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SEPARATE LANE FOR TRICYCLE INTRA-URBAN TRAFFIC: A PLANNING STRATEGY FOR URBAN TRANSPORTATION SYSTEM IN NIGERIAN CITIES

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ABSTRACT

In Nigerian cities today, increase in population, unemployment and the absence of adequate transport infrastructural system in the metropolis has brought about an upsurge in the use of commercial tricycle for public transportation which has called for an inclusion in road design to avoid conflict in road use by road users and the persistent rise in road accident among motorists as experienced in most urban centres. The increasing scenario of urban traffic congestions, frequent accident on the roads and the conflict among road users in terms of space and right of way occasioned by the use of tricycles on major urban arterials has called for public concern. The cause of the accident may include other factors other than the population of tricycle but it is necessary they are provided with separate lane to allow for decency on the Nigerian urban roads. This article proposed for separate lane for tricycles traffic in Nigerian cities. Public opinion on the necessity of the provision of separate lane for tricycle intra-urban traffic was carried out and the study revealed that it is very necessary in Nigerian urban centres. Also the opinion of the public on the usefulness of separate lane for tricycle intra-urban traffic suggests that it will bring about orderliness on the road, it will reduce the rate of vehicular-tricycle accident on the road, etc. A proposed intra-urban road with exclusive route way for tricycles intra-urban traffic was designed with specific dimensions. The issue of coordination was examined.

KEYWORDS: Separate Lane, Tricycle, Intra-Urban, Traffic, Urban Transportation System.

1.0 INTRODUCTION

One of the most serious problems of urban centres of developing world today is that of mobility and its internal circulation. Before the advent of automobile, urban morphology was essentially concentric in nature (Aderamo, (2012). The "foot cities" of this period were characterized by centralized functions that ensured short trip length. The development of the automobile in the 20th century and the resultant ease of movement conferred on these cities multifarious functions.Population grew, land use became disperse, trip length increased and better form of transportation to meet their ever increasing and specialized functions and demand remains an illusion (Dike, 2012).

The cities in developing countries ever since could not meet the increasing demand in transportation needs. Even in the developed countries where high technological advancement and high transportation facilities is said to exist in its advance form, the clogging of the roads of these cities with too many vehicles has resulted into what can be described as a state of relative immobility (Sule 2005; Adedimilia, 2006) hence several means of movement and/or traffic abound in most cities of the developing world but the problem of free and timely mobility still persists.

The condition described above reflects the situation in many cities of the developing world. Nigerian cities are facing similar situations in varying dimensions. Most of the available roads in Nigerian cities are faced with the problem of vehicular congestions. It is easily seen major roads in the cities occupied by different types of automobile without segregation. The situation is critical were the size of the roadscannot accommodate the volume of traffics hence creating serious problems within the transportation system.Attempts to solve the urban transportation problem enunciated above in Nigerian cities have taken different dimensions. These include the application of the various traffic management measures, in addition to the provision of near adequate transportation facilities by the government.The public has responded to the need of solving the problem by using para-transit or intermediate public transport modes (Sule, 2005). One of the new systems in this direction is the use of tricycle as a mode of public transportation system. The commercial tricycle mode of transport is popularly known as "***KEKE NAPEP***" in almost all Nigerian cities. In our Nigerian cities, increase in population, unemployment and the absence of adequate transport infrastructural system in the metropolis brought about an upsurge in the use of commercial tricycle and motorcycle for public transportation which has called for an inclusion in road design to avoid

conflict in road use by road users and the persistent rise in road accident among motorist as experienced in most urban centres in Nigeria.

1.1 VaryingPublic Opinion on the Use of Tricycle in the City

The use of tricycle as a mode of public passenger transport has generated a lot of controversy.While some people believe that the use of tricycle for public transportation has brought woes, suffering and maiming to the people, others believe that the use of tricycle for commercial purpose is a big blessing in terms of its contribution to the movement of goods and passengers in the city. Despite the woes, some inherent advantages in this particular mode of transportation exist such as fastness, reliability and flexibility, as it can be used for "door to door" movement coupled with its low operational cost and reduction of time wastage at bus stops. A lot of road users prefer them as they shuttle from one place to another not minding the condition of the roads they are plying.Users of this mode of transportation system in Nigerian cities see it as possible solution to the problem of urban traffic jam experienced in most urban centres in Nigeria.

