Traffic Management Concept of Sustainable City Development in Nigeria

Solomon Oisasoje Ayo-Odifiri[1*], Aruna Osigbemhe Alasa[2], Ngbede Ogoh[3], Obafemi Tijjsheg Obajina[4], Rosemary Chinonye Emeana[5]

[1,5]*Department of Urban and Regional Planning, Federal University of Technology Owerri, Nigeria*
[2]*Physical Planning Department, Auchi Polytechnic Auchi, Nigeria*
[3]*National Board for Technical Education (NBTE) Kaduna, Nigeria*
[4]*Department of Urban and Regional Planning, Auchi Polytechnic Auchi, Nigeria*

***Abstract*: Astonishing urban expansion has resulted in a slew of attendant urban hazards, including climate change, road traffic congestion, housing shortage, unpleasant aesthetic qualities, infrastructure deterioration, and waste disposal issues. A city is not only a location to dwell, it is also a place for experience and action as well as for everyday commuting, leisure, and physical expression. Thus, the mobility of commodities and services is critical for sustainable urban activities, interaction, and liveability; a fact that urban planners and architects have taken note of. As with human arteries, transportation is the lifeblood of a city, and its failure could result in the ineffectiveness of other sectors. The management of road and traffic networks that link and influence urban fabric has been inadequately addressed, thereby causing unparalleled urban deterioration. Lax enforcement of current environmental regulations, insufficient public engagement, and conflicting professional obligations in urban planning are evident causative elements contributing to Nigeria's unsustainable urban expansion. Others include inadequate implementation and revision of the urban master plan and the absence of acceptable transportation policies. This paper discusses sustainable city development in Nigeria through the use of traffic management strategies. Relevant information on traffic management, sustainability, and City development was sourced from Scopus, Google Scholar, Academia, and MPDI databases to underpin the literature for this research. This study advocated the establishment of a mobile environmental tribunal, adoption of mobility policies, resilient city master plans, and public education on physical and infrastructural development.**

***Keywords*: City Development, Urban Planner, Sustainability, Traffic Management, Urbanisation**

I. INTRODUCTION

Unceasing migration of people to urban centres and the resulting rapid change in the built environment need the immediate attention of all experts in the construction industry. Specifically, architects and city planners are cultured in the knowledge, competence, and accountability associated with planning, design, construction, and management that result in the built environment. As the city expands at an exceptional rate, forces of change are released on a variety of fronts including demographic, environmental, and socio-economic and political forces. The city is more than a place to dwell; it is a place of experience and activity with spaces dedicated to daily commuting, leisure, physical engagement, and expression. This contribution imposes special expectations on municipal areas that are adaptable, support different uses, and provide a range of experiences (Andersen, 2011). According to Oyesiku (2002), the morphology and distribution pattern of buildings in an environment that promotes good health, accessibility, convenience, and harmonious land use are a result of land rights and ways of dealing with land. Thus, efficient urban land control and management of spatial activities are critical for resolving land use and city planning-associated issues in areas with significant urban expansion such as Nigeria.

Numerous Nigerian towns are growing without following the traditional land use ethics (Ajiboye, 2005), resulting in a variety of urban problems such as pollution of the environment media, transportation issues, unhygienic conditions, and outbreak of diseases. Some Nigerian cities are regarded as dirty, least visually attractive, and potentially hazardous to live in among developing nations, and being badly managed and densely littered with illegal constructions (Odufuwa et al, 2012; Ikwuyatum, 2016). This is because the planning, physical growth, and development of these cities have been inadequately managed in the absence of relevant professional input from the architects, transportation, and city planners, whose responsibility is to schedule and design buildings, and transport infrastructure layouts that stimulate physical development. On this premise, Halpern (1995) said that meaningful involvement in life-altering choices is an inherent component of a person's understanding of existence and appropriately enabled to have some control on the path of life-altering events. As a result, Achi (2004) discovered that city fabrics are viewed to comprise the overall texture of buildings as well as other features that together define the character of a city and encapsulate its memories.

Thus, human settlement is influenced by a variety of elements, including sociocultural, economic, defence, administrative, transportation, and educational factors (Olujimi & Fashiyi, 2004). Mobility and its network architecture influence the shape and structure of cities, their development patterns, the geographical distribution of landuse, and infrastructure. In a similar vein, Omuta (2006) observed that although the definition of the physical environment might be interpreted differently, the background

stays mostly the same. The physical environment encompasses all the activities of man, for instance, the construction of buildings, structures, infrastructures, and facilities as well as the exploitation and utilisation of natural resources. All of that contributes to the activation of human and motorised traffic shaping the urban landscape. More concerning Nigeria is the vast number of metropolitan centres unmatched in Africa. Nigeria has over 840 urban areas and 10 municipalities with a size of over one million, and a visible projection by Alkali (2005) indicated that more than 60% of Nigerians would reside in urban areas by 2025. This view was backed up by the Agenda 21 action plan accepted at the 1992 Earth Summit, which emphasises the significance of human beings at the centre of the discussions of environmental sustainability (United Nation Population Fund [UNFPA], 2012; Gudmundsson et al, 2015).

