Sustainable Road Transportation Practices in Nigeria.

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ABSTRACT: This study focused on the Problems associated with Carbon emission level in Nigeria, the sustainable practices adopted in Nigerian Road Transport Industry to alleviate these problems, challenges it has faced and possible ways to overcome these challenges. Data was collected from secondary sources like journals, websites and Newspaper Articles. Findings revealed that despite the varying views on Global warming , the Nigerian Government have adopted practices like BRT scheme, lane and Carpooling and Organisations aspire for a future of low carbon by adopting sustainable practices in a comprehensive life cycle approach.

Keywords: Carbon, emission, Supply Chain, carpooling, Global Warming.

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1.0 Introduction

"Directing infrastructure investment toward low-emission modes now will help avoid lock-in of transport systems to a fossil fuel-intense and high-cost future. Developing countries have an opportunity to build a more sustainable future" (Marc, 2012)

The importance of the transportation sector in any nation cannot be over emphasised. However its contribution to the Greenhouse Gas (GHG) emission has become a situation of concern globally. In the developed world, the rise in traffic volume has occasioned a corresponding rise in Greenhouse Gas emission by 10 % from 1990 till 2007 (factsheet, 2012). According to the International Energy Agency Data reports (2009), the CO_2 related emissions had a value of 20.9Gt and 28.8Gt in 1990 and 2007 respectively which the Transport sector contributed 4.58Gt and 6.63Gt in 1990 and 2007 respectively **(IEA, 2009)**. The World Bank Energy Outlook in 2009 also forecasted a rise in the emission level of CO_2 in the year 2030 by 40Gt of which Transportation contributes 9Gt to this estimate in Year 2030 (World Bank, 2009).

This study critically looks at the Transportation issues with respect to its contribution to the GHG emission in the Nigerian Road Transport Industry, the challenges encountered in adopting Green practices in this sector and practical recommendations to the Government of Nigeria on ways to reduce this emission level in the Transport sector.

2.0 Environmental Issues and Green Practices in Nigeria's Transport Sector.

In 2005, out of the 29billion metric tons of CO_2 equivalent units emitted, the Transportation sector was responsible for the emission of approximately 23% of the total emission (Alain *et al.* 2011). The composition of Nigerian Public Transportation system includes mostly the private cars, mini buses otherwise called the "Danfo" and the traditional buses used for mass transit purpose (see fig. 1&2). With a population of approximately 160million persons, 12,545,177 registered private vehicles and 51.18 million employed citizens (FBS, 2011). It can be assumed that 23.5% of the citizens can afford their own private cars. Statistics from the Federal Road Safety Commission (FRSC) in Nigeria further shows that over 7,000,000 vehicles ply the road on a daily basis (FRSC, 2010). This shows the amount of Greenhouse gases emitted from the vehicles daily.

The issue of traffic congestion on the roads which can last for hours with vehicles steaming their engines and combustion of fossil fuel continually creates a domain of Greenhouse gas emission point. The traffic congestion on the roads has become a norm that an average of 2hours can be spent on traffic every day. Fig. 3 shows a pictorial representation of the cluster of vehicles stuck in traffic. Other forms of environmental pollution are the Noise pollution and the reduction of air Quality of the environment.

Fig.1 Danfo Buses in Lagos, Nigeria (source: LAMATA, 2011)

Fig. 1. Molue Bus in Lagos, Nigeria (source: LAMATA, 2011)

Figure 2,4. Screen shot of Traffic Congestion along Apapa Express Way, Lagos Nigeria. (Source: LAMATA, 2011)

According to RXA Guide on "Explaining Carbon footprints", burning 1liter of Diesel can generate 2.63kg of carbon dioxide (RXA Guide, 2012). Estimating the carbon footprint of 7,000,000 vehicles on the Nigerian roads per year will yield approximately 26.9 million mt /CO_2 (see table1 in Appendix).

3.0 Green Practices in the Nigerian Transport Industry.

The need for Green practices in the Nigerian Transport sector has become very imminent and the government of Nigeria has embarked on projects to improve on the Sustainability of the sector. During the Climate change conference held in Durban, the United Kingdom Minister of state for climate urged the Nigerian Government to embark on Green Transportation Projects that will help curb the alarming growth of Greenhouse gas emission level in the country. He further disclosed that "The United Kingdom has pledged to support the development of low emission urban transport system in Nigeria with £150 million and that the pledge was part of a UK vote of 2.9billion pounds to aid adaptation projects in the developing countries"(Daily Trust, *2011)*. Therefore, Green practices such as the Implementation of Bus Rapid Transit Scheme (Gbenga, 2009), Creation of BRT lanes for faster movement of these Buses (Gbenga, 2009), Creation of parking zones that are free for most private car owners intending to access the major city centres (Babatunde, 2012), levying of vehicle owners that park at unauthorized points within the metropolis are currently adopted practices.

