

TOWARDS FINANCING AND PLANNING ROAD SAFETY AUDIT OPERATIONS IN NIGERIA

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Private-ownership of roads in Nigeria is still at the deliberation stage. In other words roads (tarred and untarred) are owned by Federal, State and Local authorities in Nigeria. Most of these roads, however, share a common characteristic of being "unsafe at any speed", at any time of the day. This is as a result of the low quality of the road components, structures and patterns. For example, road surfaces are undulating and rough. Also, the poor standard of road infrastructure like guard railings/barriers; pavement marking and signs; illumination levels, traffic signals, horizontal/vertical alignment and sight lines contribute largely to the increasing carnage on Nigerian road network.

This trend persists because authorities in Nigeria have practically relegated to the background regular road safety audit operations. This is an inevitable aspect of modern methods of road administration and management, which determines a number of traffic potentials concerning highway high collision locations; protection of errant vehicles from light poles, trees, ditches, replacement of damaged and missing signs, street lighting, capacity and level of service analysis.

Finally, this paper suggests commissioning of a National Road Research Fund, with a view to developing an efficient road safety audit operational system. Also, the introduction of private initiatives and a Community-based Approach in road administration, as well as decentralization of road administration framework at all levels, will greatly help "engineer out" potentially unsafe features across Nigerian roads, towards a better road traffic environment in the 21st century.

Key Words: Private-ownership, Unsafe at any speed, Road infrastructure, Road safety audit operation, Road administration and management

1. INTRODUCTION

The Nigerian economy depends strongly on the functionality of its road transport system. Past researches have proved that about 90% of the macroeconomic activities of Nigeria depend on the automobile as a means of mobility.

Ironically, the national gridlock is in complete mess. It has over the years suffered from technical neglect by successive governments. Although more kilometres have been constructed, the existing ones continue to deteriorate. It disintegrates rapidly due to the poor maintenance culture across the nation. For instance, journey of one hour now takes several hours more, due to the devastating state of the roads. Drains are blocked and roads are without signs. Streets lights, traffic lights, packing facilities, pedestrian/cyclist facilities, road marking and painting are poorly maintained, just like other problems too numerous to mention. Hence, the road mode contribution to the Gross Domestic Product (GDP) continue to plummet (Table 1).

Table 1 Transport sector (%) contribution to the GDP at 1984 constant factor cost, 1990-1997

| YEAR | ROAD | RAIL | OCEAN | AIR | TOTAL |
|-------|------|------|-------|------|-------|
| 1990 | 2.80 | 0.04 | 0.17 | 0.15 | 3.16 |
| 1991 | 2.78 | 0.03 | 0.17 | 0.14 | 3.12 |
| 1992 | 2.84 | 0.02 | 0.16 | 0.14 | 3.17 |
| 1993 | 2.93 | 0.02 | 0.15 | 0.11 | 3.22 |
| 1994 | 2.93 | 0.00 | 0.14 | 0.10 | 3.17 |
| 1995 | 2.90 | 0.00 | 0.15 | 0.10 | 3.15 |
| 1996 | 2.86 | 0.00 | 0.15 | 0.10 | 3.11 |
| 1997* | 2.84 | 0.00 | 0.14 | 0.10 | 3.08 |

Source : Federal Office of Statistics (1998)

*Note : Provisional

0.00 = Less than 0.01%.

The contribution of the road subsector continues to plummet alongside other subsectors of the transport sector of the economy. The deteriorating and dilapidated state of the road structure across the country, inter alia, should be blamed for this discouraging trend.

These roads are not originally designed for heavy

traffic, but are now been flooded with vehicles. This heavy traffic density, especially of trailers, lorries and trucks, accelerate the damage of the poorly constructed road surfaces. Hence, the high cost of maintaining both roads and vehicles have been unacceptably high. However, highway system improvements require a proper assessment based on current and anticipated operational deficiencies and safety problems.

There is the need to reinvigorate roads in Nigeria, by applying functional and sustainable techniques of the road safety audit, that is backed with actions, just as road safety audit projects are prioritized in the developed world, with a view to improving the road traffic environment in Nigeria.

For example, in 1994, the Institute of Traffic Engineers¹ (ITE) responded to the Federal Highway Administration (FHWA), highway safety guidelines by recommending that US agencies should introduce the concept of a road safety audit into their systems. This is in an effort at preventing crashes on new and existing roads.

This paper espouses the characteristics of the road traffic environment in Nigeria, with emphasis on accident trends and traffic components. Also the need for a functional road safety audit on Nigerian roads is expatiated, as well as the way to involve private initiatives in the road safety audit. Decentralization of the road administrative structure in Nigeria is recommended, towards a sustainable and safer road traffic environment.

