Road User Pricing and Parking Management: Effectiveness and Acceptability Lessons; a Nigerian Perspective

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Abstract

Projections of energy consumption levels in the world is surely a pointer to the fact that motorization is set to become the greatest challenge facing humans in the near future; if left unchecked. This paper presents a non-technical review of the issues of increased motorization, and principles relevant for transport pricing design. It is popular knowledge that increase in roadway infrastructure, superfluously induces demand for the new infrastructure. It was on this premise that this paper sought to review possibilities in reducing levels of car ownership and dependence in Nigeria, instead of increasing supply of road infrastructure. The final part of this paper adopted survey methods to forecast acceptability levels for RUC schemes in Nigeria. Empirical evidence from online poll and interviews suggest that a great number of Nigerians would not support such schemes; however, there seems to be a little higher potential for acceptability considering that some respondents were of the opinion that if not for the issue of unaccountability, incertitude of hypothecation, and government's low level of interest in maintaining existing roads, they would have supported the development of such schemes.

Keywords*: Road User Charging; Traffic Congestion; Transport Costs; Sustainable Transport; Externalities.*

1. INTRODUCTION

There has always been a need to trade and to be able to trade with those outwith the immediate neighbourhood; consequently, the need to go after items, events, tourist attractions, and satisfy other derived demands associated with transportation. For sake of development of an increasingly integrated global economy marked especially by free trade, free flow of capital, and the tapping of cheaper foreign labour markets; better transport systems have been developed. People are now willing to travel further afield for simpler reasons like grocery shopping. Global economies today, depend on the efficient transportation of goods, people, and information.

1.1.Transport trends

There is a global trend in the transport sector which shows that as time progresses and incomes increase, more people own more cars; larger and more powerful cars. Even amid recent issues like global recession, fluctuations in global oil prices, and more particularly, scarcity and consequent increase in fuel price in Nigeria; there seems to be a continuous and steady rise in motorization, and a relentless increase in car dependence. Amongst the younger population, there seems to be an undauntable enthusiasm for car ownership; this could be

attributed to easy access to internet facilities, where unnecessary ambitions are being developed as an aftermath of observing the widening gap between the poor and the 'very rich'. It is unsurprising that car ownership and dependence levels are on the rise in a developing country like Nigeria, because there appears to be a usual trend amongst Nigerians to emulate and replicate such penchants without a concise understanding of their attendant issues. However, the element of surprise becomes glaring when one considers income levels of the citizenry.

According to Federal Road Safety Commission (FRSC), as at 2007, Nigeria had not less than 7 million registered vehicles operating on its roads (Mbawike, 2007). However, data from World Bank suggests that there were 31 vehicles per 1,000 inhabitants in Nigeria as at 2007 (World Bank, 2007). Only seven years later, the figure was almost double; Nwankwo (2014) stated that there were about 12.5 million registered vehicles in Nigeria. Most recently, National Bureau of Statistics (NBS) stated that about 2,200,481 drivers' licenses were processed between 2013 and 2015 throughout the federation; 395,539 licenses were registered in 2013, about 653, 046 were registered in 2014, and in 2015, a total of about 1,151,906 licenses were registered. In a similar statement, NBS revealed that 1,004,469 car plate numbers were processed in Nigeria for the year 2013, in 2014, about 560,987 car plate numbers were registered, and in 2015, a total of 303,274 car plate numbers were registered; totalling 1,868,730 car plate numbers registered between 2013 and 2015 (Elebeke, 2016).

On the cost implication of these high car ownership figures, the Director-General of National Automotive Council (NAC) disclosed that in 2013 alone, Nigeria spent about ₦1.2 trillion on importation of vehicles and allied goods. In that report, it was explained that ₦550 billion was spent on importation of cars, buses, and trucks; ₦500 billion was spent on vehicle spare parts; and ₦150 billion was spent on tyres (Alli, 2014).

There appears to be an established agreement between figures from NBS and such from NAC; such a high figure disclosed by NAC as money spent on importation of cars, buses, and trucks could be explained by the fact that over 1 million car plate numbers were registered in the same 2013, according to NBS.

2. ROLE OF TRANSPORTATION

Transportation is said to have derived demand because in real terms, no one travels for the mere purpose of it; for every trip made, there is a primary purpose. Hence, the role transportation plays for every individual varies in time and space. In a developing country like Nigeria, the role transportation plays cannot be overemphasized. Studies on the Nigerian economy suggests that a significant proportion of the final price of most commodities is accounted for by transportation; anecdotally, up to 30% of the value of the delivered good, in most cases. That is how much a developing economy depends on transport infrastructure. Aside its influences on industrial and economic development, advances in transportation have played a vital role in globalization which enhances exchange and adoption of cutting edge ideas which has helped shape our world today.

Amid these positive outcomes however, the dramatic rise in motorized transport and its nearly absolute dependency has brought with it a range of problems; accidents, difficulties for pedestrians, high carbon footprints, peak-hour crowding on public transport, off-peak inadequacies of public transport, parking difficulties, high traffic movement, etc.

2.1.High traffic movement

The increasing levels of car use as stated earlier, poses salient threats to human existence. Where more and more vehicles are being introduced to the road network too frequently, higher traffic movement is bound to be observed along that road network. High

traffic movement on the other hand increases the rate of congestion on the network; this occurs because as traffic volume increases, a point would be reached where there will be insufficient capacity (roadway capacity) to meet the teaming traffic demand. Vehicle congestion is the delay imposed on one vehicle by another vehicle on the same road network; delaying freight movement, frustrating passengers, and clogging streets with stationary traffic (Tolley and Burton, 1995). The problems associated with traffic congestion include unpredictable journey times, unnecessary traffic delays, localized noise and air pollution. Inasmuch as solutions are being thought out every now and then, there seems to be no optimum solution to this global challenge.

Thomson (1967) developed a linear relationship between average speed and total traffic flow; the relationship was negative-linear, such that as average speed increased, car equivalents per hour per foot width of carriageway (traffic on main roads) decreased. Wardrop (1968) expanded the variables to include flow, which depended on average road width, density of signal-controlled intersections, and proportion of green time; the paper concluded that flow decreased as average speed increased. Zahavi (1972) combining data across different regions of cities in the United States and United Kingdom, found that speed had an inverse relationship with flow. However, considering the levels of congestion in big cities today, these models have been found to be constant (never increasing or decreasing) as the values of the independent variable increased; the models find relevance when traffic is light, and not for traffic approaching a gridlock (Geroliminis and Daganzo, 2007). Raheem et al. (2015) studied the causes, effects, and possible solution to traffic congestion on a road in Oyo state, and was of the opinion that pavement defects, lack of parking bays, and shops encroaching into the roadway were the leading causes of congestion. The study went ahead to recommend several highway improvement schemes.

However, in the year 2000, 75 largest United States metropolitan areas experienced an estimated 3.6 billion vehicle-hours of delay, resulting in 5.7 billion gallons of wasted fuel, and loss in productivity valued at 67.5 billion USD (Texas Transportation Institute, 2005). In the same vein, between 1980 and 1999, there was a 76% increase in total distance covered by vehicles, and only about 1.5% increase in total length of roads in the United States (FHWA, 2004). Insomuch as there is insufficient data to conclude that the 76% increase in travelled distance was due to the 1.5% increase in roadway infrastructure, because there is an established base trend of increasing car ownership and use; it cannot be denied that increase in road length is a contributory factor. Increasing roadway infrastructure is surely not the way to go in tackling congestion because there will certainly be an overwhelming induced demand for road space as the supply increases. If Nigeria keeps building more roads for sake of increasing demand, the tremendous cost of keeping pace with population would continuously increase with a resultant increase in travel demand; this should be considered in the light of diminishing revenues, and unsustainable land use.

