, it is essential to prevent an increase.
5. The **impact of the events on neighboring settlements** is dependent on the occurrence of the event, 'The Experience Lagos' event occurs once a year with low impact if compared to 'The Holy Ghost Congress' that occurs for one week in a year. The impact on its surrounding is a positive impact that provides business services, expands land development, e.g., housing estate, includes property investment, houses major landmark that opened due to the influx of over 500,000 people daily on a one-week yearly event. While negative impact could mean residents are vulnerable to road accidents, environmental pollution (air & noise).
6. The ongoing **railway project** in Lagos will reduce road traffic congestion and noise if a terminal is proposed around a walkable distance from the Redemption camp, considering the population this religious city attracts monthly.

7.3.2 Measures for sustainable transport during large events

1. A well-structured transport policy will **integrate the informal transport** sector into Lagos State's transportation plan, improving and encouraging the change rather than a one-time phase-out scheme. Through infrastructure rehabilitation, upgrade of buses, mandatory road safety training, transport incentives, clear description of the role of the trade union that serves the interests of road transport workers called National Union of Road Transport Workers (NURTW).
2. **Improve Intelligent Transport System (ITS)** to measure the speed of vehicles, increase rapid rescue team in place of emergency by providing real-time information, sharing data, cloud networking, and improve e-ticket services to reduce waiting time at the bus stop.
3. The research explains that the problem with congestion is not mobility but traffic management. Therefore, the events should **increase the capacity and coverage of traffic units** from private and public traffic control agencies. They can be trained or licensed transit marshals, transport controllers, and road safety officers.
4. **Managing local traffic** goes as far as closing some sections of the road not because of road works but also to control the traffic during the events. Indirectly, this strategy affects local businesses within the city; therefore, proper coordination to manage such an effect is vital. In Lagos State, Lagos Metropolitan Area Transport Authority (LAMATA) with the Federal Road

Safety Corps (FRSC) are the key transport managers. They can reduce road closure by using route mapping techniques to distribute traffic and generate alternative routes, especially access roads (neighborhood roads). For example, the highway Lagos-Ibadan Expressway to the campground of 'The Holy Ghost Congress' collects and distributes extra mega traffic by opening an alternative route leading to the venue; thus, decongesting the highway.

5. The availability of **financial means** is essential to purchasing a sustainable high-capacity public transport bus that will reduce monthly vehicle maintenance costs that can contribute to environmental pollution and reduce drivers' productivity. If this happens, public transport supply will meet the demand reducing private car dependency. It also implies encouraging incentives to drivers, which could be monetary, training (security & safety for passengers, basic road signs), or vouchers that will motivate them to work more days.

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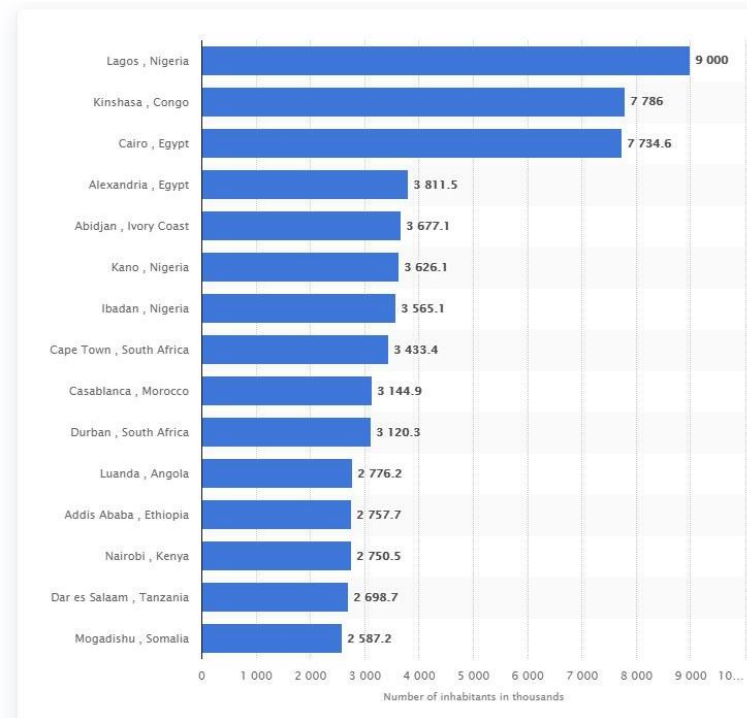
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APPENDIX