Today, the use of tricycle as a mode of public transportation has come to stay with us. The parlous state of the Nigerian economy has compelled many unemployed young men to take to the trade. This of course is seen as a means of sustaining the unemployed youths.The use of tricycle for public transport is not an entirely new phenomenon in Nigeria. Before this time when the use of public tricycle began, widespread motorcycle services had actually been provided for intra-urban transport mobility. At the moment, many city manager or transport planner is inclined to show serious concern about the alarming and unprecedented rate at which tricycles are being used for public transport in a growing number of Nigerian urban centres, with little or no regard for entry and quality controls. Newspaper reports and radio news items, if there are anything to be relied upon (since there are currently no published statistical records on the number, type or the level of severity of public tricycles accidents in this country), point to the fact that the drivers training and safety precautions are grossly inadequate or completely ignored hence the high incidence of road accidents among tricycles and other road users (Kayode, 2004;Sule, 2005) as noted in many Nigerian cities. Uyo, Akwa Ibom State and Calabar for example, this mode of transportation system is wild spread and predominantly taking over major roads and carriage way causing congestions and conflicts of diverse dimensions amongst road users.

A situation where any willing tricycles operators, irrespective of his age or ability or otherwise to drive with care, can obtain a driver's license and a hackney permit is a major contributing factor. This situation has given consequences on the safety of tricycle operators, and there passengers and other road users. The issue of safety is one of the reasons that informed this write-up. More so, the spate of tricycle use within the public transport market and the fact that tricycles are fast becoming an integral and sometimes indispensable part of the public transportation system in many Nigerian urban centers, including Port Harcourt, Uyo, Calabar, Kano, to mention but few makes this write up as reported here imperative. The purpose of the separate lane in urban circulation plan for the tricycle traffic is to reduce the rate and number of accidents that are due to tricycle traffic in many Nigerian cities and to ensure orderliness on the road.

2.0 An Overview of Literatureon the Role of Transportation in City Development

Transportation involves the movement of persons or goods from one point in space to another usually to satisfy a need which may be economic, social or cultural. There is obviously a relationship between transportation and development; the two are intricately interwoven. Their relationship is more glaring in urban centres where the nature and characteristics of transport system largely influence the level and rate of the development of the cities (Ikya, 1993). This presupposes that most urban centres in recent times have been partly due to the contribution from the transportation sector. Geohard, (2001) observes that adequate, efficient, reliable and affordable passenger and freight services are essential for national development. According to Abiodun, (1985) cited in Ipingbemi & Adebayo (2016), there is correlation between transportation and development. Abiodun, (1985) as cited in Ipingbemi & Adebayo (2016), further explained that transportation is a necessary concomitant of the exchange economy and is indispensible to economic growth.

The foregoing points to the fact that transportation cannot be completely separated from development. The material development of Africa may be summed up in one word-transport (Ipingbemi & Adebayo (2016). But then, several factors can be adduced for explaining the evolution of transport in any environment. Ikya (1993) observes that population and economic factors are crucial in explaining the evaluation of transport in Nigeria.

The increase in the population of human over time has occasioned the need to introduce the transit system in urban transportation. The historical evolution of urban centres in Nigeria indicates the dominating role of transport development of dense network of roads, and the

introduction of automobile gradually changed the face of these cities and overtime, led to the development of complex transport system which enhances the movement of people and goods from one part of the city to another (Ikya 1993). In the light of this fact, however, the changing attitude and the rise in population figures in urban centres are central to the choice of transportation mode used by commuters. The use of other unconventional mode of transport such as the para-transit mode came into use.

Alan (1995) observes that a para-transit in urban towns could be referred to by various names such as dial-a-ride, dial-a-bus, demand responsive transitive transit, and demand actuated transit. All describe a type of service that is more flexible than the conventional transit service. Alan, (1995) outlined the ridership characteristics of para-transits to include the poor, the elderly and out of town visitors. This in essence means that there seem to be certain level of income earners who patronize this mode of transport more than other income groups. As observed, the reason for the operation of the para-transit mode of transport borders around the belief that there are those whose ability to travel is restricted by not having adequate access to either an automobile or transit service. In our automobile-dominated society, lack of access to automobile is the basic problem (Sule, 2005). Transit then becomes the back up for those without automobile.