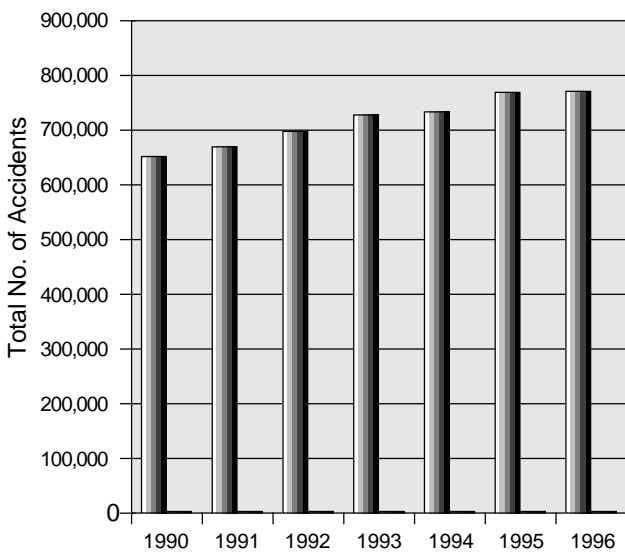


Fig. 1 Road traffic accidents trend in Nigeria (1990-1996)

Source: Federal Office of Statistics (1997)

2. THE EMERGENCE OF ROAD NETWORK DEVELOPMENT IN NIGERIA

In the pre-colonial days, the dominant mode of overland transportation was porters and draught animals over bush paths and tracks. But, in 1904 a cart road for mules and ox-carts was built, to reduce the strain of securing porters for the British officials.

The first road for motorised vehicles in Nigeria was, however, built in 1906 from Ibadan to Oyo. By 1914 there were 3,200 kilometres of roads in Nigeria. In 1926, the kilometrage rose to 41,780 kilometres. By 1992, the total kilometres of Federal and State roads for motorised vehicles in Nigeria amounted to 51,428.98 kilometres.

In terms of road length, the Federal government is responsible for 22% of roads in Nigeria, while state and local authorities are equally responsible for 27% and 51% of road network across Nigeria respectively.

3. HIGHWAYS CLASSIFICATION, MANAGEMENT AND MAINTENANCE IN NIGERIA

Right from the colonial days to the present, there are three major classes of roads in Nigeria, viz:

- (i) Trunk Road "A"
- (ii) Trunk Road "B"
- (iii) Trunk Road "C"

Trunk Road "A" forms the skeleton of the national road grid. It cuts across regional boundaries in the country. It even extends to the international borders of neighbouring West African countries. Notable examples are Ijebuode-Benin Expressway, Abuja-Kaduna Expressway, Lagos-Ibadan Expressway, Akure-Ilesa road, etc. In addition the Badagry-Republic of Benin road is a prominent international highway that links Nigeria with the neighbouring Republic of Benin. This class of road is constructed, maintained and financed by the Federal government through the Federal Ministry of Works and Housing.

Trunk Road "B" is the second category of main roads in Nigeria. It links the major cities within States with the State headquarters. These roads are financed by the State governments. They are tarred roads. The primary objective is to enhance the socio-economic development of the States.

Trunk Road “C” are local feeder roads constructed and maintained by the Works Department of local government authorities in Nigeria. This class of road is usually untarred and seasonal in nature. For instance, it links villages and communities in the remote parts of each local government region. Recently, the Nigerian government did a great deal in the construction of greater numbers of this class of road through the establishment of the Directorate for Food, Roads, and Rural Infrastructure (DFRRI). This revolution in the construction of feeder roads in rural areas enhanced the socio-economic life of rural dwellers. As at 1989, the total kilometres of DFRRI roads are 57,074.78 kilometres.

The issue of highway maintenance and management is a complex issue in Nigeria. The reason being that the supply of road facilities in Nigeria cuts across various categories of public agencies. For example, the Federal Ministry of Works and Housing constructs and maintains the Trunk Road “A”. Likewise the State Ministry of Works and Works Department of local government authorities construct and maintain Trunk road B and C respectively.

In an attempt to improve the quality and quantity of the road network in Nigeria, there are annual financial allocation by federal, state and local governments. For example, during the First National Development Plan, 1962-68, a total of 150.6 million nairas or 52 per cent of the total allocation to the transport sector was allocated to road development. Also, during the Second National Development Plan, 1970-74, 332, 588.00 nairas or 95 per cent of the total allocation to the transport sector was earmarked for road construction, maintenance and development. At the Third national Development Plan of 1975-80, 5,340,436 nairas or 73.12 per cent of the total allocation to the transport sector was allocated to road development by the Federal government.