2.2.Increasing parking difficulties

Having established that transport has a derived demand, and no one embarks on a journey without a predefined purpose; it is safe to conclude that typically, a vehicle spends a greater proportion of its life span, parked. In urban cities, the spatial imprint of parked vehicles is significant; motorization has further caused a higher demand for parking spaces. For car drivers, the problem does not end with struggling with high traffic volumes on the course of the journey, but finding a parking space upon arrival at their destinations. Increasing parking difficulties is very closely related to congestion which is a corollary effect of increased motorization. As mentioned earlier, the overwhelming increase in motorization has further increased the number of vehicles on our roads; for sake of urbanization, each

block has become a trip attraction, hence more vehicles make their way to several locations requiring a parking space. The supply of such parking facilities, unfortunately, has become limited; vehicles are seen on the road shoulder, scrambling for parking spaces and the hapless ones continue in a circuitous cruise in a bid to find a space. This uncontrollable search for on-street parking further increases the traffic volume; in central areas of large cities (like Lagos and Abuja), such parking space induced cruising accounts for 10% of the localized traffic as drivers could spend up to 20 minutes in search of a lot (Rodrigue, 2013). In areas where on-street parking is controlled and possibly charged, these events migrate to a further location where, perhaps, parking is uncontrolled. Ogundare and Ogunbodede (2014) studied congestion and parking difficulties in Akure, and concluded that lack of off-street parking has left car drivers with only one option – on-street parking; this effectively reduces the carriageway width, introduces a chicane effect on the road, and causes terrible obstruction to traffic flow. Similarly, study carried out by Asiyanbola and Akinpelu (2012) on the subject matter but adopting Ibadan as case study, revealed that lack of parking lots was the leading cause of congestion, the next was absence of loading bays for the commercial vehicles. Furthermore, traffic congestion was found to be the leading cause of on-street parking.

2.3.Accidents

A proper definition for Road Traffic Accidents (RTA) would stress that these are random but infrequent incidences caused by interaction between road users or conflicts between road users and the roadway design elements. Suffice it to say that such definition as above would only hold true where the roadway elements are well designed, and road users are properly disciplined. The untold recklessness on Nigerian roads is nothing to be considered as stochastic, especially when considering motorcycles, and its less destructive counterpart – tricycle. These two, most frequently, have increased the rate of Killed or Seriously Injured (KSI) category of RTA; it is either they constitute problems amidst themselves or they pose threats to other road users. Nevertheless, the patronage of these means of transportation has been maintained, and this is due to the fact a large proportion of Nigerians live below the poverty line. This does not in any way exonerate car drivers as parties to the perpetration of traffic offenses which often culminates in RTA. According to the World Health Organization (WHO), RTA are the causes of 'preventable' deaths, globally; the major cause of death amongst young people aged between 15-29; more prevalent in low- and middle-income countries where rapid economic growth has been accompanied by increased motorization; and causes such economies a 3% loss in GDP (WHO, 2015).

Several countries have developed policies to help combat this problem but the peculiar problem facing developing countries like Nigeria is policy enforcement. From WHO data, Nigeria, like other countries, has established national speed limits, and national seatbelt law; however, WHO records hold that there is no adaptation of the national speed limit at a local level, and no applicability of seatbelt law to all occupants in Nigeria (WHO, 2013). Asiyanbola and Akinpelu (2012) observed that RTA were the 2nd highest effect of on-street parking; sampling views of commuters, operators, and government officials. Between 2006 and 2013, FRSC recorded 41,118 KSI RTA; 74% of the total accidents recorded resulted in deaths (Ukoji, 2014). 7 in 10 accidents resulting in fatalities go to show that the causes of accidents on Nigerian roads are intense. Ukoji (2014) went further to establish that cars and buses are most commonly involved in these RTA. Imo, Jigawa, Benue, Niger, Edo, Gombe, Borno, Ondo, Enugu, Kano, Kaduna, Rivers, Zamfara, Kogi, Katsina, Kebbi, Adamawa, and Yobe states had the highest severity indices of fatal RTA (6.00 – 8.99%); while Ebonyi and Lagos states had the lowest indices (2.4% and 2.5% respectively). Further establishing trends,

it was observed that Mondays had higher RTA, while Thursdays had the least; also, June had the least RTA, while December had the highest.

2.4.Public transport issues

Periods of congestion, in most cases, occupy a small proportion of the day but a high proportion of travel demand arises at such critical periods. Anecdotal evidences suggests that traffic congestion is at its peak at 'peak' times; and such peak times have been found to be between the hours of 7-9am (morning peak) and 4-7pm (evening peak). However, traffic models consider a phenomenon known as peak within peak; i.e. the fraction of time when traffic volume is highest with the established peak times. In urban cities, there is an unarguable demand for transport in the morning and evening hours because of trade and business appointments. It is also an obvious fact that majority of Nigerians rely on public transport regardless of inadequacies in operations. Public transport provision is either handled by the public sector, and considered as a public good, to be provided in the interest of the masses, primarily to forestall social exclusion and its consequent effects; or run by the private sector as a profit making venture (primarily), and characterized by profit scheming.

In Nigeria, provision of public transport is almost an exclusive reserve of the 'unorganized' private sector; the advanced level of profit scheming is evidenced by a high level of bus provision to cater for the morning and evening peak, when there would obviously be more passengers. Two issues arise here, overcrowding of buses due to the rush to meet up with appointments, and the introduction of more vehicles to the road network at these dreaded times. However, at off-peak times, when traffic volumes are low, most operators reduce or cut off services because such times are considered as uneconomical or less profit generating. Assuming the services are cut off, people who have engagements during off-peak times are left with the option of purchasing private vehicles (of course as a 'do-or-die' affair), or forfeiting the gains of such engagements.

The adequacy and accessibility of public transport is therefore central to considerations of social inclusion which is a major societal concern because social exclusion is key to development of ghettos and associated social vices. On the flipside, however, the uncoordinated nature of public transport provision strains traffic flow. Another consideration is that bus drivers are the most lawless and unethical drivers on Nigerian roads; unethical driving surely tells on the rate of RTA.

2.5.Difficulties for pedestrians

Pedestrians are considered as the most vulnerable during highway designs, and planning of various transport infrastructure; they are most at risk of RTA. Where proper procedures are followed, a new roadway should not be opened to traffic without a road safety audit; road safety audit is carried out by transport planners alongside other allied professionals to ensures that the needs of every class of road user is met. However, in Nigeria this is rarely done, hence public roads are commissioned without considering the safety of the most vulnerable – pedestrians. Designing for pedestrians requires great tact because their mean of transportation is non-motorized, having no safety shields to absorb impacts, if the unfortunate happens. Many road users do not even understand what zebra crossings mean; many roads do not have provision for pedestrian sidewalk. In most cases, where sidewalks are provided, pedestrians are restricted in movement, and are taken off the direct route between their origins and destinations. This was not the case when our roads functioned as 'shared spaces', where there exists no psychological rule of pedestrians giving way to motorized modes. Increased motorization is making it increasingly difficult for pedestrians to cross roads even when they 'look left, look right, and look left again'. Unspecified and

unenforced speed limits on Nigerian roads worsens the problem; how can a highway which is basically for mobility possess a high accessibility function too? And why should a local street possess a mobility function as evidenced by relatively high operating speeds? This is a common issue in most urban cities in Nigeria, and this is chiefly caused by lack of adequate town planning.