Before the introduction of tricycle in Nigerian cities, some countries of the developing world like India, Bangkok and Bangladesh has deeply involved in the use of tricycle for public transport mode. Although Ikya (1993) observed that it was originally used for short shuttles by dispatch riders, for sports and for recreation and not designed as modes of commercial passenger transport. Ikya (1993) posits that an adoption of motorcycle and perhaps tricycle for urban transit is a negation of the policy of mass transit scheme in Nigeria.

2.1 Some Problems with the Use of Tricycle and Other Means of Public Transportation

The development of tricycle mode of transport and indeed other modes is invariably associated with accident rate and other related transportation problems among road users. (Dike, 2012) observed that there is always negative environmental impact in the use of various transport modes. The negative environmental impacts can be significant due to increase per capita emissions, which can in turn be attributed to the age of vehicles, maintenance standards, the state of roads and driving habits. Also, the likely environmental benefits of reduced per capita fuel consumption in the overcrowded public modes are lost by

the increase and often unmet need for maintenance. As also observed, these public transport modes contributed to high noise levels and poor safety standards in urban area (Sule 2005).

In the samevein, Kayode (2004) observed that urban and rural areas of Nigeria presently are in intractable transportation crisis, partly due to high rate of urbanization mismatch between the supply of transportation infrastructure, services and technology on the one hand and the mobility need of majority low income earners on the other hand. Adefolalu (1977) cited in Ibrahim–Adedeji, (2014) presented a gloomy look of the problems of transportation in urban centers when he observed that traffic congestion in the city of Lagos is the "most serious and the intractable". Adefolalu (1977) cited in Ibrahim–Adedeji, (2014) further outlined the physical and human factors involved in traffic congestion, the consequences of traffic congestion and how best these problems can be resolved in Lagos.

In like manner, Aderamo, (2012) observed the alarming rate which the traffic congestion which were only observed in Lagos Metropolis, spread to other cities of Nigeria particularly Ibadan, Port Harcourt, and Abeokuta, almost stagnating movements in these cities. Aderamo, (2012) attributed this chaotic situation to inadequate road design and maintenance, lack of adequate control device, wider car ownership and inadequate public transport and examined those causal factors under social, economic, road, vehicular, human and accident factors. In his contribution on factors militating against free flow of traffic in metropolitan Lagos, Ibrahim–Adedeji, (2014**)** outline physical, human and institutional matrix that affect traffic flow in metropolitan Lagos.

In contemporary urban scene it has been argue by many transportation experts that as long as industrial, commercial, administrative and recreational activities concentrate in urban areas, there by attracting large numbers of people concentrating in these cities there will always be transportation problem. This means that urban mobility problems could apparently be salvaged only by putting a good lace on a bad scene (Sule, 2005).

Nevertheless, other experts have argued that non-motorized mode of transportation is best for intra-urban mobility. Amongst the modes outlined are bicycle pedicab, handcar and walking. Ike-chukwu (2001) argued in favour of the use of tricycle for urban mobility. According to Ike-chukwu, (2001) the real task and target however, is to change the national psyche and reorient our social habitats back into the path of simplicity. In the same vein, Newman and Kenworthy (2006) observed that "A Sustainable transport system must meet the mobility and

accessibility needs of people by providing safe and environmentally friendly modes of transportation. This, I consider is a complex and difficult task in mega-cities of developing countries because the needs of people belonging to various income groups are not only different, but also often conflict in nature.

In view of the above, the problem of urban transportation in Nigeria may have been brought about by the increase in population, as Geohard (2001) observed, that urban sector which accounts for at least 50% of the Gross Domestic Product in Nigeria, has 5 – 10% of urban household income spent on transport and more than 25% of city budget is typically for transport, yet urban transportation problems seem far from being solved. The increasing scenario of urban traffic congestion, frequent accident on the road and the conflict among road users in terms of space and right of way has necessitated this write up.

2.2 Some Critical Advantages with the Use of Tricycle and Other Means of Transportation System

Transportation has its associated advantages as well as problems. For instance, the analysis drawn from this write-up show that it is a source of employment for the teeming unemployed population of urban centres. Sule (2005) observed that the problem of theft and other social vices common among young people has been reduced as more of them are now engaged in the commercial tricycle business. Robert, (1998) noted that another advantage is the ease with which mobility of person is achieved. As evidenced from the foregoing discussion, some of the urban populace prefers to use tricycle for their daily movement due to its relative flexibility in use, and convenience of travel.