APPENDIX A Largest city in Africa 2021 by inhabitants (in 1,000sqm) (Julia, 2021).



APPENDIX B Third Mainland bridge: Federal Truck 'A' road (Gidittraffic.com).



APPENDIX C State Government road, Trunk 'B' road (constructionreviewonline.com).



APPENDIX D Local road maintained by the Local Government (www.trtworld.com).



APPENDIX E Lag ferry Water Transport, Five Crown Port (Theresa, 2020).



APPENDIX F Informal transport systems are known as paratransit modes in Lagos.

(a) Motorcycle (Okada) (Oche, 2018).

(b) Tricycles (Keke Napep) (Raheem, 2020).

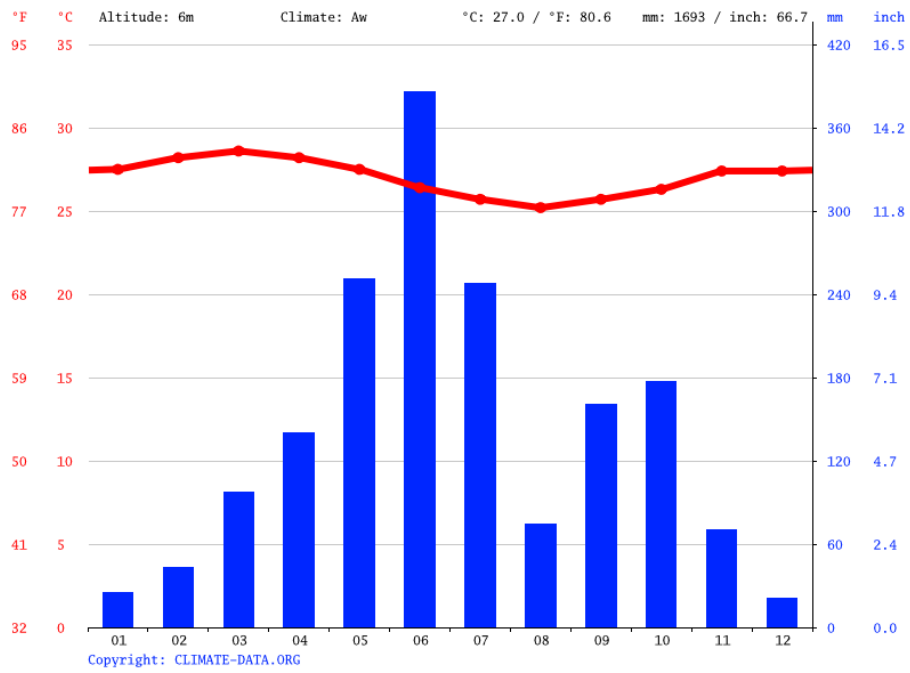


(c) Minibus Services (Iju, 2017).

(d) Shared Taxis (Ekocab) (Devesh, 2013)



Appendix G Lagos Weather Climate by month (Lagos Climate Nigeria, 2020).



Appendix H Examples of Bike Hailing company
(a) Opay (Kido, 2021).



(b) Gokada (Jake B. , 2019).



(c) Max.ng (Jake B. , 2019).