A road is constructed either for its accessibility or mobility function, and sometimes to satisfy both (on well defined grounds). In the actual sense, an expressway should not have frequent access roads and developments which could become trip attractions; it should primarily achieve mobility, and at relatively higher speeds. A Street, on the other hand, should offer more accessibility having lower speeds thereby allowing more pedestrian movements; this is the idea behind the promotion of liveable streets in the developed countries. An arterial road, to an extent, offers mobility alongside accessibility, but its accessibility function is further reduced compared to the street. Having a pedestrian bridge along Oshodi/Apapa EXPRESSWAY, with the mentality of pedestrians and vehicle drivers is not just the solution, and would face problems of enforceability as is the case now. It should be considered that pedestrians require a convenient route that is almost a direct and shortest possible route. Even though it might be difficult to retrofit better solutions, this should at least be borne in mind during the planning and design of new roads. According to Morris and Zarian (1962), pedestrian traffic is far more fluid and adaptive; Buchanan (1963) holds the opinion that the freedom with which a person can walk about and look around is a very useful guide to the civilized quality of an urban area. Atubi (2013) stated that pedestrian bridges are neglected because of poor positioning, lack of maintenance, they are very high with dangerous steps, lack of ramp access for wheelchairs, and poor construction (there have been cases where pedestrians fall off the bridges). Also, pedestrians are the primary receptors of the elements of environmental pollution. The world is clamouring for sustainable transportation but the unbridled motorization is proving prohibitive to efforts being made to increase the modal share of active mobility.

2.6.Environment impact

Transportation has been identified as the largest contributor to global warming through high carbon dioxide emissions occasioned by high dependence on fossil fuels. The issue of the environmental impact of transport systems is paradoxical in the sense that transport remains key to industrialization, economic growth, achieving social inclusion, but on the flipside, achieving these positive gains means continuously increasing the carbon footprint of transport systems. Apart from its direct impacts in terms of noise pollution and the release of carbon dioxide, transportation systems are associated with incomplete combustion in the internal combustion engine which releases particulate matter to the atmosphere. Inhalation of such particulate matter leads to cardiovascular and respiratory diseases.

The increasing demand for transport infrastructure has led many governments to constructing new roads. These roads, considering convenience in road alignment, could require felling of trees, reclaiming of water bodies, and destruction of the natural habitat of many plants and animal species. Transportation is greatly influencing biodiversity. Pavement surfacing, and indeed road construction processes have reduced the permeability of soils, and increased run-off rates, so much so that the risk of flooding is on the increase. There is a continuous rise in the destruction of urban space; reduction in the quality of urban life by creating physical barriers, increasing noise levels, and reducing the aesthetic features of our natural environment.

Transportation accounts for almost half of all world oil consumption. Transport systems require so much energy; doubling the travel speed of vehicles, requires eight times the power, and this requires even more fuel, this has become a concern to transport planning professionals because we live in a world where faster and powerful cars are used to depict affluence. It is projected that by 2050, there will be a 31% increase in total vehicular travel worldwide, taking a base value of 32 trillion passenger-km from the year 2000; high speed modes and car travel would account for about 80% of this increase (Schafer and Victor, 2000). This means there will be a higher dependency on oil which is a finite natural resource controlled by a small number of often politically-unstable nations. Most of these countries, like Nigeria, have their economies almost solely dependent on oil, ignorant of the problem of 'peak oil' when production of oil heads into decline due to depletion. Gujba et al. (2013) demonstrated that if the increase in motorization in Nigeria is maintained, the total fuel cost for the transport sector alone would triple, from 3.4 billion USD in 2003 to about 9.7 billion USD in 2030. It further stated that the environment impacts would increase by 16%.

3. TRANSPORT POLICY

Development of transport policy is the only way governments express the approach and underlying principles they are to adopt in fulfilling their responsibilities in the transport sector. In most economies, even the most laissez-faire markets, the transport sector remain the most regulated and greatly subsidized. Considering the economic benefits accruing from efficient transport infrastructure, the high level of interests from governments should not be surprising. In light of the roles of transportation, negative and positive influences associated with it, there are three main reasons for government intervention in the transport sector.

Firstly, the issue of transport market failure; this occurs when the transport market is unable to regulate itself to produce an efficient allocation of scarce resources. Failure of the transport market could be either on the demand side or the supply side of the market. Economic principles suggest a balance in the forces of demand and supply. When the demand for transport facilities outweighs the supply, inefficiencies like traffic congestion arises; such inefficiencies are not without a cost. Government being the major regulator in the transport sector, in such cases, would have to intervene by developing necessary policies to tackle such issues. On the other hand, when the supply of transport facilities outweighs the demand, cases like underutilized highways and epileptic patronage of public transport facilities are observed. The general outcome of either sides of market failure is undesirable from economic and societal perspectives, and requires government intervention.

Secondly, the issue of equity; in a society where there is an obvious difference in two extremes of the societal class, equity is a major issue. This is one of the underlying causes of several problems that have befallen Nigeria. Where people perceive they do not have equal opportunities because of location, several vices naturally spring up in their minds. Efficient transportation, cost-wise, is the key to ensuring every citizen has access to transportation, at least, as a participative requirement. This would help keep everyone in the positive realm.

Lastly, revenue generation; although it has been stated earlier that provision of transport infrastructure by the public sector is primarily in the public interest, there should naturally be a return on investment. Transport services and complementary goods can serve as a source of revenue generation for government. Through proper policy instruments, lots of revenue could be generated from transport service delivery. Similarly, government generates revenue in form of vehicle excise duty, distribution of petroleum products consumed mainly by motorized engines, etc.

Excerpts from the 2010 National Transport Policy (NTP) draft, superseding the NTP document of 1993, explains that the NTP provides guidelines for planning, development, co-

ordination, management, supervision, and regulation of the transport sector. It would also explain government's decisions and actions in the sector by espousing the various transport strategies and plans; identify existing gaps and how to address them; show how actions in the different modes ply in pursuit of common goals; provide the basis for a monitoring system; and ensure consistency in the application of policy principles across all modes and in pursuit of different objectives (FMoT, 2010).

There are several policy instruments available to the government, some of which were captured in the NTP; most effective of all being legislation, financial consideration, and direct management instruments. Traditional policy development requires three stages; identification of problem, identification of possible solutions, and political will. Unfortunately, legislative processes in Nigeria which represents the last stage of policy development (political will) are so bureaucratic that the problems are left to linger so much so that they appear sane. The idea behind financial consideration as a policy instrument is to give room for proper evaluation of the government's financial capability to handle imminent problems in the sector; where it is identified that the best solution is cost intensive, several sources of revenue could be harnessed. Demand management instruments, in most cases, appear to be the most cost-effective policy instrument; it includes campaigns to bring about behavioural changes, e.g. information provision or tools that prioritize one mode or group of road users ahead of others, such that an effective increase in the modal share of sustainable transport is achieved.

In the light of striding economic recession, it is necessary to consider how much transport infrastructural provision costs, and justifications for public sector investment in the road subsector. One of the government policy objectives in the road subsector as captured in the NTP is to develop new sources of revenue to close the resource gap. At this point, it is imperative to mention that between 1998 and 2008, ₦300 billion was required to bring trunk A roads to a fairly good condition. After the recovery, an average of ₦24 billion was required each year for subsequent maintenance, and ₦32 billion per year for road rehabilitation. Further neglect was speculated to plunge the country into loss of network value to the tune of ₦80 billion per year, and additional operating cost of ₦53 billion per year (FMoT, 2010).