Table 2 Per capita expenditure on city roads and other indicators

| CITIES | Travel Time* (Min) | Car Ownership Cars/1000 | Road Expenditure (\$ per capita) |
|----------------|-----------------------|----------------------------|--|
| Lagos, Nigeria | 85.00 | 4.30 | 0.04 |
| Cairo, Egypt | 59.50 | 59.10 | 5.70 |
| Paris, France | 35.00 | 426.00 | 248.00 |

Source: Adapted from Urban Edge, World Bank (1999)

*Travel Time - The average number of minutes needed to travel between two locations within the cities.

Table 2 gives a comparative illustration of road expenditure in the most populous city in Nigeria, Lagos along with other cities of the world. Road expenditure in Nigeria is the least among all other cities mentioned in the table. This is evidence of the urgent need for an alternative source of finance other than government for road improvement programs in Nigeria, so as to make the national gridlock more safe, vibrant and viable. For instance, the travel time in Paris is shorter and better than that of Lagos, because all facilities needed for an advanced traffic system management are provided for. Meanwhile the reverse is the case in Lagos.

4. THE CHARACTERISTICS OF THE ROAD TRAFFIC ENVIRONMENT IN NIGERIA

The paramount objective of road safety audit operations is to review high collision locations so as to review measures towards ensuring the safe operation of roadways and to help “engineer out” potentially unsafe features.

According to Akinyemi², the road safety engineering program is a set of activities designed to reduce the number and/or severity of accidents on specific road sections by exchanging or modifying some road environment characteristics. The activities generally consist of planning i.e., identification of safety problems, road locations and feasible road counter measures; implementation, i.e., installation or construction of the countermeasures; and evaluation, i.e., the determination of the degree of effectiveness of the countermeasures. Hence, better engineered roads mean less driver error and a more forgiving environment when an error is made.

The complexities in road administration in Nigeria are responsible for the inability to attain this lofty assertion as stated above. Rather, the road traffic environment in Nigeria is characterized by the following:

- over-speeding;
- blocked drains;
- narrow pedestrian walkways;
- bushy road environment;
- rough and undulating surfaces;
- black spots;
- unfit road/intersections;
- narrow bridges;
- defaced signs;
- non-functional traffic lights;

- irregular road marking;
- road median not crash-worthy (concrete);
- poor guard railing arrangement;
- high disregard for traffic regulations and the law; and
- flooded road surfaces.

Hence, the number of road accident fatalities across Nigeria continues to increase (Figure 2). The dishearten-



Photo 1 Rough road surface, blocked drainage with pedestrian walking side by side with the vehicular traffic

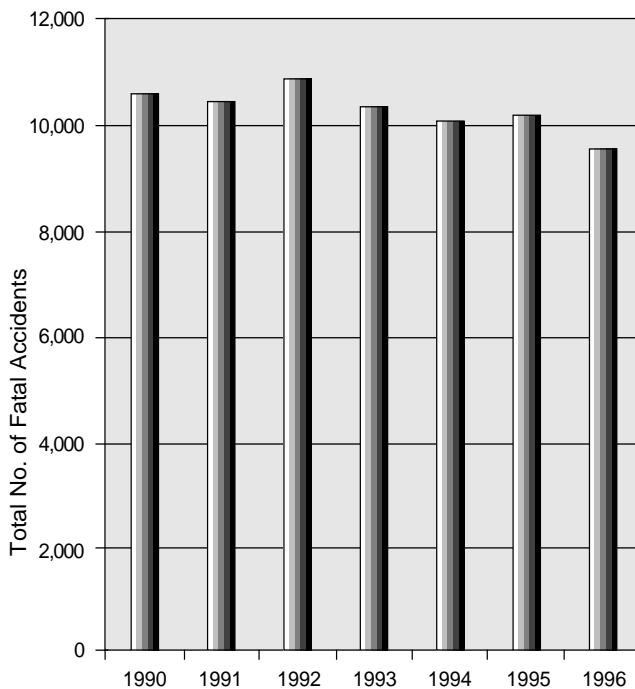


Fig. 2 Road accidents fatality trend in Nigeria (1990-1996)

Source: Federal Office of Statistics (1997)

ing state of roads is attributed to bureaucracy in attention to preventive maintenance projects. Inadequacies on road infrastructure are rarely attended to, until it becomes a death trap. For instance, night travel in Nigeria is not encouraging. For all the important components that aid night travel such as road lighting are not adequately available. Also, traffic lights, signs etc. are always defaced and in bad shape whenever provided. The trend of road traffic accident in Nigeria portrays the deplorable state of the road traffic environment. Notwithstanding, many fatal cases are not reported to the police by victims. Also in the rural areas there are inadequacies in the highway environment provision such as lack of passing lanes, unprotected embankments, lack of adequate shoulders, narrow pavements and bridges, absence of fencing to keep stock restrained etc.

5. TRAFFIC COMPOSITION OF THE NIGERIAN ROAD NETWORK

Road transport is responsible for about 90% of all inter and intra city movements across Nigeria. This is a result of the poor planning procedure in the modal strategic development, since the “oil boom” of the 1970’s. For instance, more roads were constructed at the expense of the poor state of the railway and waterway systems.