A sustainable city is a location where all inhabitants have the opportunity to better their living conditions and contribute to the growth of the city and country (Swedish International Development Agency [SIDA], 2006; European Union, 2010). The notion of a sustainable environment may be contested due to the several meanings given to the following concepts: development, needs, and future generations (Kadiri 2006). These factors are certain to change geographically and dynamically, since they may be changed by time and technological growth. Okoko and Fasakin (2007) emphasised that a society's quality of life and economy is contingent upon functional, affordable, inclusive, and integrated multimodal transportation infrastructure that enables rapid movement of people and products while allowing for transfer across modes. This suggest that the transportation system which enhances human interaction and connects the various land uses and activities could impede urban sustainability if not adequately managed.

In several Nigerian metropolitan areas, there is an increase in bumper-to-bumper traffic in metropolitan areas during weekday rush hours of 7am to 9am and 3pm to 5pm (Ayo-Odifiri et al., 2017). This impacts a large number of employees who spend significant time attempting to commute to work or return home across distances of less than three kilometres. Particularly, traffic congestion (platoon of cars) has therefore developed into an acceptable and tenable excuse for arriving late to work. Solanke (2013), the United Nations (2013), and the United Nations Habitat (2013) all reported that the availability of transportation infrastructure to support the ever-growing population of emerging cities in Nigeria has been insufficient, and attempts to bridge the gap have resulted in some form of mobility crisis and traffic congestion over time. This scenario is exacerbated by the unprecedented travel pattern and spatial interaction of city dwellers. On this basis, Oyedipo and Makinde (2009) saw travel pattern as the process and estimation of traffic origin and destination, assignment and distribution, demand, and mode choice by land use and socioeconomic factors.

Despite the growing traffic congestion in Nigeria's metropolitan centres coupled with diminishing government resources allocated to improving transportation infrastructure, there is a growing need to establish proactive methods to ease traffic inside and all around the city. The management of transit facilities that links and drives the city fabric has been particularly neglected. Land uses are impossible without a sufficient, accessible, and affordable mass transit system that serves the public interest. This paper discusses sustainable city development in Nigeria through the use of traffic management strategies. It highlights the architecture of the built environment; transportation and sustainable city development; traffic management concepts; and canvassed policy guidelines to sustain city development using the traffic management concept approach.

II. COLLECTION AND ANALYSIS OF THE LITERATURE

Different approaches were utilised to gather and evaluate the literature for this topic. Four databanks were selected to conduct a comprehensive assessment of the literature: Scopus, Google Scholar, Academia, and MPDI. The key terms used to perform the searches comprising city development, the architecture of the built environment, transportation and sustainable city development, and traffic management was extensively studied to give a better understanding of their significances. Sixty-nine (69) publications were considered relevant to this study out of the 112 articles accessed and downloaded from the search. The investigation was conducted to examine the following concerns: what is the architecture of the built environment? What is the significance of transportation to sustainable city development? What are the available traffic management systems adaptable in Nigeria? Are there traffic management policy guidelines to sustain city development?

III. LITERATURE UNDERPINNING

A city refers to perceptions of a densely populated way of life, distinctive cultural and social characteristics, as well as functioning socioeconomic and political centres. As a result, housing affordability is critical to the sustainable and liveable development of the city and its environs. However, in many cities, as a result of various polarities, spatial isolation tendencies make it more difficult for persons on low wages or from disadvantaged groups to obtain quality accommodation at cheap costs (European Commission, 2011). Hahn (2011) stated that cities are both a source of problems and solutions; that is, they are centres of employment, inequality and economic concentration, demographic shift, and multiculturalism such as youth, ethnic and religious restiveness, urban crime, and violence. On the other side, the city is a good factor of growth and job creation. This shows that a city will grow sustainably if it is capable of effectively and fairly fulfilling the social, political, economic, and environmental concerns of its citizens.

The World Commission on Environment and Development (WCED, 1987) and Emas (2015) described sustainable development as a practice of meeting current demands without jeopardising upcoming generations' capacity to fulfill their own. The concept of sustainability has grown in importance as a means of ensuring a decent future for the world's cities politically, culturally, economically, socially, and ecologically. Factors such as demographic expansion and the roughly exponential development of non-renewable energy usage are working against efforts to create a more environmentally sustainable prospect for transportation in the cities (Elkin et al., 1991). Therefore, the significance of urban centres in deciding whether sustainable development is a feasible aspiration is growing in popularity, with the population in urban areas more than tripling since 1950 and anticipated to double again to 6.2 billion by 2050 (Rodrigue, 2005).