A snippet of the enormous financial burden the road subsector imposes on the government is worrisome. Now, the question, how can these monies be raised? The obvious source is budgetary allocation. However, private sector funding through investment and Road User Charging (RUC) are avenues yet to be exploited. While every other revenue generating scheme could be exploited independently by government will, the role of the public sector can only be felt on the grounds of partnership; the idea here would not be to shift the entire burden to the private sector because transport infrastructure is greatly subsidized by government for sake of its social service function. If the responsibility is shifted to the private sector, a huge chunk of an average individual's income would be taken up by transport infrastructure and services.

There are benefits in engaging the private sector in the operation of transport services; in a fairly competitive market, private ventures have more focused aims. Technical efficiency (producing maximum outputs from minimum inputs) and allocative efficiency (producing outputs most closely meeting market demands) are more likely to be achieved by a private management responsible and accountable for achieving stable and measurable commercial objectives, considering the needs of consumers (commuters). Conversely, the public sector is characterized by x-inefficiencies. As infrastructure provision represents a very large financial investment, it can be beneficial for the public sector to employ the idea of risk transfer; having the private sector contends with several risks through contractual obligations. Avoiding the profit-scheming nature of the private sector, government could adopt the

tendering or franchising approach; thereby empowering government to set transport strategies and regulations on safety, fares, and environmental impacts while the private sector implements. Public Private Partnerships (PPP) may not bring all the efficiencies of an entirely free market solution but can be used to strike a balance between a desire for efficiency and the achievement of more socially orientated objectives.

4. ECONOMIC INSTRUMENTS

Having considered the various transport problems, and several policy instruments available to the government to tackle these issues, the enormous cost of providing and maintaining transport infrastructure was reflected on; economic policy instruments were acknowledged as one of the best suited solutions. Saying that the major reason for the dilapidated state of the roadway infrastructure in Nigeria is insufficient funding, would not be far from the truth.

Economic instruments make use of market forces, i.e. the price mechanism, to influence transport demand and supply in order to achieve policy objectives. These can be used to target specific objectives relating to modal share, emission reduction, road safety, etc but they can also be used to recover the costs of providing transport infrastructure or to generate additional revenue. The two main ways economic instruments can work in the transport market are; charges/taxes, and subsidies. Technically, charges/taxes are employed where economic principles are to be adopted in solving a market failure or to encourage a particular mode over the others; this could be achieved by imposing taxes on the modes to be discouraged. On the other hand, subsidies are financial benefits given by the government either as direct payment or as tax reduction, to support or encourage particular modes, services, etc. For two competing modes, one could be heavily taxed, and revenue generated is used to subsidize the other; cross-subsidization. Almost every road user in Nigerian today, is aware of the concept of fuel subsidy which was a controversial issue in early 2012; though that is a typical application of the idea of subsidization in the transport sector, Nigerian did not accept the idea of the removal of fuel subsidy. In Nigeria today, there is no concerted effort to promote a modal shift to sustainable transportation, though such ideas were covered in the NTP; hence, there is no real subsidy to promote sustainable transport. However, charges/taxes could be employed to reduce the patronage for single-occupant motorized transport; thereby encouraging public transport, car sharing, and active mobility.

Charges and taxes, in details, are measures to increase the price of transportation and are levied as a means of reducing transport demand in general or discouraging the use of certain modes. Taxes or charges can apply to the purchase or use of vehicles, and fuels used to power vehicles, and to the use of infrastructure. In adopting the charge/tax policy tool, price differentiations can apply according to type of engine, type of fuel, transportation mode, time of day, type of road, etc. Charges are normally linked directly to the provision of services, e.g. road use charge, parking charge, etc; taxes, on the other hand, do not have this direct link, and are a source of funding for the general budget.

In discussing charges and taxes, issues about transport costs are raised, because these charges/taxes are based on transport costs. Transport costs are costs associated with the acquisition and use of a particular transport mode; these can be considered as running costs or standing costs. Running costs are the costs of using a particular mode (car, for instance); including petrol, oil, tyres, routing servicing, repairs, etc. Standing costs represent the basic costs of owning a car for use on public roads. For a long term projection, personal car ownership and use, over the years, has appeared to be cheaper than public transport use; considering both standing and running costs. However, when there are charges incurred as a

result of private car use, motorists are forced to notice the marginal cost involved in their choice mode.

In Nigeria, costs and methods of applying charges to car trip making include; Acquisition costs (purchase price including VAT, and vehicle registration), Periodic costs (vehicle license, certificate of road worthiness, ministry of transport vehicle test certificate, insurance, and maintenance including VAT on servicing, tyres, and parts), Fixed costs per trip (none, except trips to the airport), and Variable costs per trip (fuel costs). Conversely, payments for trips made on public transport are usually made at the time of undertaking the trip, and are charged at a rate that is related to the average operating cost. The cost of operation would have to cover labour cost (which makes up a greater percentage), fuel, vehicle cost, and bus-stop charges. In general, the cost of car trips is calculated using the marginal costs and the cost of public transport is calculated using the average cost.

Studying transport costs in relation to only standing and running costs does not capture all factors required to develop good transport economic instruments. Transport costs are categorized as internal and external costs. Internal costs arise from building and using transport infrastructure and are the basis for all decisions in the transport market. They largely determine both individual mobility demand and the economic feasibility of infrastructure projects or service provision. On the other hand, external costs are not part of the supply or demand decisions in the transport market. They are external to these decisions; they stem from the wider effects of transportation like congestion, accidents, emissions, noise pollution, and aesthetic factors. The issue here is that these external costs are not borne by the road user concerned but the other road users, who probably are not connected to these costs. The resultant effect of this is that the running cost of personal car use appears so cheap that almost every one can afford it. In analyzing transport costs, every road user should bear the cost of both internal and external costs; by so doing, people get to actually consider if they really can afford private car use. The seemingly uncontrollable increase in motorization that has become an issue today is a result of external costs not being reflected in the market pricing of personal car use.

4.1.Taxation Methods

The potential for taxation to influence trip-making decisions lies in the way that it can change costs and therefore the relative attractiveness of various modes. The most common taxation methods, which are applicable in Nigeria, are vehicle license and other periodic taxes, and fuel tax.

A large proportion of infrastructure costs are not dependent on usage; for a new highway that has been constructed, usage does not influence the cost of construction. Therefore, costs of transport infrastructure are fixed; and periodic vehicle taxation is a way of ‘recovering’ the cost of infrastructure investment, though in the actual sense, it does not offset the cost. Charging according to vehicle type reflects the fact that initial road design is dependent on the destructive effect of the axle load of various types of vehicle; axle loading being one of the major causes of flexible pavement failure in Nigeria (Amanamba, 2016). Charging according to vehicle price attempts to improve social equity; there would be a ‘balance’ if those buying more expensive cars pay a higher periodic vehicle tax, while those driving less expensive cars pay much less. Charging according to emission or noise levels attempts to apply the ‘polluter pays’ principle where the charge to the road user more accurately reflects the external costs. The issue with vehicle tax, no matter how it is charged, is that when a person is determined to own a vehicle, there is no incentive to limit its use in the most efficient manner.