Nigerian roads, thus, are heavily motorized. Goods that ought to have passed through the railways and waterways are now being forced on the overstressed road network. Hence, the deplorable state of the road surface and environment, has led to the increase in road traffic accidents.

However, reactivating a functional multi-modal system across Nigeria, along with regular preventive maintenance across the roads will further enhance road safety in Nigeria. The following are the composition of the road traffic environment:

- heavy duty trucks;
- lorries;
- trailers;
- tankers;
- cars;
- motorcycles/tricycles;
- pedestrians; and
- cart-pushers.

The activities of heavy duty trucks and trailers on these roads are frequently responsible for some of the fatal accidents. They are known for overloading, over-speeding,

and contemptuous disregard for traffic laws. Despite, the unreliable state of their vehicles' brakes, and bad head lamps. The excess weight of these trailers and trucks on the asphalt surfaced road is often responsible for the ubiquitous potholes. Because of the acute shortage in weigh-bridge provision, road weight capacity enforcement is flouted with impunity by the truck/trailer drivers in Nigeria.

6. THE EXISTING INSTITUTIONAL ARRANGEMENT IN ROAD TRAFFIC MANAGEMENT

In Nigeria, the agencies responsible for the provision of the road infrastructure and road safety maintenance are not coordinated at all. Rather, each agency works unilaterally. This, however, has made it cumbersome to attain better road safety in the road traffic environment in Nigeria.

For instance, the Federal Ministry of Works and Housing provides the roads and road infrastructure, while the Federal Ministry of Transport engineers the national policy that guides the vehicular traffic operations on these roads.

Furthermore, the Federal Road Safety Commission manages road safety along the Federal roads in Nigeria, while the Traffic Department of the Nigerian Police Force takes charge of prosecution of erring road users. Other agencies are the Traffic Warden, Vehicle Inspection Official and other informal private initiatives such as Special Marshal Corps, Red Cross, Man-O-War.

However, problems of overlapping objectives, responsibility and self-esteem amongst these agencies have made their existence sometimes meaningless in alleviating the poor state of the road traffic environment in Nigeria. They never see themselves as one. Rather, agencies often claim supremacy over one another, instead of complementing the activities of one another.

7. ON THE NEED FOR ROAD SAFETY AUDIT IN NIGERIA

Streets, especially commercial streets in Nigeria are crowded corridors, where automobiles and pedestrians are hopelessly intermingled while the ugly, unplanned, uncoordinated street infrastructure completes the visual con-

fusion.

Hence, Okin³ stated that the essence of maintaining highways regularly is primarily "to ensure that highways are maintained in a condition such that vehicles carrying passengers, goods, livestock, etc. can travel safely and economically between given locations". However, roads in Nigeria are somehow death traps, due to the lack of regular maintenance and repair by the authorities.

Again, Hobbs and Richardson⁴ asserted that road surface affects the stability of vehicles by the nature of the contact between the wheels and surface and it further affects the driver in controlling his vehicle, by the amount of irregularities present. Sudden bumps may cause loss of control if speeds are not adjusted to the conditions. Therefore, the higher the speed the better must be the riding conditions and uniformity of surfaces. Hence, there is a need for regular safety audit activities on all roads.

Furthermore, well-maintained roads should be well lit especially to aid night travel. Hence, Berry⁵ stated that "road lighting is put in place on roads to ensure the safe movement of both vehicles and pedestrians during hours of darkness. Moreover, it is a measure of protection against injury and damage to property. However, the method of lighting adopted, and the level of lighting provided is related primarily to the importance of the road from the standpoint of the traffic it carries, and the installations must provide and distribute the necessary brightness over the road surface, so as to show up clearly both pedestrians and vehicles on the road". No sooner had street lights been installed on Nigerian roads than they are vandalized by unscrupulous individuals. When it is not vandalized, the power supply remains erratic.

Onakomaiya⁶ portrays the ugly picture of the road traffic environment in Nigeria thus "... when you have a combination of largely illiterate or inexperienced or drunken or over-confident drivers, unconcerned about the lives of other road users, operating poorly-maintained vehicles, on high quality but poorly designed and ill-maintained roads, that are ridden with all kinds of hazards and obstruction, in a society that is devoid of traffic law enforcement services, and that is ill-equipped with emergency road safety facilities, where government, police and military drivers flout traffic laws with impunity, where paramedical personnel are sometimes cold and unconcerned about the agonies of road accident victims, and where the relevant government authorities merely pay lip service to road safety, you have the best conditions for maximum accident rates with attendant high fatality, casualty and non-survival indices"

8. REFORMING THE ROAD AUDIT SYSTEM IN NIGERIA

The above scenario in Nigeria is so bad because it is generally the belief that it is the sole responsibility of governments to provide/supply and maintain notable infrastructure such as road networks, electricity, portable water, communication, and solid waste facilities, and that private initiatives are rarely needed to complement the efforts of government.