It is a bit of a cliché that all disciplines are imbued with the notion that if the world were only filled with good buildings (designed by talented architects), sustainable towns and cities (planned by experienced urban planners), and higher-quality facilities (designed by skilled engineers), the world would inevitably be a better place (Urban Task Force [UTF], 1999; Frederick, 2007; Carmona et al., 2010). This lesson may be difficult to convey since many professionals believe and have been taught that they alone possess the skill and capability to contribute to the shaping of a better world than others. This may obstruct a particular profession's capacity to create sustainable growth by its aims and desires (Frederick, 2007; Cowan, 2010). City planners must first believe in cities, their significance, and worth to human comfort and culture to bridge the divide between the related professions responsible for managing human mobility and achieving a sustainable environment.

The architecture of the built environment

The physical environment is regarded as the most critical element of a spatial context. Social characteristics of expanding urbanisation, growing modernisation, increased knowledge of economic and social rights, and the resulting political reconfiguration of power has motivated the demand for environmental alteration. Dispersed and complexity of growth, unrestricted personal car usage, road system connections, heavy traffic, and also, unplanned and unapproved physical construction and land-use diversity are only a few of the factors that contribute to rapid changes of the urban fabric.

The built environment could be considered as a man-made ecosystem that serves as a setting for human interaction, accommodation, supporting infrastructure, and amenities. It is an artificial environment that is so large and well-organised that it functions as an organism in terms of resource utilisation, physical activity, and active life. According to Butterworth (2000), locations, landscapes, and structures are more than props in people's lives; they are infused with significance and relevance as symbols of people's personal experiences, group cohesion, and shared experiences. More challenging is the fact that many urban areas in Nigeria evolved before the advent of regional town planning and urban development organisations (Oyesiku, 2011) thus, impeding infrastructure improvement, urban administration, and the incorporation of workable planning practices.

Across the globe, the function of environmental practitioners is an extremely sensitive and contentious subject that has piqued the interest of policymakers, academics, and the wider community, notably Nigeria. The flow of people into metropolitan areas, rural-urban migration, and insufficient reaction at all levels of government have all led to the deterioration of the environment. This has had a severe impact on the spatio-physical and social development of many communities and their inhabitants. Cities and towns should thus adapt to new population demands, public policy analysis, and history as well as the design and maintenance of the physical environment. According to Donk (2006), the globe is rapidly urbanising, and the rate of expansion reflects the speed of social and economic changes. This has been the lure of expanding urban sprawl in many emerging nations, including Nigeria. However, this condition has also resulted in the incursion of criminal activities and aggression, aggravated climatic change, contamination of the environmental media (air, water, and land), transportation and traffic difficulties, housing issues, landuse changes, and discrepancy in rental values.

Cities are centres of knowledge and sources of development and innovation, but they face population challenges, social inequality and exclusion, inaccessibility and unaffordability of housing, and environmental challenges (Bauer et al, 2007). One of the approaches by which infrastructure planners can attain a universal identity between subjectivity and objectivity is by initiating its criteria of need, meeting those needs while remaining independent of them. Urban communities in affluent and poor nations alike will progressively face the effects of climate change, environmental deprivation, food shortages, socioeconomic and political uncertainties, and communication gaps. These variables would drastically alter the layout of towns and cities a century from now, necessitating immediate attention and mitigation actions if cities are to remain sustainable, ecologically safe, economically efficient, and socially equitable.

According to the European Commission (2011), socio-demographic, cultural, political, and economic trends affect geographical habitation structure and worsen social divisiveness, as well as strengthening certain socioeconomic categories' ties, pitiable housing conditions, and location, and transportation issues. This is a concern not just for individuals living in vulnerable situations but also for individuals suffering revenue declines or a sharp rise in market housing costs as well as for environmental practitioners. Cities are defined by their people, and as such, should be developed for

all inhabitants, not just the privileged, tourists, or investors. Consequently, they should be considered as the city's primary asset, rather than a demographic or socioeconomic issue, and a primary issue for professionals in the built environment seeking to guarantee a smart environment with improved traffic flow.