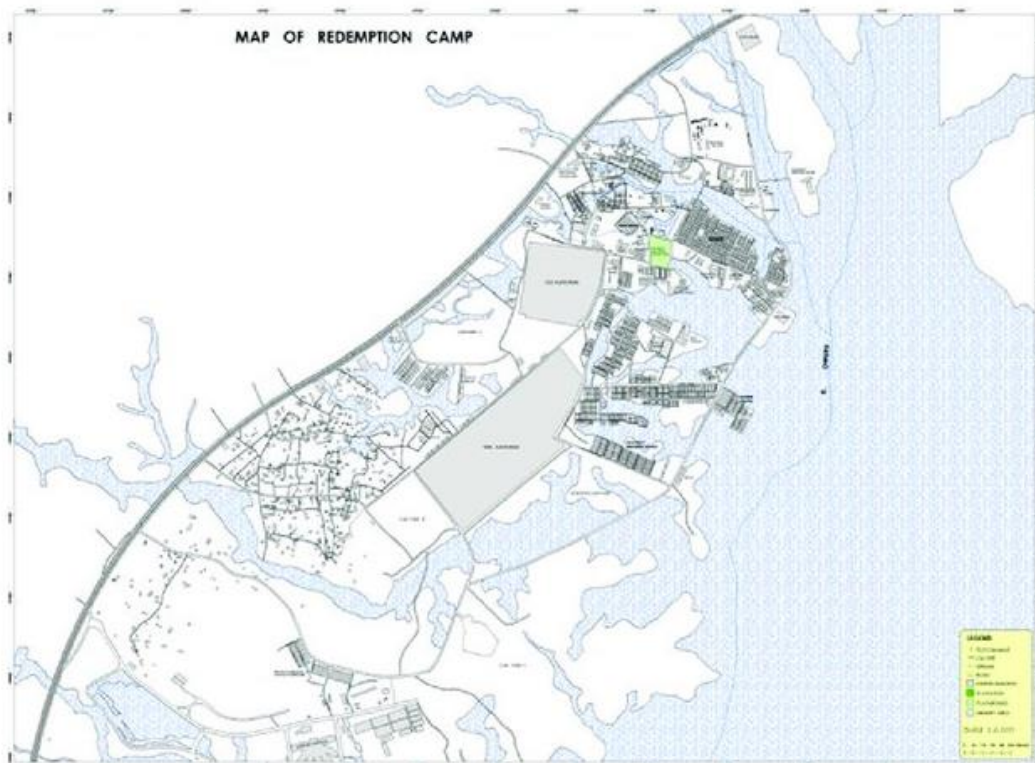
(d) EkoCab Taxi (Emmanuel, 2020).



APPENDIX I Removal of roundabout Lekki-expressway (Nairaland.com)
(a) before **(b) after**



APPENDIX J Base map of The Redemption camp for 'The Holy Ghost Congress' (Ukah, 2003).



APPENDIX K Online Survey Questionnaire Template*INTRODUCTION*

Dear respondent,

You are invited to participate in a short survey that will take 3 to 7 minutes, your answers will be used for research that is investigating the current transport networks and the transport modes in Lagos.

If you have any questions/comments, you can always reach me at the following e-mail address:

modupe.osunkoya@student.uhasselt.be

Again thank you for your participation.

I agree to participate in this study and to the survey?

- a. Yes
- b. No

Are you an inhabitant of Lagos?

- a. Yes
- b. No

Travel Mode & Satisfaction (Published on Qualtrics software)

1. How many cars does your household own? _____
 - a. 0
 - b. 1
 - c. 2
 - d. 3
 - e. More than 3
2. How many trips do you make per day?
 - a. 1
 - b. 2
 - c. 3
 - d. More than 3
3. What is the average distance of your journey?
 - a. 0-1 km
 - b. 2-5 km
 - c. 6-10 km
 - d. 11-50 km
 - e. 51 - 100 km
 - f. more than 100km
4. What is the average time spent in traffic?
 - a. Less than 30min
 - b. 1hour
 - c. 2hour
 - d. More than 2hour
5. What transport mode do you use to get around the city (more than one answer possible)?
 - a. Private car
 - b. Commercial bus (Danfo)