Fuel tax, unlike vehicle tax, provides an incentive to limit the use of a vehicle or to use it in the most efficient manner after purchase. The consumption of fuel by motorized modes is strongly correlated to the negative externalities imposed on other road users; fuel tax is therefore a much better economic tool to employ charging on a 'user pays' basis. While drivers may feel that an increase in the pump price of petrol may not really affect their travel behaviour, on the long run, it is realized that there is a great price elasticity of demand for petrol; i.e. charges in petrol price would have a huge effect on quantity demanded. This was exemplified in the first quarter of the year 2016, when prices of petroleum products in Nigeria increased gradually; form N86.50 up to about N250 in some states. Initially, the effect was not really felt, but along the line, as it approached N200, fewer cars were observed on the roads because people started preferring to travel by public transport. The marginal cost of each trip to be made by private cars increased greatly but the average cost of travel by public transport increased slightly. Fuel tax is an easy economic tool to implement as this can be collected from the major oil marketers. It has a long and reliable track record in restraining growth in fuel demand in countries that set taxes sufficiently high. Hence, consumers and suppliers of transport services change their behaviour, fleet profile, trip planning; there is also reduction in distances travelled, increased use of public transport, reduction in traffic congestion, and other externalities (Sterner, 2007).

4.2.Road User Charging

The idea of charging road users directly for the use of congested road space has been a contentious one, in many countries. Road User Charging (RUC), e.g. toll roads and congestion charging schemes offer the potential to reduce congestion and some of the other problems associated with excessive traffic by charging people more directly for their use of the roads. As stated earlier, such measures are adopted to either solve the issue of market failure, or to generate funds independent of that provided by the budget; this adopts the 'polluter pays' principle. RUC measures are basically of two types; congestion charging/road pricing, and tolling. The former refers to a charge applied to the use of an existing road to cause a behavioural change, while the latter refers to a charge applied to the use of a newly constructed road in other to recoup the cost of construction. Road users find tolling more sensible because it is convenient for them to judge transport costs from standing cost (in this case, internal costs); however, congestion charges appear ridiculous because they consider that the road network was free at some point, and they fail to appreciate the impact of externalities generated by them. A simple performance indicator for congestion charging is the travel speed; if the speed is above a reference level, it is assumed that the congestion charge is over-compensating in reducing traffic so the charges are reduced, but if the speed is lower, it is assumed that the congestion is too high so the charge is increased (IET, 2010). A well designed RUC scheme would be such that the traveller bears the full economic, social, and environmental costs of their choice mode; this way, the Cost-Benefit Analysis (CBA) of individual drivers aligns with the wider Social Cost-Benefit Analysis (SCBA).

There are several ways of administering road pricing, and technologies adopted to collect these monies. There is an area charge (for entering, and driving within a cordoned area); point charge (for drivers passing a cordon point); and distance-based charge (paid according to how far drivers travel within a charged area). The technologies adopted could be very complex, and reflects in the charge; the more complex the technology and enforcement measure, the larger the proportion of the scheme revenue that will be absorbed by its operating costs. In planning for RUC schemes, it is necessary to design an adequate enforcement measure, so that the average Nigerian does not boycott the charge. For sake of poorly designed unified personal data collection system in Nigeria, there is no comprehensive

database unlike the developed nations; this makes it difficult to adopt common technologies used in developed cities of the world. Amongst all possible technologies used for enforcement of RUC, including Automatic Number Plate Recognition (ANPR), Electronic tagging of vehicles, Dedicated Short-Range Communication (DSRC) systems, Global navigation satellite systems, manual collection/enforcement, coin machines, , and paper licenses; the best suited for the current state of Nigeria's technological orientation are manual collection, and DSRC systems. The charge could be collected manually at the cordon points; this would require constructing a collection booth, and employing skilled personnel. Alternatively, the DSRC system could be employed. It requires beacons and tags; the beacon is mounted on roadside equipment communicating via microwave signals with an in-vehicle electronic tag/smart card. The electronic tag/smart card could be recharged (funded with cash) at designated points like banks; the beacon is designed such that a stipulated charge is taken off the electronic tag/smart card whenever a vehicle crosses the cordon point. The cordon point would also require a booth, situated at a specific distance from the beacon upstream; the essence of this booth is to situate enforcement officers or for housing ANPR cameras. Using ANPR cameras would mean a tandem arrangement with the motor licensing offices; hence, for defaulting vehicles whose number plates have been captured, their records would be flagged up and upon renewal of vehicle license and they would be surcharged. A barrier could be placed at these booths, such that it would be automatically released when payment is made at the booths; but this would initiate more congestion just like the police roadblocks.

In summary, the system of communication using the DSRC system will be such that; a recharged tag/smart card would send money to the beacon at the roadside; the beacon sends signals to the ANPR camera stationed at about 25m away from the beacon; the ANPR camera monitors all crossing vehicles; a computer system is used to match payments from the beacon, and daily traffic count from the ANPR using time differentials since the distance is known and a speed limit could be maintained within that distance; hence, defaulters are filtered, and forwarded to the licensing office.

4.3.Parking Management

Literature in parking suggests that there are only two places where vehicles can be found; they are either on-street or off-street. If they are on-street, they can be considered to be parked, searching for parking, or in transit. If they are off-street, they are parked, at least most of them. Estimates show that cars spend more than 95% of their lives parked (Rye and Koglin, 2014). There are four main types of parking according to TRL (2010); they are: on-street, public off-street, private non-residential off-street and private residential parking.

On-street parking, as the name implies, is a parking space on the public road. Private off-street parking is a car parking space off the public road, where people can park their car so long as they obey the rules of the car park. Private non-residential off-street parking describes parking provision made outside the public road where people associated with a particular building or land use can park their cars. Lastly, private residential parking is an off-street parking provided for residents of a building. While all forms of parking provision impacts on travel demand, of particular interest is on-street parking because it bothers on safety and throughput. The availability and cost of a parking space is an important determinant of whether people would choose to drive to a particular destination, or use public transport. Where it is perceived that the available spaces at a choice destination would be highly contestable or highly priced; a lot of people would choose public transport, which would offer a more direct and convenient travel pattern. Parking, in the actual sense, is not

really free at locations where it is perceived to be free; it is either the driver is charged for occupying that space, or other road users bear the cost in form of externalities.

Parking pricing is particularly useful where facilities are costly or where land is valuable; it is also important where government wishes to generate more revenue, and to encourage use of alternative modes to reduce the externalities associated with on-street parking. The easiest way to collect such charge is by adopting the 'pay as you go' measures; where drivers entering a Controlled Parking Zone (CPZ) pay to attendants or electronic machines around the area, and display their receipts on their dashboards.

Inasmuch as there may be cost implications, restricted kerb parking (on-street parking) should be designed to cover the following: parking restrictions around the mouths of junctions to ensure visibility for drivers, and safety for pedestrians; peak hour restrictions on roads with higher congestion tendencies, to enhance traffic flow; restriction on dual lane parking on narrow roads; enforcement of short term parking (timed parking) so that the available spaces would be better distributed; and restrictions at certain locations to provide loading and unloading spaces for commercial vehicles (Litman, 2010).

Parking charges are very much related to road pricing because both could be designed as measures to control personal car use. It has been established earlier that in most big cities, a great proportion of drivers continue on a circuitous trip on the roads, in search of parking spaces, thereby increasing traffic flow; hence, congestion. Therefore, a comprehensive scheme geared towards trapping the positive effects of RUC, should involve parking management measures.

In a typical big city in Nigeria, on-street parking demand is high, and would continue to increase if measures like RUC are not put in place to curb motorization. Revenue generation along this line would surely yield positive effects in curbing some transport externalities. It could be designed such that locations with high trip generations are charged at all hours (excluding dark hours), considering the fact that demand at such locations would be higher. In the Nigeria of today, the only possible means of enforcement is by recruiting parking wardens, who could be ad hoc staff of the ministry of transport or allied parastatals.