3.1 Bus Rapid Transit Scheme.

The Bus Rapid Transit was successfully launched in 2009 with an introduction of 220 buses on a route of Mile12-CMS-Moshalashi- CMS -Mile 12, operation time of 6am to 10pm daily and an estimated headway of ten minutes (Tayo, 2010). This route was selected first because it covers the major span of the main route on Lagos metropolis that is characterized with heavy traffic generating point, offices, industries schools, hospitals etc.

The government of Nigeria has embarked on provision of Bus rapid transit scheme. This scheme was introduced for the following reasons:

- efficient level of service (low cost, high frequency, high speed, high occupation, high Safety, low emissions),
- adequate institutional framework and regulation,
- high socio-economic benefits, especially for low income population,
- maximum level of private participation
- minimum level of public expenditures and liability
- adequate mitigation of environmental and social impacts of the BRT system (Tayo,2010)

The number of commuters conveyed by the BRT is so large that is can even be compared to some of the Bus Rapid systems in the World. This can be justified by it level of patronage. BRT-Lite patronage is comparable to many of the individual lines in Curitiba, Brazil, and approaching that of the Metro bus in Quito, Ecuador (Tayo, 2010). 85% of the passengers attracted to this bus service were existing commuters using the traditional 14 seater bus service system, 8% used the mini buses locally called "molue" and 6% of passengers travelled by car and taxi (Tayo, 2010).

This shows that the introduction of the BRT transit means to an extent has reduced the users of private cars by 6%.

Figure 5;BRT Buses; (source : LAMATA, 2011)

3.2 **Bus Rapid Transit Lane.**

The introduction of the **Bus Rapid Transit** scheme was actually a step in the right direction in alleviating the situation. Taking into consideration that the difference between the bus system and the Bus Rapid Transit system is that the later operates longer buses on dedicated bus lanes thereby creating a regular, faster and congestion free travel (Somoyiwa, 2009). Therefore a customised path must be made available for the buses in order to achieve the speed of travel required to convince the users of private vehicle to engage in the use of these Buses (see fig.7). This strategy of special path construction is carried out on major roads in the metropolis to improve the time of travel of passengers. On major roads this lane was marked with signs indicating that no other vehicle has to ply that lane. This project alone led to the reduction of Greenhouse gas emission by 13%, a 10% drop in the annual per capita expenses on transportation, 33% reduction on travel time and a reduced rate of traffic accidents (Olukayode, 2011).

Figure 6: BRT Lane in Nigeria. (SOURCE: LAMATA .jpg)

3.3 **Tree Planting (Carbon Offsetting).**

It is estimated that approximately \$6.4 million is generated from planting of 3.6 million trees yearly with a corresponding air pollution reduction of 890 tons. Similarly, planting trees around your house could also lead to a 25 % 4reduction in the electricity bills (Abor day, 2011). The problem of desertification in the Northern part of Nigeria necessitated the   need for all Governors   to engage in the Project tagged "**5 for 1**". This means that for every one tree cut down, five trees must be planted. This project can be seen as an alternative way of offsetting the CO_2 emission level in the country.

Figure 8. Shows picture of the wife to the President of the Federal Republic of Nigeria launching the tree planting campaign

Figure 7: Operation 5 for 1 in Schools; (Source: Zauro, 2011)

4.0 **Challenges of Adopting Green Practices in the Transport Industry**.

Green practice adoption in the Transport sector has faced numerous setbacks but for the purpose of being concise, this study will look at the following issues:

- **Urban Population Growth**

The continual growth of the population in Nigeria is a major factor affecting the success of Green practices in Nigeria Road Transport sector. There is a positive correlation between the population and the demand for Transport service. Mobogunje (2012) asserts a 4.8% growth in urban population annually and this has led to the migration of most rural dwellers to city in search of a batter life. He further forecasts that 50% of the current population of 160 million would migrate to urban centres in 2015(Mobogunje, 2012). This rise in population in most urban areas will lead to an increased emission level as a result of increase demand for mobility.