Meanwhile, quoting Gomez-Ibanez et al.⁷, the above general belief is totally wrong because “the most commonly asserted advantages of private operators is that they can build and operate infrastructure facilities at lower cost than their public sector counterparts. It costs less as long as there is competition to ensure that the private operators remain efficient”.

However, this awkward general opinion incapacitates the willingness and interest of the private sector investing in road network development across Nigeria. The private sector, thus in akimbo watching helplessly the gradual and continual degradation and disintegration of the national gridlock. In as much as there are no existing policies presently that encourage full participation of the private sectors in road maintenance and/or private ownership of road infrastructure in Nigeria.

There have been pockets of unilateral contributions and participation by a few private operators, especially in areas of roads maintenance, toll gate administration, erection of safety billboards along major highways, funding of traffic safety jingles in newspapers, radio and television. These efforts, although worthwhile, are inadequate. It will however be adequate, if the enabling environment is created by government, whereby roads are leased to, constructed and maintained by the stakeholders in road transport.

A recent notable example is the Oresund Fixed Link, connecting Malmo, Sweden and Copenhagen, Denmark. It comprises of a four-lane highway and a two-way railroad. It is reducing the crossing from a one-hour ferry journey to a ten-minute car ride, and it is privately financed. The users are made to pay for the cost of construction and maintenance. This is one of the many wonders private finance could offer in road infrastructure provision across the globe.

From this perspective, the prevailing status quo whereby private investors in road infrastructure are limited to toll fee collection is obsolete in its entirety. Private sec-

tor participation should be summarily extended to cover and permit full private ownership of roads across the country. This, however, will enhance efficiency as well as a reliable and dependable road traffic environment. Notable construction engineering companies as well as serious stake-holders in road transport operations should be encouraged to finance road projects and supply road safety infrastructure.

A privately-owned road environment will receive regular attention as well as adequate finances for routine repairs, maintenance and integration through which the road traffic environment will enjoy the benefit of the sophisticated technology like Intelligent Transport System (ITS) / telematics component installation along Nigerian road network. This is with a view to alleviating road traffic accident fatalities in Nigeria. Nigeria like every other developing nation will not be an exception, for nine-tenths of the expressways in Italy are privately owned and operated, and so are a significant portion of the expressways in Spain.

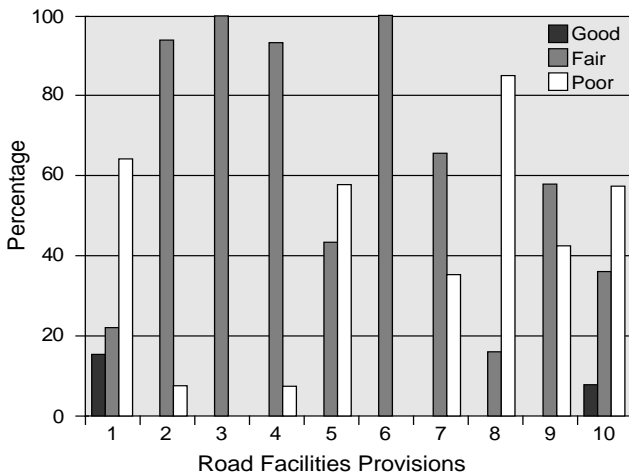
9. KEY ISSUES IN ROAD SAFETY AUDIT OPERATION

Internationally, the following key issues are considered and addressed during road safety audit operations. This is with a view to measuring the degree of safety on a particular road:

- road alignment;
- pavement width;
- pavement roughness;
- intersection treatment/consistency of application of traffic control devices;
- consistency of geometric roadway standards;
- road shoulder condition;
- road shoulder width;
- pavement edges and drop-offs to shoulders;
- lateral clearance to roadside objects;
- guardrail;
- median barriers;
- culverts;
- embankments;
- information signs;
- number of signs;
- sign size/letter size;
- sight distance to signs;
- signs as hazards;

- sign condition;
- centerlines;
- edge lines/shoulder lines;
- lane lines and overtaking lanes;
- intersection delineation;
- guideposts and guardrail reflectors;
- bridge markers;
- lighting at intersections and night time visibility;
- animal fencing and other mitigation measures;
- capacity and level-of-service analysis;
- climbing lane warrant analysis;
- traffic signal warrants;
- traffic signal timings and phasings;
- posted speed limits; and
- police enforcement.