The COST 342 project of the European Union recommends the following for developing parking policies (EU TCoT, 2005):

a. Parking management should be recognized as a demand management tool.
b. There should be a national maximum parking standard expressed as guidance for new developments.
c. National level legislation is needed to set a framework for parking charges and fines, and to put liability for any fine with the owner of the vehicle.
d. States and local governments should be provided the powers to enforce parking regulations if they wish (or to contract out the enforcement operation), to keep the revenue generated and to follow up those who boycott the fines.
e. There should be a clear communication of the new policy; explaining in details the plans being set out.
f. There should be adequate monitoring of the scheme to note parking standards, effects on travel patterns and economic activity.

5. EFFECTIVENESS

There is no gainsaying the fact that the two economic instruments discussed above (RUC, and parking management) are structured measures for achieving a higher modal share for alternative modes. Rodrigue (2013) suggested several measures of alleviating congestion in automobile-dependent cities; some of which are: measures aimed at imposing charges on specific segments of the road network, these charges should be on the worst networks and

could vary according to congestion levels; and removal of free parking spaces to dissuade cruising on the traffic-bearing lanes in search of free parking. Cost is a very sensitive issue for humans of all social class; hence, any measure geared towards internalization of transport externalities is surely going to initiate a behavioural change. Motorization level has been on a continuous increase in the world because people have found it easy to own personal vehicles; the real costs (external costs) are not built into the long term cost of personal car use. In several countries of the world, where transport externalities have become very daring, RUC and parking management schemes have been developed. In Beijing, congestion pricing was recommended by the World Bank in 2010 to help fight the issues of air pollution and congestion Xinhuanet (2010). Following Smeed's Report in 1964 (Tempest, 2006), and the fact that London city had approached peak traffic flow considering available road networks which can only be increased marginally for sake of vast development; RUC schemes were developed to combat congestion within the city of London amid oppositions at the planning stage. Similar schemes exist in several big cities of the world: New York, San Francisco, Dubai, Brazil, Sweden, Italy, Austria, Germany, Australia, Singapore, Hong Kong, etc; the endless list does not preclude the fact that in some of these cities, pressure groups drove the scheme into oblivion. However, a number of case studies have been selected from different continents to illustrate the breadth of system types, technologies deployed, and effectiveness.

RUC scheme in London: A study was commissioned on congestion charging options for London in 1993 by the Government Office for London and Department for Transport, it was concluded that existing technology was not mature enough to support a fully automated RUC scheme in London. In 1998, a new feasibility study proposed to start with a small zone in the centre of London, using ANPR cameras; in 2003, the system went live. The scheme was designed such that vehicles entering the specified area known as London Congestion Charge Zone (CCZ) are charged a daily rate to gain access into the area between 07:00 and 18:00 hours, Monday – Friday; since February, 2003, the fare has gradually increased from the initial £5 to £11.50, with a non-payment fine of between £65 and £195 (TfL, 2015). Drivers intending to travel across the cordon area are expect to prepay at designated shops, kiosks, online, by telephone, or by SMS using mobile phones. The scheme is enforced by 340 ANPR cameras installed at both entry and exit points of the cordoned area. Since its introduction, there has been a 21% decrease in traffic, and 6% increase in bus patronage during the charged hours (IET, 2010). Initial cost of setting up the scheme was estimated to be £161.7million (approx. ₦71billion); ten years into the scheme, Transport for London (TfL) recorded gross revenue of about £2.6billion (approx. ₦1.5Trillion), of which reinvestment in the transport sector was valued at £1.2billion (46%) (TfL, 2014).

RUC scheme in Singapore: Singapore, just like London city, has a challenge of traffic growth exceeding road network supply. Singapore developed a congestion pricing scheme; Area Licensing Scheme (ALS) in 1975, to tackle the problem of congestion in the central business area. The scheme covered an area of about 3.2 square km in the central business area (known as 'Restricted Zone' – RZ) between 7:30 and 9:30am. The licences to cross the cordoned area were purchased at retail outlets, banks, stores, service stations, and roadside booths. Violations were addressed by roadside enforcers, with heavy fines set to discourage violations. The scheme was designed comprehensively to include parking management. The pricing time was extended, and the charged reviewed upwards until it was redesigned in 1998. After extensive field tests, Electronic Road Pricing (ERP) was introduced to the ALS; the charges now varied by time of day (between 7:00 and 19:00), location, and type of vehicle. The ERP scheme covered more locations, and was effective during weekdays; the

price varied between 0USD to 4.00USD per crossing at a charge point. The system requires an in-vehicle transponder fitted on the dashboard with a smart card; the smart cards are issued by a consortium of banks and can be recharged at various points. Using a DSRC system, the appropriate charges are deducted from the smart cards. Vehicles with no in-vehicle transponder face fines of 50USD, and those with insufficient money on the smart cards face administrative fines of 6USD (FHWA, 2013). The scheme has achieved positive results right from when ALS was in existence; current statistics shows that the ERP has achieved a reduction in traffic flow by 24% from 271,000 veh/day to 206,00veh/day, and average speeds within the RZ increased from 30-35kph to 40-45kph. Capital cost of the ERP was estimated to be 110million USD (approx. ₦35billion), including purchase and installation of 1.1million in-vehicle transponders; as at 2005, the annual revenue was estimated at 100million USD (approx. ₦32billion) (FHWA, 2013).

RUC scheme in Stockholm: in Stockholm, efforts were made to establish a RUC scheme in 1990, but issues with change in government stalled it. In 2004, a trial scheme was set up, and allowed to run for 9months, after which a referendum was held to get public reactions (IET, 2010). A 32square km area was designated as the priced zone; the charges were effective weekdays from 6:30 to 18:30, and the charged varied according to traffic flow (peak, shoulder, and off-peak periods) with the highest charge being 2.67USD. Fines for non-payment were set at 10USD for first reminder, and 70USD for the second reminder. The technology adopted is similar to that of Singapore; ERP system having in-vehicle transponders and overhead gantries. Data as at 2007 shows an 18% reduction in traffic volume. From a capital investment cost of 410million USD (approx. ₦130billion), and annual operating costs of 30million USD (approx. ₦10billion), the revenue from charges are estimated at 100million USD (approx. ₦32billion) (FHWA, 2013).

RUC scheme in Edinburgh: after several traffic management measures, more and more delays were still observed in Scotland's capital city. The impacts of traffic congestion had been estimated to cost the local economy about £20billion per annum, inasmuch as only 54% of Edinburgh residents have access to cars (Black, 2002). The plan for a congestion charging scheme was such that the city centre would be cordoned between 7:00 and 19:00, during weekdays. The technology used in the similar scheme in London was to be adopted, but fines would be issued to defaulters using the Driver and Vehicle Licensing Agency database (Rutter, 2002). An all-day scheme was projected to generate £900million (approx. ₦396billion) (Curtis, 2002a) from capital expenditure of £8million (approx. ₦3.5billion) (Curtis, 2002b). Upon several public consultations, the scheme failed to gain public acceptance, and the plan was aborted. The failure was attributed to lots of issues, including: lack of consistent political will; a distrust of the motives of the government; absence of a powerful champion for the scheme; significant stakeholder opposition; a commitment to a popular referendum; and a difference in perception between transport professionals and the stakeholders (Allen et al., 2006).