Transportation and sustainable city development

Transportation is a medium of contact, a necessary process, and activity that connects people, commodities, and services across diverse use of land infrastructure, and sectors of the economy (Doi, 2015). It is so critical to the socio-political, commercial, and cultural growth of society. On this point, a city is considered acceptable if the public transportation system is capable of satisfying the demand of people, products, and services in a safe, pleasant, comfortable, effective, and efficient manner. No infrastructure facility is more worthy of being criticised for its lack of life than those that prevent people from utilising them. The key to designing city's pattern of activities is intelligently arranging activities regarding transportation routes while attempting to create maximum variety in each location (Ayo-Odifiri et al., 2017). A city is fundamentally a location of the exchange, and its capacity to affect trade is contingent upon the closeness of complementing components and the isolation of mutually destructive components. As with the human blood circulatory system, a city's transit-system failure impairs all other sectors.

Takyi et al. (2013); Pojani and Stead (2015); and Zanule (2015) argued that expanding existing roads, which requires the removal of existing structures is not an environmentally sustainable approach for road safety and traffic management. For instance, frequent journeys, disregard for feeder roads, and socioeconomic characteristics of trip makers were identified as contributing reasons to the traffic nuisance in Akure metropolis (Okoko, 2006; Olorunfemi et al., 2014). According to Ogundare and Ogunbodede (2014), other reasons included traffic congestion, on-street parking and trade, and difficulty with motor park location. However, only the implementation of innovative transportation planning processes will end the city's traffic nightmare (Okoko, 2002; Poopola et al., 2013). In a related study, Asiyanbola and Akinpelu (2012), and Atomode (2012) emphasised that Nigerians' demand for highway travel has continued to grow particularly in urban areas, and therefore advocated for cost-effective traffic management schemes and adequate transportation facilities to address the urban transportation peril.

In many Nigerian urban areas, traffic management strategies such as traffic demand management (TDM), traffic system management (TSM), park and ride, polluter pay principle, modal limitation, and car-sharing have been neglected. Variation in the accessibility of city services has a significant impact on the relative development of urban centres throughout the urbanisation process. Thus, when a new transportation connection is introduced to a regional network, it affects the relative accessibility of the city fabrics that are linked (Haggett, 1979). As connection improves, travel distances decrease and route alternatives expand, allowing for more direct transit between the origin and destination points and resulting in a more robust, effective, and accessible system (Ayo-Odifiri et al., 2017).

Urban transportation in selected Cities around the World

According to Sopranzetti (2013) and Singh et al. (2015), Bangkok's traffic condition is the most infamous in the world with an average travel speed of 5 to 6 kilometres per hour on main routes in the Bangkok metropolitan. This has made identifying peak travel times more challenging since congestion persists throughout the city from dawn to dusk. Arguing further, Sopranzetti (2013) said that the primary cause of the traffic congestion is the fast growth of private automobile ownership and usage, inadequate road network design capacity, insufficient investment in public transit, and ineffective transportation programme. According to Lamm, Psarianos, and Mailaender (1999), South Africa has a mortality rate of 31.8 per 100,000 people per year compared to 6.7 in the United Kingdom, 11.3 in Australia, and 15.4 in the United States. Between 9,600 and 10,000 people die on South African roads each year, and almost 150,000 people are wounded in the roughly 500,000 collisions that occur. Apart from the painful and emotional toll on South Africa's socio-physical and economic fabrics, the Council for Scientific and Industrial Research (CSIR) estimated that this costs the country's economy around R13 billion annually (Adams, 2001).

Urban transportation in selected Cities in Nigeria

Numerous Nigerian metropolitan centres lack suitable transit infrastructure that would allow for flexible interaction. This is because growing urbanisation has affected not just land uses but also the spatial growth and distribution of infrastructure and human interaction around the globe. Atoyebi et al. (2015) lamented the difficulty of forecasting traffic conditions in Lagos, where the average commute time is more than one hour. On the other hand, Olagunju (2015) identified the issues of municipal transportation and traffic regulation in Lagos as complicated and multidimensional. This transportation vulnerability includes crowded buses, poor road infrastructure, environmental pollution, and scarce development of comprehensive mass transit approaches to alleviate congestion. Poor management of distribution roads has been mentioned as the scourge of traffic problems in Akure (Okoko, 2002; Ogunbodede, 2010; Aribigbola, 2011). However, Ogunbodede (2010) noted that apart from road maintenance, the city's road network has been unable to alleviate traffic-related difficulties associated with the use of private automobiles. According to Adeagbo (2004) and Adewuyi and Iyanda (2020), many commercial vehicles that ply Ibadan roads are not roadworthy, and also identified other problems with urban traffic as the paucity of a hierarchical structure of roads to convey the type and intensity of traffic,

improper road surfaces, and extremely closely located road junctions. Adeagbo (1995) highlights accessibility, traffic, and parking as the three major development and implementation issues confronting marketplaces in Ibadan.