However, experience from series of empirical surveys and studies of the road traffic environment in Nigeria, confirmed that the components listed above, are provided during road construction exercises in Nigeria. Afterwards they are either vandalized or technically abandoned to degenerate to such a standard that the road traffic environment is rendered unsafe at any speed at any time of the day. Hence the increase in the rate of road traffic accidents in Nigeria is not unexpected (Figure 3).



| | |
|----|---|
| 1 | : Horizontal/vertical alignment and sight lines |
| 2 | : Pavement marking and signing |
| 3 | : Illumination levels |
| 4 | : Traffic signals |
| 5 | : Road surfacing |
| 6 | : Guardrails/barriers |
| 7 | : Wildlife mitigation measures |
| 8 | : Traffic operation |
| 9 | : Police enforcement |
| 10 | : Capacity and level-of-service analysis |

Fig. 3 Summary of safety audit checklist analysis

Source: Field Survey (1999)



Photo 2 Spoilt traffic light, absence of road marking, and obsolete concrete road partition which is not crash-worthy

10. REAWAKENING PRIVATE SECTOR'S INTEREST IN ROAD SAFETY AUDIT IN NIGERIA

There is the need to evolve a functional Public-Private partnership between government agencies/representatives and the private sector operators in the area of road environment integration and development, with a view to minimize the rate of accident fatalities on Nigerian roads. The road environment in Nigeria like in other developing nations of the world, are characterized by gross inadequacies in road traffic environment components. Hence government should encourage private investors to invest their money in provision of the following:

- weigh bridges across Nigeria;
- lighting facilities;
- Intelligent Transport System (ITS), telematics and information technology (IT) components;
- road surface maintenance;
- bridge consolidation and expansion;
- road marking, painting and supply of road directional and traffic signs;
- removal of hard substances (e.g., rocks, trees) from the roadside;
- provision of crashworthy roadside railings;
- drainage facilities construction and maintenance;
- communication facilities provision etc.; and
- electronic toll collection.

Nigerian roads need real financing so as to attain a reasonable level of efficiency and reliability. Financing, according to Allen⁸, “is not just funding, financing means a business plan for a profitable investment, with a long-term view, and is the combination of time and money put together in a dynamic contract with a delegation of responsibility over time”. The organized private sector, especially in developing countries, are more creditworthy than governments. As a result, finances can not be their problem, but they need a very strong, dynamic policy backing from government, to operate in a conducive environment.



Photo 3 Broken bridge railings/barrier. Pedestrian are forced to walk along the road with moving vehicles

Finances for road maintenance by the private sector could be acquired from the following outlets locally and/or internationally as stated below:

- local banks;
- loans;
- self-financing;
- stock exchange market;
- selling prepaid ticket to potential users of the proposed road; and
- International finance institutions etc.

In view of the above, government, however, should limit itself to the role of regulating, monitoring and coordinating the activities of the private sector. Also road tariffs must be fixed by government in accordance with the inflationary trend and ensure that the private sector operators do not overshoot their toll charges. Provision of a dynamic national transport policy that will guide and check the excesses of the private operators must be put in place by government.



Photo 4 Pedestrian crossing the highway without traffic island

11. INVOLVING PRIVATE INITIATIVES IN ROAD SAFETY AUDIT PLANNING

The government in Nigeria, it is believed, has the responsibility to supply road and infrastructure at all times. Also, the inability of government to involve private organizations and community based organizations in the planning process, especially in the area of road/maintenance planning, further aggravates the deplorable state of the road. The populace sees it as the total responsibility of the government.

However, government should start to involve these organizations in the planning process, so as to alleviate the deplorable state of our roads. For example, a community knows better where pedestrian bridges could be appropriately located. The people will be in a better position to monitor road infrastructure like street lights, railings, traffic lights and signs from being vandalized by unscrupulous individuals in their community.

Creating an avenue for the free flow of information between the government, the community based organizations, and non-governmental organizations will also help in finding quick solutions to any part of the road that is fast deteriorating. Government should therefore encourage private initiatives, so as to maintain a much safer road traffic environment in Nigeria.

12. TRANSPORT POLICY DYNAMISM, ROAD SAFETY AUDIT IN NIGERIA

Over the years traffic regulations and laws have not been dynamic in Nigeria, for instance, the national trans-

port policy that is supposed to aid and encourage such dynamism is still regarded as a secret document in Nigeria. Notwithstanding, it was signed into law, under a military government in 1993. Issues in transport planning have been approached from ad hoc and piecemeal arrangements, hence the poor standard of all road systems in Nigeria.

However, in the developed countries, according to Matson⁹, “while developing workable and effective traffic regulations, facts are sought through traffic surveys, accident studies, driver records and other sources, in order to avoid biased political influences and other undesirable approaches.” From this perspective, placement and ad hoc arrangement could not offer a dependable result in the safety audit operation across Nigeria.