- c. BRT (Lagbus)
 - d. Motorcycle (Okada)
 - e. Tricycle (Keke Napeep)
 - f. Shared taxis (Uber, Bolt, Shuttlers)
 - g. Bike hailing (Gokada, Opay, Bolt)
 - h. Lagferry
6. How many modes of transport do you use for a trip?
 - a. 1
 - b. 2
 - c. More than 3
 7. Specify the modes (bus,okada,etc.,)_____
 8. How satisfied are you with the service quality, including the comfortability of a private car?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
 9. How satisfied are you with the service quality, including the comfortability of the Commercial bus (Danfo)?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
 10. How satisfied are you with the service quality, including the comfortability of BRT (Lagbus)?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
 11. How satisfied are you with the service quality, including the comfortability of the Motorcycle (Okada)?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
 12. How satisfied are you with the service quality, including the comfortability of Shared taxis (Uber, Bolt, Shuttlers)?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied

- e. Very Dissatisfied
13. How satisfied are you with the service quality, including comfortability Bike hailing (Gokada, Opay, Bolt)?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
 14. How satisfied are you with the service quality, including comfortability LagFerry?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
 15. How satisfied are you with the frequency of Commercial buses (Danfo)?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
 16. How satisfied are you with the frequency of BRT (Lagbus)?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
 17. How satisfied are you with the frequency of the Motorcycle (Okada)?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
 18. How satisfied are you with the frequency of Shared taxis (Uber, Shuttlers)?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
 19. How satisfied are you with the frequency of Shared taxis Bike hailing (Gokada, Opay, Bolt)?
 - a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied

- e. Very Dissatisfied
20. How satisfied are you with the frequency of Lagferry?
- a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
21. How satisfied are you with the price of a Commercial bus (Danfo)?
- a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
22. How satisfied are you with the price of BRT (Lagbus)?
- a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
23. How satisfied are you with the price of the Motorcycle (Okada)?
- a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
24. How satisfied are you with the price of Shared taxis (Uber, Bolt, Shuttlers)?
- a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
25. How satisfied are you with the price of Shared taxis Bike hailing (Gokada, Opay, Bolt)?
- a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
26. How satisfied are you with the price of Lagferry?
- a. Very Satisfied
 - b. Quite Satisfied
 - c. Not Satisfied or Dissatisfied
 - d. Quite Dissatisfied
 - e. Very Dissatisfied
27. In general, what transport mode do you own?

- a. Motorcycle
 - b. Car
 - c. Bus
 - d. Bicycle
 - e. Tricycle
 - f. Others_____
28. How often do you use it?
- a. 1
 - b. 2
 - c. 3
 - d. More than 3
29. In general, what type of trips do you make?
- a. Home to work
 - b. Home to school
 - c. Dropping-off/picking-up people.
 - d. (Grocery) shopping.
 - e. For leisure (restaurants, owambe, sports, going out).
 - f. For visiting someone.
30. In general, at what times do you travel?
- a. Before 6 am
 - b. 6 am to 8 am
 - c. 8 am to 10 am
 - d. Between 10 am and 2 pm
 - e. 2 pm to 4 pm
 - f. 4 pm to 6 pm
 - g. 6 pm to 8 pm
 - h. after 8 pm
31. Which of the road network do you usually travel from?
- a. Third mainland bridge
 - b. Carter bridge
 - c. Ikorodu Road
 - d. Lekki Epe Expressway
 - e. Eko bridge
 - f. Others, specify_____
32. What time do you use this road for the trip?
- a. Before 6 am
 - b. 6 am to 8 am
 - c. 8 am to 10 am
 - d. Between 10 am and 2 pm
 - e. 2 pm to 4 pm
 - f. 4 pm to 6 pm
 - g. After 6 pm
33. Which part of the road network do you usually travel to?
- a. Third mainland bridge
 - b. Carter bridge

- c. Ikorodu Road
- d. Lekki Epe Expressway
- e. Eko bridge
- f. Others, specify_____

34.What time do you use this road for this trip?