Moreso, Adeniji (1993) observed that transportation is inextricably linked to the form and density of population and land use, and therefore noted that highways promote a variety of land uses along their corridors. On the other hand, Uwadiegwu (2013) noted that though the Enugu State government anticipated traffic issues by rehabilitating and redeveloping several transit routes in the City, and the creation of new ones yet traffic congestion remains a typical occurrence. This indicates that the Government has not been active in addressing the problem of road rehabilitation without achieving a significant reduction in the rate of traffic congestion. Similarly, Osaghae (1972) identified traffic congestion, delay, and accident in Benin City particularly downtown, and also noted on-street trading and unauthorised parking as a result of terminal inadequacy and the limited expansion potential of metro stations due to their destination within the built-up area. In addition, traffic and other attendant noises are severe in fast-developing cities and towns like Gusau town, owing mostly to poor transportation choices, improper city planning, and travel patterns (Ebozoje & Umoh, 2013).

Adaptable traffic management strategies in Nigeria

Cleveland (1976) suggested *Transportation System Management (TSM)* concept as an effective method for addressing rising economic transportation difficulties. Transportation systems management is a short-term strategy for optimising the utilisation of current transportation infrastructure, services, and modes (Okoko, 2006). Clark et al. (2017) argued that TSM is a sequence of purposeful activities taken to affect the supply-demand equilibrium of different transportation components within a metropolitan system. It is thus necessary to promote the employment of simulations for economical mobility, environmental appeal, and social equality in the control of a city's transportation system. TSM includes measures aimed at optimising the performance of existing infrastructure rather than building new roads and transportation systems (Famakinwa, 1997), which seem to be complex and expensive.

Transportation Demand Management (TDM) concept as an alternative to developing new roads and extending existing transit lines, Okoko (2006) and Houser (2017) proposed that TDM techniques be used to reduce traffic volumes, particularly during rush hours. It is worth noting that other strategies that may be implemented include carpooling, a ride-sharing scheme, and bus priority in traffic. TDM encourages commuters to use public transportation and other modes of transportation such as walking and cycling to achieve an impressive shift-away from private automobile use and toward public transportation travel made possible through transport systems and service enhancement measures. It is a set of measures that are implemented to maximise a transportation system's capacity to move people by (i) increase the number of passengers in a vehicle; (ii) reduce travel time; (iii) manipulate the need to travel; or (iv) able to influence the direction of travel. Furthermore, it impacts the purpose (why?), destination (where?), time (when?), and mode (how?) of personal travel decisions by increasing the attractiveness of travel alternatives and fostering a favourable public attitude toward the aforementioned travel alternatives (Dublin Transportation Office, 2001).

Contemporary Management Techniques for Transportation (CTMO): Pacione (2005) reported that opposition to further large-scale road infrastructure supply has led to probably hundreds of approaches for optimising the utilisation of existing transportation infrastructure. Other complex choices include *Advanced Vehicle Control Systems (AVCS)* and cautioning systems where devices take over control automatically to prevent collisions. Other modern transportation management alternatives suggested by Okoko (2006), Ohiaegbunem (2007), and Ndikom (2010) included road tolls, fuel duty, carpooling, traffic segregation, traffic constraint, bus priority, one-way schemes, parking management, and land-use decision.

IV. CONCLUSION

Transportation eases employment opportunities and access to institutional, commercial, and residential land uses as well as open spaces and other amenities. While advancements in technological innovation have benefited society, rising car fleets and increased utilisation have generated traffic congestion in many Nigerian towns. Where transport infrastructure and the management system are appropriate, road congestion and environmental degradation are kept in check, hence enhancing the viability of the cities. The handling of traffic is a critical issue in any nation since it results in economic loss and has a detrimental effect on the city’s quality of life. One frequent strategy for resolving traffic issues is to develop road infrastructure, although this has become more challenging. Not only has the high cost of construction become an issue, but also the lack of available space and the environmental impact of developing new roadways in comparison to existing housing stock should also be of concern.

V. RECOMMENDATION

These recommendations were made to manage and eased traffic, and promote sustainable, visually appealing, functioning, and orderly cities in Nigeria:

i. Adopt and apply urban design strategies such as open space, transportation system, capital network, public policy, physical design, plug-in, and individual building approaches to activate the principles of urban design (mass, scale, space, activity, and circulation);

ii. Establish a development control board within the Ministry of Physical Planning and Urban Development to be headed by a city planner, and an exclusive traffic department administered by a professional transport planner;
iii. Create a robust, resilient, and inclusive planning and development template that engages individuals who reside and operate in cities (private-public participation);
iv. Promote site and service strategies before physical development of new towns and cities commences;
v. Strict enforcement and compliance with environmental laws such as traffic, waste, and pollution management laws;
vi. Establishment of a special traffic mobile court and environmental tribunal for expeditious justice; and
vii. Public transport intervention through the use of High Occupancy Vehicles (HOV).