In summary, properly designed RUC schemes in several cities of the world has achieved a myriad positive gains in both reduction of the externalities of transportation by ensuring these externalities were adequately internalized by the road users (evidenced by the amount charged); and revenue generation running into billions of naira. In most cases, however, parking management measures were initiated to ensure that the problem of cruising in search of on-street parking does not jeopardize the estimated effect of the RUC scheme. Though there are lots of positive gains, some cities have experienced failed schemes owing to various factors; suggesting the issue of acceptability.

6. ACCEPTABILITY

We live in a democratic setting, where the masses have a say in the policies that guide their activities. In developing any policy, it is necessary to seek public opinions through public consultations, referendum, etc; where this is not done, agitations from pressure groups could nullify such policies. In 2012, the Goodluck Jonathan-led administration decided to enforce a total removal of fuel subsidy, without extensive interactions with stakeholders and the public; though this was a right step in the right direction as it would have had an impact on car ownership and dependence, the reasons and aims were not adequately communicated to the common man. In practice, public acceptability is a necessary condition for RUC to be possible and successful (PATS, 2001); there is no point enacting a law that people do not feel comfortable obeying.

In Singapore, government carried out an assessment and education program for one year, and responded to public reactions by making adjustments to the charges prior to the implementation of the RUC; since then, the charges have been on slow and steady increase. Lots of programs were introduced before and after the implementation to further increase acceptability levels; there were expansions in the public transportation modes and services, and reduction in certain vehicle purchase and ownership taxes. Also, the government embarked on large-scale provision of modern, subsidized housing outside the central area, thereby encourage more people to move out of the congested areas; the details of the aims of the scheme is continually communicated to the people, as well as the positive gains achieved, periodically (FHWA, 2013).

In London, it took almost four decades of feasibility study, impact estimation, and public debates before the scheme finally came onboard in 2003. While these were going on, London found a political champion in new mayor in 2000, who sought support from business community, and the high proportion of people who supported public transport. However, the congestion levels in London at the time was such that the people acknowledged that a drastic measure must be taken; following a poll in 1999, 90% of residents accepted that there was too much traffic in the city, and they were concerned about the impact of high traffic flow on travel times and air pollution, 41% felt that congestion charging was the best solution to dissuade people from driving into the city centre. Also, a clear and well-composed presentation of the problem and the proposal, and effective communication via a dedicated website helped promote the scheme and its benefits (FHWA, 2013).

In Stockholm, numerous feasibility studies were carried out and RUC proposals were modified and abandoned over a twenty-year period. First, a trial scheme was initiated in 2006, and following success reports, it was made permanent in 2007; prior to the implementation of the trial scheme, 55% of residents said it was a “rather/very bad decision” to conduct such congestion-tax trial, but after its implementation, 53% of all citizens believed it was a “rather/very good decision”. Upon commissioning of the permanent RUC scheme, a referendum result had 51.3% in support, and 45.5% against the scheme. Several residents of the nearby municipalities were not in support of the scheme, and raised arguments about them being excluded in the referendum. The RUC scheme in Stockholm faced serious oppositions but public awareness was secured by bringing experts from the already flourishing London Congestion Charge scheme (FHWA, 2013).

Aside the proposed Edinburgh RUC scheme, there are lots of failed, or overly debated RUC schemes; some of the cities/countries which suffered unsuccessful RUC schemes includes: Kuala Lumpur, Hong Kong, the Netherlands, and several states in the United States (Allen et al., 2006). However, after several public consultations and awareness creation, some of these schemes were realised. The main lesson learned from the causes of failure of some of

these schemes is lack of public acceptance. According to Gray and Begg (2001), there is a great chance of large-scale, city-wide RUC scheme being delivered, if the authorities would seek the hearts and minds of key stakeholders, the media, and ultimately, the public. Considering dwindling economic situations, an economic policy instruments cannot be imposed on the masses against their will. Another issue that affects public acceptance is management of the funds to be generated from the scheme; it is always expected that the revenue generated would, at least to a large extent, be hypothecated to the road transport subsector. Lastly, all the details of the scheme must be communicated to road users in simple and clear terms; including the benefits of the scheme, and of course, a statement on how the money would be spent. It would certainly be a wrong move to give citizens the impression that the scheme is purely a revenue-generating measure. Having considered RUC schemes that have been implemented, and those that were planned, but failed to become reality for a variety of reasons, there are factors which should be put in place if a RUC scheme is to stand a chance of implementation, having maximized acceptability; these key factors include (Ison and Rye, 2005), but not limited to:

1. There should be an agreement on scheme objectives; if the residents of the congestion-laden city do not agree that there is a congestion problem that requires immediate and decisive solution, then they are not likely to agree that there is a need for a congestion charging scheme. It should be recalled that in a poll conducted in London in 1999, 90% of the residents agreed that there was way too much traffic within the city, and 41% agreed to the proposed RUC scheme.
2. There should be sufficient resources to implement the scheme; these resources should include the people and the money to be able to sell the idea to the citizens. A lot could be achieved through the media, in this 'social media' age.
3. There should be ability, and resources to improve infrastructure and services for the alternatives to car, before the scheme goes live. If it is intended that there would be a reduction in personal car use, there should be service and infrastructure enhancement for the other modes that are to gain the losses of the car. Jones (1995) found that acceptability level for RUC virtually doubled when it was expressed as the bedrock of a range of measures that improved alternative modes and provided a safer and more pleasant environment.
4. A political champion is key; in the political sphere, where everyone tries to keep their records free from every negativities, no one would want to champion a scheme that has acceptability issues. RUC schemes, like every other economic policy, require a strong-willed politician who would champion such course.
5. Ideally, the scheme should be the responsibility of one political entity only. If different levels of government or neighbouring authorities have to get involved, then reaching a consensus is likely to be impossible.
6. There should be a single agency to implement the scheme and any supporting measures like parking management. Multitudinous enforcement agencies would create a feeling that the scheme was only initiated to compensate political associates.

Acceptability can be increased by reducing charging levels or broadening the range of groups being offered exemptions or discounts (like government officials, service vehicles, and senior citizens) (Jaensirisak, 2002); however, there is a tendency of a reduced level of effectiveness. On the other hand, acceptability should not be over-emphasised to the extent that the RUC scheme would no longer be efficient or effective in achieving the intended objectives. The government could adopt various tools to design options that capture the full range of potential RUC design combinations, and the widest possible range of complementary measures, taking concerns of stakeholders into account; this could potentially

maximise acceptability, whilst not compromising the desired outcomes and effectiveness of the scheme. Rye (2006) found a relationship between effectiveness and acceptability; suggesting that if the government presents citizens with a range of properly designed RUC schemes, there is a chance of increasing acceptability of one of the options, or increased effectiveness of one. Also, with a comprehensive RUC scheme that includes complementary measures like parking management, improvement on public transport services, etc; there could be an increase in acceptability.