Other reasons observed are that it consumes less journey time, has fastness of travel and relatively safe for contemporary urban road condition. It can beat up hold up in most cases hence faster; it provides door to door services within the urban centres. It is also a source of economic development through the provision of employment opportunities, income and facilitates the movement of goods and services on a timely basis Sule, (2005). It should be noted that poor road condition accounts for most of the vehicles to vehicles, and vehicle to pedestrian's conflicts recorded by the road safety command and the hospitals statistics.

In this view, it is obvious that both the motorized and non-motorized modes of urban transportation have their relative merits and demerits. It is also apparent that apart from economic implications on the use of tricycle for intra-urban mobility, it has come as a relief

to the problems of contemporary urban transportation. Robert, (1998) opines that para-transit such as dial-a-ride vans and tricycle, most of which provide subsidized, curb-to-curb services to the elderly and disabled are always of solving the mobility problems.

2.3 Some Challenges in the Use of Tricycle in Intra-Urban Transportation

Worthy of note is the exorbitant fare charged by the commercial tricycle operators on commuters. Geohard, (2001) observed that in most cases, the operators charge an average of one hundred naira for journey of about two kilometers. Geohard, (2001) further opines that the reasons being that there is high cost of maintenance of the machines brought about by the hike in price of fuel, difficulty to ply most routes due to poor road conditions, police harassment and high cost of purchasing the tricycle. The aftermath of this development are mostly born by the final consumers of the services of the commuters.

It is also evidenced that in recent times, harvest of accident victims on the roads is now a recurring incident. The cause of the accident may include other factor other than the population of tricycle but it is necessary they are provided with separate lane to allow for decency on the urban roads.

As earlier pointed out, Ikya (1993) had observed that an adoption of tricycles for urban passenger transit is a negation of the policy of mass transit scheme in Nigeria. Ikya (1993) attributed the most negative trend in transport development to include commercial tricycle for urban passenger transport. Although this is correct, but the findings of this write up has it that tricycle passenger transport is a welcome development in the transport sector especially when there is a good transportation policy, which may include the provision of mechanism to solve the problems as identified in this write up.

3.1Basis for Separate Lane for Tricycle Intra-Urban Traffic as Planning Strategy in Nigeria Cities

Necessity as argued is the mother of invention. Aderamo, (2012)revealed that more than 40 percent of the commuters in our urban cities in Nigeria depend on tricycle as a means of transportation, either as owners or passengers. The implication of this phenomenon is the high volume of tricycle traffic in our Nigerian urban centres. It is in the context of the foregoing evidence that a separate traffic lane is now being strongly advocated to be created as part and parcel of urban road development in Nigerian cities. It may even be desired to make such road design policy a uniform practice in the entire country.

The purpose of the separate lane in urban circulation plan for the tricycle traffic is to reduce the rate and number of accidents that are due to tricycle traffic in many Nigerian cities. These accidents in many cases arise out of collision between tricycle and vehicular traffic. When this happens, there are casualties who in many cases are from the side of the tricycle operators and his passengers, much more than the regular vehicular traffic like taxi, private automobile, buses etc.

A separate lane would create a psychological sense of safety and security for the users of this urban transportation mode. There is no doubt that it may increase the use of tricycle but it would ensure potential security for the users who are usually in large numbers. The content of this write-up had already demonstrated the heavy dependence on the use of tricycle because of poverty of the masses. In addition, to this, tricycle can take you to the nooks and corners of the city which taxi or private automobile may find difficult to penetrate because of bad roads. The flexibility of this mode with the advantage of door-to-door transport service also put it above other transport modes.

Separate traffic lane for the tricycles would also enhance transportation of goods and services on Nigerian urban roads and motor traffic arteries. It has been observed that this has constituted a serious problem on Nigerian roads, resulting in traffic congestion, accidents, delay and in many cases death of the commuters. The investment on separate lane for tricycles is therefore justified. The table below shows the opinion of the public on whether it is necessary or not for the inclusion of separate lane for tricycle intra-urban traffic in Nigerian cities.

Table 3.1: Public Opinion for the Inclusion of Separate Lane for Tricycle Intra-Urban Traffic.