REFERENCES

[1]. Achi, L. B. (2004). *Urban design in Nigeria.* Kaduna, Nigeria: Yambe Enterprises.
[2]. Adams, M. (2001). *The road traffic management corporation: a case study of South Africa:* Unpublished. PhD. Thesis in Engineering management. Afrikaans University.
[3]. Adeagbo, D. (1995). Market planning and management: a case study of selected markets in Ibadan. A research report. *Nigerian Institute of Social and Economic Research.* Ibadan.
[4]. Adeagbo, A. (2004). Accessibility, traffic and parking problems in urban markets. *International journal of transportation studies, 1*(2), 29-39.
[5]. Adeniji, K. (1993). Public transportation: a basic need in Nigeria. *Third world planning review*, *4*, pp. 383-389.
[6]. Adewuyi, G. K. & Iyanda, G. O. (2020). Assessment of major road transportation planning and management for commercial transport in urban settlement. *International Journal of Research in Environmental Science (IJRES), 6(2), 42-58.* http://dx.doi.org/10.20431/2454-9444.0602005.
[7]. Ajiboye, A. P. (2005). Globalisation and the urban growth process in Nigeria. In Fadare, et al (Eds.). *Globalisation, culture, and Nigerian built environment* (2, 342-345). Ile-Ife, Nigeria: Faculty of Environmental Design and Management, OAU.
[8]. Alkali, J. L. S. (2005). Planning sustainable urban growth in Nigeria: challenges and strategies. *Presented at the conference on planning sustainable urban growth and sustainable architecture.* Held at the ECOSOC chambers, United Nations Headquarters, New York, on 6th June.
[9]. Andersen, R. B. (2011). Activating architecture and urban planning: sports conference of Denmark: *the Ministry of Social Affairs*.
[10]. Aribigbola, A. (2011). Planning and urban governance in developing societies: the example of Akure, Ondo state of Nigeria. *Canadian Social Science, 7*(6), 119-127. doi:10.3968/j.css.1923669720110706.194.
[11]. Asiyanbola, R. A., & Akinpelu, A. A. (2012). The challenges of on-street parking in Nigerian Cities' transportation routes. *International Journal of Development and Sustainability.* 1(2), 476-489.
[12]. Atomode, T. I. (2012). Assessment of traffic delay problems and characteristics at urban road intersections: a case study of Ilorin, Nigeria. *IOSR Journal of Humanities and Social Science (IOSR-JHSS).* 12(4), 06-16. www.iosrjournals.org
[13]. Atoyebi, A. O., Gbadamosi, T. K., Nwokoro, I. I. C., &Omole, F. K. (2015). Analysis of intracity public transport system of Ojuelegba Park, Lagos State, Nigeria. *Mediterranean Journal of Social Sciences MCSER Publishing, Rome-Italy*. 6(2) 1, 624-634.
[14]. Ayo-Odifiri, O. S., Fasakin, J. O., & Henshaw, F. O (2017). Road connectivity approach to eased traffic congestion on market roads in Benin metropolis, Nigeria. *American Journal of Engineering Research*, 6(6), 41-48.
[15]. Bauer, A., Rohl, D., Haase, D., & Schwarz, N., (2011) 'Leipzig: between growth and shrinkage' in Pauleit, S., Bell, S., Aalbers, C., (eds), Peri-Ubarn Futures: landuse and sustainability. Berlin: Springer.
[16]. Butterworth, I. (2000). *The relationship between the built environment and wellbeing*: a literature review. Melbourne, Australia.
[17]. Carmona, M., Tiesdell, S., & Heath, T. (2010). *Public places, urban spaces: the dimensions of urban design.* London: The Architectural Press.
[18]. Cowan, R. (2010). *The urban design group-the need to mobilise member networks for grassroots action as catalysts for the delivery of sustainable urbanisation*. London: Plandemonium.
[19]. Clark, J., Neuner, M., Sethi,S., Bauer,J., Bedsole, L., & Cheema, A. (2017). *Transportation systems management and operations in action.* U.S. Department of Transportation. Federal Highway Administration, New Jersey Avenue, SE. Washington, DC.
[20]. Doi, K. (2015). *Cities and transportation.* Retrieved February 26, 2019fromhttp://www.iatss.or.jp/common/pdf/en/publication/commemorative- publication/iatss40_theory_01.pdf.
[21]. Donk V. M. (2006). Positive urban futures in Sub-Saharan African: HIV/AIDS and the need for a broader conceptualisation. *Environment and Urbanisation*, 18(1), 155-177.
[22]. Dublin Transportation Office (2003). *Greater Dublin area travel demand management study*. Retrieved June 3, 2018, from www.dto.ic
[23]. Ebozoje, O. J &Umoh, A. E. (2013). Evaluation and analysis of noise levels at high-traffic locations inGusau, Nigeria. *Asia Pacific Journal of Multidisciplinary Research*, 1(1), 19-26.
[24]. Elkin, T. Mclaren, D., & Hillman, M. (1991). Reviving the city towards sustainable urban development. *Friends of the Earth.* 8.
[25]. Emas, R. (2015). *The concept of sustainable development: definition and defining principles.* Brief for global sustainable development report 2015. Retrieved February 26, 2019, fromhttps://sustainabledevelopment.un.org/content/documents/5839GSDR%202015_SD_concept_definiton_rev.pdf.
[26]. European Commission (2011). *Joint report on social protection and social inclusion*. Retrieved June 3, 2018, from http://ec.europa.eu/social/main.jsp?catId=757&langId=en.
[27]. European Union (2010). Making our cities attractive and sustainable: How the European Union contributes to improving the urban environment. *European Commission.* 1-29. http://bookshop.europa.eu Luxembourg.
[28]. Frederick, M. (2007). *101 things I learned in architecture school.* Cambridge: MIT Press.
[29]. Gudmundsson, H., Hall, R. P., Marsden, G., & Zietsman, J. (2016). *Sustainable transportation: indicators, framework, and performance management.* Springer-Verlag Berlin Heidelberg. 15-49.
[30]. Haggett, P. (1979). *Geography: A modern synthesis*, 3rd Edition. NewYork: Harper & Row Publishers.
[31]. Hahn, J. (2011). Cities of tomorrow: challenges, visions way forward. *European Union Regional Policy.*
[32]. Halpern, D. (1995). *Mental health and the built environment: More than bricks and mortar?* London: Taylor & Francis.
[33]. Houser, K. (2017). Working together to support transportation efficient communities. *Washington State Department of Transportation's (WSDOT).*
[34]. Ikwuyatum, G. O. (2016). Migration and urbanization: exploring the factors of the nexus in Nigeria. *International Journal of Humanities and Social Science.* 6(8), 161-179.
[35]. Kadiri, W. A (2006). Millennium development goal project challenges and prospects for sustainable city development in