- a. Before 6 am
- b. 6 am to 8 am
- c. 8 am to 10 am
- d. Between 10 am and 2 pm
- e. 2 pm to 4 pm
- f. 4 pm to 6 pm
- g. After 6 pm

Personal information

To conclude, there are some socio-demographic questions

35.Gender?

- a. Male
- b. Female
- c. Non-binary/third gender
- d. Prefer not to say

36.How old are you? _____

37.What is your highest level of education?

- a. Secondary education (SSCE)
- b. Ordinary National Diploma (OND)
- c. Higher National Diploma (HND)
- d. University Degree

38.Where do you live?

- a. Lagos Mainland, specify_____
- b. Lagos Island, specify_____
- c. Outside Lagos, specify_____

39.How many people are in your household? _____

40.What is your Occupation?

- a. Employed
- b. Self-employed
- c. Unemployed
- d. Secondary student
- e. University student

41.Household income size

- a. Less than N30,000
- b. N30,000 to N100,000
- c. N101,000 to N500,000
- d. N500,000 to N1,000,000
- e. Above N1,000,000
- f. I prefer not to share it

We thank you for your time spent taking this survey
Your response has been recorded.

The online questionnaire survey question (Published on Opinion Stage)

1. Have you attended any Edition of 'The Experience Lagos; gospel concert before?
2. If yes, where do you travel from?
3. If no, are you affected by the traffic generated on the day of the event?
4. What modes of transport do you use to travel to the event?

Interview Guide

Aim: information about the transport network (and modes) during the event & sustainable mobility solutions

Interview 1: Transport unit of 'The Holy Ghost Congress' and Transport Expert within Lagos State transport sector. (LAGBUS, Primero)

Transport unit 'The Holy Ghost Congress'

1. How many days is the 'The Holy Ghost Congress' in December?
2. How do you manage to plan with the population?
3. What are the challenges faced when organizing and controlling the transport aspect of the event?
4. How large are the transport coordinators and controllers?
5. Do you provide sufficient transport by partnering with other service providers or with the government? With whom?
6. Do you partner with the informal transport sector? Why(not)?
7. For private car owners, do you provide sufficient parking? How many lots/capacity per lot?
8. What is the impact of road closure/traffic congestion on the day of the event or the city?
9. Generally, what are the challenges involved in event transport management?
10. Which ideas or solutions are you implementing to better organize the transport to and from the event site?
11. How would you rate the safety and security of road users in the city during the event?
12. Does the planning come with a high cost?
13. What is its impact on the built environment and population?
14. What is the long-term consequence of the event for the city's significant/permanent urban effect?
15. How is the mobility pattern of the organization planned?
16. Do you face an unplanned mobility pattern?
17. What are the potential negative impacts (minimum or maximum) caused by the event?
18. What is the beneficial legacy the event leaves for the host community?

19. Do you practice low emission transport and mobility to achieve environmentally-friendly events?

Interview 2: Transport Expert in Lagos State (LAGBUS, Primero)

1. Over the years, to what extent has public transport contributed to large events within the state?
2. What is the policy guiding the contribution of public transport to such large events like 'The Experience Lagos' and 'The Holy Ghost Congress'?
3. What is the major problem in terms of transportation in the city during such an event? (too much transport/people, insufficient transport offer)?
4. What is the impact of road closure/traffic congestion on the day of the event or the city?
5. What is the effect of 'The Experience Lagos' and 'The Holy Ghost Congress' on the transport network in Lagos State?
6. What would be the best way to address large event mobility? (in terms of infrastructure, communication/information of road users/visitors, increase in transport offer)
7. How would you rate the safety and security of road users in the city during the event?