Public Opinion	Frequency	Percentage
Not Necessary	10	13.3
Necessary	25	33.3
Very Necessary	40	53.3
Total	75	100

Source: Researchers' Field Survey, 2017

Analysis in table 3.1 shows varying public opinion on whether it is necessary or not for the inclusion of separate lane for tricycle intra-urban traffic in our urban cities. The result reveals that 33.3% and 53.3% of the sampled survey said it is necessary and very necessary

respectively while 13.3% said it is not necessary. The conclusion drawn from the analysis of the data as presented in table 3.1 is that there is high demand from the stand point of the general public for the inclusion of separate lane for tricycle intra-urban traffic in Nigerian urban centres.

From the point of its importance to the circulation of traffic within the urban centres, table 3.2 below presents varying opinion of the public on the importance and perhapsthe use of separate lane for tricycle intra-urban traffic.

Table 3.2: Public Opinion on the Usefulness of Separate Lane for Tricycle Intra-Urban Traffic.

Public Response	Frequency	Percentage
It will bring about orderliness on the road	16	21.3
It will reduce the rate of vehicular-tricycle accident on the road	15	20.0
It will reduce the rate of conflicting uses among road users	9	12.0
It will decongest the vehicular carriage way	11	14.7
It will enhance free flow of traffic among road users	9	12.0
It will be a measure of controlling road traffic, roadcongestion and vehicle to pedestrian's conflicts on the road	15	20.0
Total	75	100

Source: Researchers'Field Survey, 2017

The analysis as presented in table 3.2 shows that 21.3% of the sampled respondents suggested that separate lane for tricycle traffic will bring about orderliness on the road; while 20% saidit will reduce the rate of vehicular-tricycle accident on the road and will be a measure of controlling road traffic, road congestion and vehicle to pedestrian's conflicts on the road respectively. The opinion of the public as shown in table 3.2 also revealed that 14.7% of the respondents said it will decongest the vehicular carriage way while 12% said it will reduce the rate of conflicting uses among road users and enhances free flow of traffic among road users respectively.

The implication of the data as shown in table 3.2 is that the importance of the use of separate lane for tricycle traffic in our urban centres cannot be overemphasized as it portraits a befitting design for intra-urban traffic circulation.It is an attempt to co-ordinate the different modes of public transportation system based on the sizes and operational capabilities to engage in area where the best use or maximum benefit could be derived. Moreso, to prevent smaller means oftraffic from clogging busy arterials, decongesting the major roads and

ofcourse enhancing the performance of large vehicles without interference along the major roads in the urban centres.

3.2 ProposedIntra-urban Road Designed to include Separate Lane for Tricycle Traffic in NigerianCities

Figure 3.1 shows a proposed typical intra-urban road designed for the inclusion of tricycle traffic in Nigerian urban centres. The road is designed to accommodate vehicular traffic, tricycle exclusive route, pedestrian corridor and central reserve. The carriage way has total dimensions of twenty two (22) metres width inclusive of both sides. The vehicular traffic route has seven (7) metres width on each side of the road making a total of fourteen (14) metres; tricycle exclusive route has 2.5 metres width on each side of the road making a total of five (5) metres; pedestrian corridor has one (1) metre width on each side of the road making a total of two (2) metres and a central reserve of 0.6-1 metre width depending on the available land space.

Vehicular traffic route = 14 metres both sides
Tricycle exclusive route = 5 metresboth sides
Pedestrian corridor = 2 metres both sides
Central reserve = 0.6-1 metre both sides
Total carriage way = 22 metres both sides