Nigeria. Lecture delivered at public Lecture organised by NITP Ondo State Chapter, Thursday 27th July at the multipurpose hall, Ministry of Works, Lands and Housing, Akure.

[36]. Lamm, R., Psarianos, B., & Mailaender, T. (1999). *Highway design and traffic safety engineering handbook.* New York: McGraw-Hill.

[37]. Ndikom, O. B. C. (2010). *Elements of transport management.* Nigeria: Bunmico Publishers.

[38]. Obateru, O. I. (2003). Space standard for urban development. Nigeria: Penthouse Publication.

[39]. Odufuwa, B. O., Oludare, A. H., Johnson, O. O., & Aloysius, B. (2012). Floods of fury in Nigerian Cities. *Journal of Sustainable Development* Published by *Canadian Center of Science and Education*, 5(7), 69-79. http://dx.doi.org/10.5539/jsd.v5n7p69.

[40]. Ogunbodede, E. F. (2010). *Assessment of traffic congestion in Akure, Nigeria using GIS approach: lessons and challenges for urban sustenance.* Retrieved December 20, 2011, from http://download.sue-mot.org/conference-2007/papers/Ogunbodede.pdf

[41]. Ogundare, B. A., & Ogunbodede, E. F. (2014). Traffic congestion and parking difficulties in Akure metropolis, Nigeria. *IOSR Journal of Humanities and Social Science (IOSR-JHSS).* 19(8) II, 01-07. *www.iosrjournals.org*

[42]. Ohieagbunem, E. I. (2007). Analysis of traffic management in Benin City, Nigeria. *International Journal of Transportation Studies.* 3(1), 44-56.

[43]. Okoko, E. (2002). Some factors influencing on-street parking in Ikare Akoko, Ondo State, Nigeria. *International Journal of Social Science and Policy Issues,* 1(1), 202-207.

[44]. Okoko, E. (2006). *Urban transportation planning and modeling*. Akure: Millennium Publishers.

[45]. Okoko, E., & Fasakin, J. O. (2007). Trip generation modeling in varying residential density zones: an empirical analysis for Akure, Nigeria. *Medwell Journals, the Social Science, 2(1), 13-19.*

[46]. Olagunju, K. (2015). Evaluating traffic congestion in developing countries -a case study of Nigeria. *A paper presented at the 2015 Chartered Institute of Logistics and Transport (CILT) Africa forum*. Held 4th March 2015 at mount Meru hotel Arusha, Tanzania.