- **Low Standard of Living**

Statistics from the National Bureau indicates that " 61.2 percent (against 51.6 percent in 2004) of the Nigerian population (about 112.47 million out of the 163 million Nigerians) were living on less than $1 a day at the end of 2010"(Chioma, 2013). Based on this, the level

of poverty in the country therefore distorts the mentality of the average citizen from long term environmental issues to short term economic issue. It has therefore become very difficult to convince majority of the citizen about the need to pursue green practices.

- **National Economic Situation.**

The government in its bid to satisfy the basic needs of its populace is faced with problems of choosing between creating a Greener Environment or implementing more economic policies that will guarantee a better livelihood of its citizen. This trade-off between economic benefit and environmental benefit has been a major problem affecting most developing countries in the world.

5.0 Recommandations to Minimise Environnemental Impact.

The following are the basic recommendation for effective and efficient minimization of Green House Emission level.

- **Improvement in Vehicle Fuel Type and Economy.**

The improvement in vehicular fuel and economy is a significant move to reducing the emission level. For instance , if the combustion of one gallon of gasoline creates about 19.6 pounds of CO_2 in comparison to the 22.4 pounds CO_2 for one gallon of diesel (EIA,2012). This means that with an average of 7 million vehicles on the Nigerian roads daily (FRSC, 2011), a 22% CO_2 emission will be reduced. (see table 2 in appendix).

- **Encourage Carbon Tax**

The issue of carbon tax should also be made sector specific and not just a national issue to avoid the compensation effects of some sectors. For example, if the Transport sector in Nigeria is aware that it will be taxed if its overshoots its limits, there will be sector based performance improvement and not a cumulative National based performance.

- **Parking Zones at Reduced Tarrifs**.

Most citizens in Lagos Nigeria are resident outside the city metropolis. The urge to beat the traffic and still achieve some level of comfort has led to the increased use of private vehicles but the BRT scheme has to a large extent reduced the number of vehicles coming into city centre. If dedicated parking zones are designed at strategic locations for private vehicle owners to park their cars at very reduce tariffs. Bicycles can also be position at these parking zones so that people intending to visit locations can do so with the use of these bicycles. This practice has been adopted in Hamburg and some parts of Germany.

- **Encouraging the Use of Bicycles**

Government can start by the free distribution of bicycles to individuals as an awareness campaign. This will fully attract the attention of the public to the need for Greener modes of transport. Subsequently, subsidies can be placed on the purchase of the bicycles so that it can be easily acquired and used. Rentable bicycles can also be made available around the city and at car parks to enable commuters use the bicycle to move around for their transactions. Cycle paths should be included on the roads as this has been totally neglected in the design of roads in Nigeria.

- **Encouraging the Use of Car Pooling System**

Carpooling can simply be defined as sharing of rides in a private vehicle among two or more individuals. Researchers from the University of Tehran Iran recognized carpooling as a viable means to saving fuel consumption by vehicle in urban areas of Iran. Similarly, researchers in US, UK and Canada has also proved that adopting the culture of carpooling is a benefiting practice. (Yemi, 2013)

To achieve this, government can carry out mass awareness campaigns especially through the different private organizations assuring them of reduced tax levy if their staff can engage in car sharing. Firms will find this as a cost saving mechanism as they will not be needing an expanded space for packing cars. Firms can introduce this practice into their policy and incentives can be used to stimulate workers to engage in this practice.

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APPENDIX.

Table 1.Estimating the carbon Footprint of Vehicles in Nigeria per Year(According to RXA Energy values)

Vehicle	Number of vehicle	Duration 1day	1ltre diesel (2.63kg)CO_2	Min litre of diesel	Total /day	Total/annum
Cars/buses	7,000,000	1day	2.63kg/CO_2	4	73,640	26.9million mt./CO_2

 (Source: Excel, 2010)

Table 2*. Analysis of Diesel vs. Gasoline fuel in Vehicles. (According to IEA values)*

Gasoline emission analysis					
Year	no of vehicles/day	CO_2 equiv.(pounds)	volume(litres)	Total /Day	Annual Emission

Year	no of vehicles/day	CO_2 equiv.	vol(litres)	Total /Day	Annual Emission
2007	7000000	19.6		686000000	2.5039E+11
		Diesel emission analysis			
Year	no of vehicles/day	CO_2 equiv.	vol(litres)	Total /Day	Annual Emission
2007	7000000	22.4	5	784000000	2.8616E+11

$$1-(250390000000/28616000000) = 22.5\ \%$$

This gives a 22.5% reduction if vehicles operates on Gasoline rather than Diesel