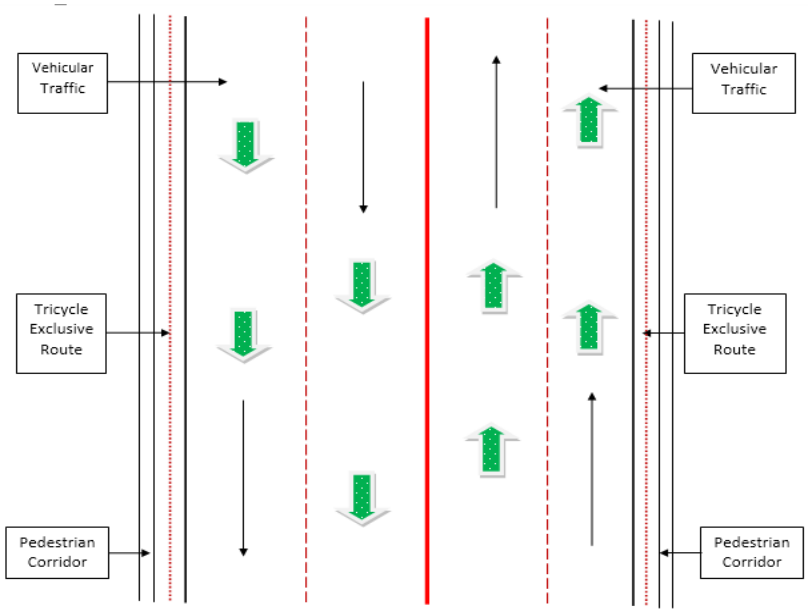

Fig. 3.1: Exclusive Route Way for Tricycles Intra-Urban Traffic Source: Researchers' Proposed Intra-Urban Road Design, 2017.

4.0 The Issue of Coordination

In developing countries, including Nigeria, the extent to which public transport services can be adequately coordinated depends on factors such as the availability of resources, the level of modal competition and regulation, commitment on the part of operators and the level of enforcement. In principles, an efficient transport system could be attained if wasteful service duplication is eliminated, if overall operating cost is reduced to the barest minimum,and if the features of the mode can be fully exploited upon (Faulk, 1990). This means that all modes should not only complement one another, but each mode should be put in to use where it fits it best.

The reason being that the choice of a given transport mode is affected by factors such as vehicle speed, the distance or journey length, comfort, convenience, cost and the reliability of alternative modes. Other factors include the availability of age composition and the socio-economic status of the people making the journey.

As already mentioned, coordination is an essential part of the system concept, whereby all transport modes can function properly as a harmonized whole, either on a modal or international basis, or also on a local and national scale. According to Sule (2005) one can view coordination as involving the introduction of common route numbering, stopping points for various public transport operators, use of common fare structure or through ticketing, improvement of interchanges between feeder trunk routes and so on.Coordination could also be viewed from policy perspective wherein transport policy is coordinated with land use planning, housing, national investment and so on.

In Nigeria urban centres, as those in many developing countries, car ownership level are usually low and different types of para-transit modes abound in them. Besides, the level of transport coordination differs between urban centres and countries. Nonetheless, Soegijoko (1986) cited in Sule (2005) has noted that the concept of coordinating complementary modes is possible in the developing countries urban centres especially with formal and informal public transport system. Informal or para-transit system particularly those involving the use of small vehicles, are best suited to serving areas where large vehicles are unable to reach and they help in meeting demands for short distance trips.

The conventional or formal public transport system and large capacity vehicles are best suited to trunk radial routes and other traffic with high density flow. This is to ensuring that public

transport modes, based on their sizes and operational capabilities, are engaged in areas where the best use or maximum benefits could be derived. Also, be preventing small vehicles from clogging busy streets, congestion on such streets is reduced and the performance of large vehicles is enhance.

CONCLUSION AND RECOMMENDATIONS

The use of tricycle for intra-urban mobility as evidenced from this write up is seen as an integral part of the transportation system which can be advantageous to urban economic development in an atmosphere of good transport policies and management system. The road network pattern of most Nigerian cities are typically radial hence there is high level concentration of economic activities within the Central Business District. Most commercial and public institutions are found within the central areas thereby attracting more traffic and its associated problems. Compounding these problems is the nature of road circulation within the cities and the different mode of transportation system that existed.

Tricycle has become a household means of transportation in Nigeria and therefore the European Master Plan for urban road design may not be presently suitable for the present Nigerian situation. The urban master plan must therefore be a reflection of the people's culture and life style, including the recent changes in the mode of transportation. The urban master plan must be designed as part of its circulation elements to show tricycle lane, pedestrian corridor and also cross and walk signals. These are strategies for the design to modern road free traffic anywhere in the world. The emphasis on separate lane for tricycle is because of the peculiarity in the use of this mode of transportation in Nigeria in recent time. Upon the provision of separate lane for tricycles on urban roads, policies should exist to control the speed of travel by the tricycle operators and solely restricted on same route design for them during operation. The travelling speed should not be allowed to exceed 60km/hr with the urban thoroughfare.

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