[47]. Olorunfemi, S. O., Olowosegun, A., Koffi, A. E., Okoko, E. E., & Mobolaji, S. (2014). Examination of on-street parking and traffic congestion problems in Lokoja. *Civil and Environmental Research,* 6(4). www.iiste.org

[48]. Olujimi, J. A. B., & Fashiyi, S. O. (2004). Anatomy of illegal structures in Akure metropolis, Ondo State. *Journal of the Nigerian Institute of town planners, 17 (1), NITP,* Lagos, Nigeria.

[49]. Omuta, E. D. (2006). *Lea*d P*aper* "the built environment: its dimensions, status, challenges and prospects." *Presented at the national environmental conference, School of Environmental Studies.* Federal Polytechnic: Auchi, Nigeria.

[50]. Osaghae, M. (1972). *Benin City motor park and their sphere of influence,* unpublished B.Sc. Dissertation, Department of Geography University of Ibadan.

[51]. Oyedipo, O. J., & Makinde, O. O. (2009). Regression model of household trip generation of Ado-Ekiti Township in Nigeria. *European Journal of Scientific research,* 28(1), 132-140.

[52]. Oyesiku, O. K. (2002). *From womb to womb: a 24th inaugural lecture.* Olabisi Onabanjo University, Ago-Iwoye, Nigeria.

[53]. Oyesiku, K. (2011). *Development before town planning, the cause of flooding in Nigeria.* Retrieved June 3, 2018from http://www.vanguardngr.com/2011/07/development-before-town-planning-cause-of-flooding-in-nigerian/

[54]. Pacione, M. (2005). *Urban geography: a global perspective* (2nd ed.). USA: Routledge.

[55]. Pojani, D., & Stead, D. (2015). Sustainable urban transport in the developing world: beyond megacities. *Sustainability*, *7*, 7784-7805; doi: 10.3390/su7067784.

[56]. Popoola, M. O., Abiola S. O., & Adeniji W. A. (2013). Traffic congestion on highways in Nigeria -causes, effects and remedies. *International Journal of Civil and Environmental Engineering.* 7(11), 858-863.

[57]. Rodrigue, J. P. (2005). *Transportation and urban form.* Retrieved June 3, 2018 fromhttp://people hofstra.edu/geotrans/ch6en/conc6en/ch6clen.html.

[58]. Swedish International Development Agency (2006). Fighting poverty in urban world. Retrieved June 3, 2018, from www. Sida.sa/urban.

[59]. Singh, J., Sahni, M. K., Bilquees, S., Khan, S. M. S., & Haq. I. (2015). Reasons for road traffic accidents victims perspective. *International Journal of Medical Science and Public Health*. 5(4).

[60]. Solanke, M.O. (2013). Challenges of urban transportation in Nigeria. *International Journal of Development and Sustainability,* 2(2), 891-901.

[61]. Sopranzetti, C. (2013). *The owners of the map: motorcycle taxi drivers, mobility, and politics in Bangkok.* Doctoral dissertation, Harvard University, Department of Anthropology. Cambridge, MA. http://nrs.harvard.edu/urn-3:HUL.InstRepos:11169780

[62]. Takyi, H., Kofi, P., & Anin, K. E. (2013). An assessment of traffic congestion and its effect on productivity in urban Ghana. *International Journal of Business and Social Science,* 4(3), 225-234

[63]. United Nations (2013). Sustainable development challenges: World economic and social survey. *Department of Economic and Social Affairs.* New York: United Nations Publication.

[64]. United Nations Habitat (2013). *Planning and design for sustainable urban mobility: policy directions global report on human settlements 2013.* (abridged edition) New York: Routledge.

[65]. United Nations Population Fund (UNFPA, 2012). *Population matters for sustainable development.* New York, USA. 1-26. Retrieved February 26, 2019, from http://www.unfpa.org/public/cache/offonce/home/publications.

[66]. Urban Task Force (1999). *Towards an urban renaissance.* London: Spon.

[67]. Uwadiegwu, O. B. (2013). Factors responsible for traffic congestion in Nigeria, a case study of Mayor bus stop and Coal Camp along Agbani road in Enugu City, Nigeria. *Journal of Environment and Earth Science*, 3(3), 71-78.

[68]. World Commission on Environment and Development (1987). *Our common future*. Oxford, New York: Oxford University Press.

[69]. Zanule, P.G. (2015).*Road management system and road safety in Uganda.* Doctoral dissertation, Walden University, College of Managementand Technology.