13. ROAD SAFETY AUDIT FROM INTERNATIONAL PERSPECTIVES

Preventive maintenance is rarely adopted in Nigeria. Rather corrective maintenance, whereby the operations will gulp huge sums of money is noticeable. For instance, potholes, weak bridges, dilapidated roads, broken guard railings/barriers, lighting, sharp curvature on roads, blocked drains, flooded roads, skidding and undulating road surfaces and so on are attended to when the whole system must have collapsed or on the verge of total collapse. This lapse, among other factors, is responsible for the grievous state of road accidents in Nigeria.

In contrast, Sweden and Japan, like every other developed countries take the road safety audit concept seriously. It is generally accepted as an effort to prevent crashes on new or existing roads. In other words, it is a formal examination of an existing or future road or traffic project that interacts with road users in which an independently qualified examiner looks at the project’s accident potential and safety performance.

Hence, the introduction of road surface condition measuring system such as utilization of ALFRED measuring system developed by the Norwegian Public Roads Administration Institute. ALFRED data are used annually to follow up maintenance objectives and surface maintenance 5-year plans. The road surface condition parameters measured by ALFRED are:

- rut depth/width/area;
- cross fall with horizontal radius of curvature;
- longitudinal profile including; and
- roughness (IRI).

There is the need to measure road surface deficiencies on regular basis, so as to determine black spots and thus enhance traffic safety, but this is rarely done in Nigeria.

14. ROAD TRAFFIC ENVIRONMENT INTEGRATION: LESSONS FROM INTERNATIONAL EXPERIENCE

Owen¹⁰, while preaching the gospel of an eclectic approach in transport research observed that “... land transport was left to humans; and, while roads and rails have increased mobility and access in wealthy places, the cost of building and maintaining such infrastructures remains a burden in less-developed areas”. Despite international aid, poor countries may have so much debt that annual charges for interest and repayment are eating into foreign exchange reserves and showing current development programs.

The affirmation by Owen that there is a wealth of material for international case studies of moderate-income planned communities such as Tama and Senri in Japan, Tema in Ghana, and the Fifteenth of July, a new town outside Cairo. Data about these places, according to Owen, await comparative case studies that will help us understand the details of how transportation and communication can foster livable and transportation-friendly communities.

In view of the above, Nigeria has a lot to learn from the road construction methods of South Africa, France and the United States of America, as the best way to eliminate potholes on Nigerian roads. For example, South Africa has many miles of excellent asphalt pavement. Although the asphalt layers are thinner, about two inches thick, the roadbed is well consolidated before constructing the pavement. The underlying soil layer often undergoes compacting and smoothing. Although it takes time, effort and cost, in the long run they end up with good roads. These roads last a long time, despite their relatively thin asphalt surfaces.

Also, France avoids pitfalls or potholes, especially on its heavily traveled highways. Perhaps, due to past careful roadbed preparation, as well as usage of new tools and cutting-edge technology like improved mix and soil testing, and analytically detailed pavement design.

However, the good nature of the roads in the USA, being free from potholes is attributable to regular road safety audit operations. For instance, in California and much

of the USA, according to Moni Smith¹¹, the government has a pavement management system in which every two years, engineers venture out to evaluate the condition of state highways. Based on the engineers' evaluation, they decide on appropriate maintenance rehabilitation strategies.

Interestingly, the French method of integrating roads practically supports private participation in pavement ownership. For example, once a contractor submits a design for a job, the contractor will guarantee his work usually for a period of 5 to 10 years. Quality control is up to the contractor, and he is not overseen by a government agency. The reverse is the case in the USA, contractors are not under obligation once he has met the specification. If the road got damaged after a few years, new surfacing for the road will be put in place.

France's success in building excellent major highways seems in some part to reflect those contractual relations. From the above, Nigeria has a lot to learn from abroad towards improving the deplorable state of the road environment.

15. APPLYING THE CONCEPT OF PUBLIC/ PRIVATE PARTICIPATION IN ROAD MAINTENANCE PROGRAMS IN NIGERIA

According to Mabogunje¹², 'there are few available avenues in most African countries for raising sufficient revenue to fund urban infrastructure they are however restricted by their national governments to a narrow range of revenue'. This is the true state of road development funding in Nigeria. Government solitarily finances all road development projects. It has never encouraged the partnering between multinational/indigenous corporations and allowed to singly invest in road construction and maintenance activities, little wonder the national gridlock has been in a dilapidated state years back.

However, Mabogunje's proposition for municipal bonds which allow people to invest their savings - particularly through institutional investors such as banks, pension funds and insurance companies to build public infrastructure has become necessary in this dispensation, so as to improve the roads. He asserted further that "a municipality may float two types of bonds: self-liquidation revenue bonds which are often used for financial projects such as water supply systems, bridges"

In view of this, indigenous private transport compa-

nies, multinational corporations with strong financial bases should be encouraged to invest and participate in road development projects, alongside the Nigerian government. They should be encouraged to build roads, maintain them and transfer when due, so as to improve road safety in Nigeria. Private road ownership in Nigeria is long overdue. It should be backed by an Act of law so as to enhance road safety in Nigeria in the new millennium.

16. PROVISION FOR A CONSULTATIVE FORUM IN ROAD SAFETY AUDIT OPERATIONS IN NIGERIA

There is an urgent need for a broad spectrum of technical experts in road administration in Nigeria. This forum will cut across classes (public and private). It will comprise representatives of major stakeholders in road transport operations. Among these are:

- tyre manufacturing companies;
- automobile manufacturing companies;
- petroleum product marketing companies;
- engineering/designs firms;
- telematics/information technology (IT) firms;
- hauler/commuter associations;
- universities/research institutes;
- government representatives; and
- prominent CBOs, NGOs.

This forum will create an interface between the government agencies as well as the private sector of the economy. The primary objective is to alleviate the deplorable state of the road traffic environment through exchange of ideas, as well as willingness to finance road safety operation activities in any form across Nigeria.

Other responsibilities of this forum will include:

- policy appraisal and/or review;
- monitoring of road safety audit operation across the country;
- sourcing for funds to enhance road environments;
- road safety audit planning;
- recommendation of the best private sectors, that support road safety audit operations for national awards;
- encourage multi-disciplinary research projects; and
- dissemination of road safety education and information.

In as much as they are part of the broad road transport system, each will contribute a token fee for the uplifting of the road traffic environment in Nigeria, so as to reduce the rate of road traffic accidents. In return for their contribution in cash and kind, aiming at eradicating ghastly road traffic accidents in Nigeria, each devoted member should enjoy the following:

- tax holiday;
- highway advertising free franchise;
- national honor; and
- merit award.

The activities of this forum will be coordinated by specialized government agencies that are autonomous of ministerial control to be known as National Road Safety Audit Research Fund.

17. RECOMMENDATIONS

It is high time Nigeria took a clue from the experience of developed countries, and thus prioritized road safety audits, so as to redeem the unsafe state of the national gridlock, with a view to achieving a safer road traffic environment in the new millennium. The following are recommended as a better way of achieving a better road traffic environment in Nigeria.

- Routine road safety audit projects should be prioritized by the three tiers of government. In other words, regular and adequate attention should be given to ruts, cracks on asphalt and bituminous road surfaces. This problem must not be allowed to degenerate to potholes. Bushy roads, defaced road signs, faded markings along all roads should be treated in exigencies by the three tiers of government.
- Regular replacement/installation of traffic signs and signals, as well as provision of pavement markings on all major roads, i.e., damaged road signs, guard railings, traffic lights and highway light poles by errant vehicles must be replaced on time, so as to avert re-occurrence of more fatal accidents along all roads in Nigeria.
- Private initiatives in road funding should be encouraged by government. That is, the private sector should be encouraged by government to fund and finance road construction and maintenance in Nigeria so as to improve road safety standards in the country.
- Emergency road maintenance projects should be attended to at the earliest time. Also roads should not be

allowed to become death traps before being attended to. Rather, regular surveillance of the road environment will help tremendously in identifying the potential problematic zones of particular roads that require urgent attention.

- Provision of adequate surveillance equipment on all roads.
- Lay-bys, bus stops and off-street parking should be avoided on all major roads.
- Animal fencing in the vicinity of Game Reserves should be provided.
- Upgrade all breakaway sign supports for information signs.
- The cleaning and repainting of signs are of paramount importance, too.
- Reflectorised materials are desirable on all roads, because of the advantage at night and daytime.
- Modern equipment in road surfacing surveys such as stradograph, ROAR, should be procured for routine measurement of the asphalt surface.
- Creation of a Nigerian Highways Authority with autonomy, will speed up action on all safety audit programs on roads.
- Strict enforcement of traffic laws is important, too.
- Obstruction of road signs should be removed on a regular basis.
- Bodies responsible for road administration should work together as a single system.
- A comprehensive database containing data on road traffic should be provided, and made accessible to all, for proper planning.
- Funds should be released regularly by government, multinational to finance expressway surveillance and research.
- Government should create a traffic engineering department with autonomy to undertake safety audit operations on Nigerian roads.

18. CONCLUSION

The unsafe state of roads in Nigeria is a noticeable phenomenon. Both the ruled and the rulers are conscious of this menace. However, little is done to put the roads back in line with internationally accepted standards. The excuse all over the year about the poor state of roads, has been that of lack of financial support to upgrade and/or integrate the road traffic environment.

However, government should decentralise the present road administration structure, and thus allow the populace to play an advisory as well as supportive financial role in road maintenance. By so doing the problems of road accidents on Nigerian roads will fade out gradually.

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