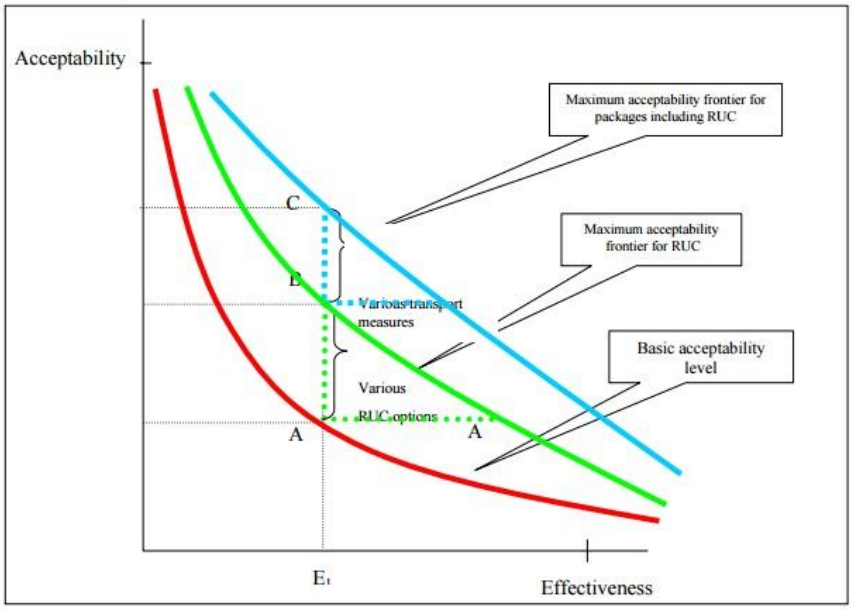


Figure 1: A schematic approach to increase acceptability and effectiveness of RUC schemes (Rye, 2006).

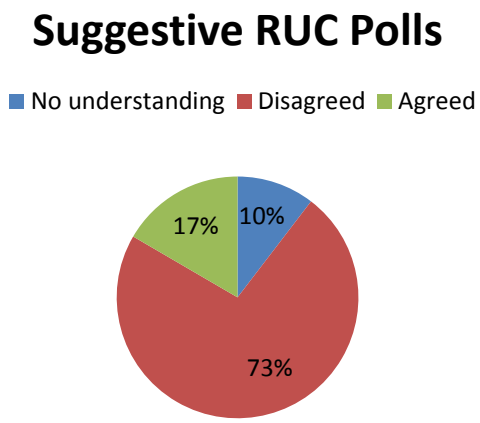
From the figure above, it could be observed that for a RUC scheme with effectiveness level 'E' and acceptability level 'A', a basic acceptability level is achieved. Where a range of RUC options are presented to the public, a higher acceptability level (moving from 'A' to 'B') could be achieved; also, these range of RUC scheme could cause an increase (moving from 'A' to 'A_1') in the effectiveness of the choice scheme. Lastly, the maximum acceptability frontier could be achieved when various complementary measures are added to the RUC scheme. It could be observed, however, that the more acceptability a scheme tries to achieve, the less its effectiveness; at most, the effectiveness level remain unchanged regardless of changes in acceptability. Rye (2006) concluded that the generating a wide range of RUC scheme options has a tendency of leading to the selection of an option that combines a high level of effectiveness with a high level of acceptability, compared with a scheme that is not the result of a wide ranging option generation exercise. Also, the design of RUC scheme with other transport measures will enhance its acceptability at a given level of effectiveness. Finally, it explained that there is a theoretical maximum level of combined effectiveness and acceptability beyond which a scheme cannot go.

6.1.Suggestive Level of Acceptance in Nigeria

In trying to relate these theories of acceptability with empirical evidence, certain research methods were adopted. Firstly, an online poll was conducted, having 1756 participants. The sex distribution of the participants was such that there were 1023 males and 733 females; the sample population was made of young people (age between 21 and 35), as this was generated from Facebook friend list. The sample population was made up of both

workers and students of higher institutions. Secondly, several interview sessions were conducted at six fuel stations; the fuel scarcity that lasted for about the first half of the year 2016, and the resultant queuing at fuel stations provided an opportunity to generate quite a reasonable representative sample to that effect. 514 persons responded to the interview questions; the sample distribution was such that there were 278 public transport operators and 236 private car owners (31 of which were government officials). The respondents' age cut across a robust age distribution, but were mainly males (83%). Both survey methods were structured to obtain the respondents' view on the issue of RUC, so as to estimate its level of acceptance.

10.4% (183) of participants of the poll did not understand the idea. 73% (1281) of the participants objected to the idea of charging road users for congestion on the roadways; and 16.6% (292) of participants consented to the scheme.



64% (329) respondents of the interview objected to the RUC scheme, while 36% (185) consented. 18% of the population objecting to the scheme expressed doubts of the money being hypothecated to the road transport subsector; but for this issue, they would have been in support. 43.2% of the overall population not only expressed disapproval of the scheme, but suggested that the revenue would not be accounted for. Furthermore, 6 out of 20 government officials that consented to the scheme suggested that more support could be achieved if more effort is seen in the area of road construction and rehabilitation.

7. CONCLUSION

It has been established here and in other literature on similar subject that there appears to be a seemingly insurmountable increase in car ownership and dependency, not only in Nigeria, but world over. Lots of factors have been attributed to this; ranging from increase in personal incomes, socio-cultural influences, to the need/effect of development. This growth in motorization is indeed costing low- and middle-income countries a reasonable portion of their finances. However, the role transportation plays in a developing country like Nigeria, cannot be overemphasized. Inasmuch as there are various positive impacts of transportation, the gains spanning across industrial and economic development, globalization, and exchange/adoption of cutting edge ideas which has helped shape our world today; the negative impacts are overwhelming. Advances in transport infrastructure, the dramatic rise in motorized transport and its nearly absolute dependency has brought with it a range of problems; accidents, difficulties for pedestrians, high carbon footprints, peak-hour crowding on public transport, off-peak inadequacies of public transport, parking difficulties, high traffic movement, etc.

In light of all these issues, several scholars are of the opinion that poor transport infrastructure is one of the major causes of congestion in developing countries; suggesting improvement in transport infrastructure in Nigeria, and providing more where necessary. Considering the economic benefits accruing from efficient transport infrastructure, the high level of interests from governments in line with construction of roads should not be surprising; especially, when seen from the perspective of unwholesome politicking. However, a fact has been established from literature that increasing roadway infrastructure increases the rate of induced demand. It is therefore wise for Nigeria to check its level of transport infrastructure provision, so we do not find ourselves in the gridlock that has befallen the streets of central London. In light of the roles of transportation, negative and positive influences associated with it, there are three main reasons for government intervention in the transport sector; these interventions could be to tackle transport market failure, equity issues, or revenue generation.

A snippet of the enormous financial burden the road subsector imposes on the government is worrisome; raising questions in the mind of enthusiast as to where the monies required to maintain the already existing roads would come from, in the face of economic recession. The NTP revealed that one of the government policy objectives in the road subsector is to develop new sources of revenue to close the resource gap. Also, there is good reason to join governments of other nations to reduce the use of personal vehicles; to make our environment safer, to make road users (especially the vulnerable ones) feel safer, to reduce congestion affecting journey times, and to generate revenue in the course of that. To achieve these, economic policy instruments were highlighted; charges and taxes have explained as tools to enable government increase the perceived cost of transportation by personal cars, thereby compelling people to embrace more sustainable means.

RUC schemes were seen as a sure way of ensuring externalities of transportation is internalized; hence road users pay directly for the negative effects of their choice modes. Review of literature showed that a well designed RUC scheme should include parking management as a similar demand management tool. Case studies of several cities that have established RUC schemes suggest that such schemes are highly effective in achieving the objectives guiding its development. Also, several works suggested that complementary improvements in the sustainable modes would foster acceptability; however, care must be taken not to press so much for acceptability to the detriment of effectiveness. High level acceptability and effectiveness seems nearly mutually exclusive. Empirical evidence suggests that a great number of Nigerians would kick against RUC schemes; some for the reason that the revenue would not be accounted for, and some others think that the returns would not be hypothecated to the source of the revenue. However, there seems to be a little higher potential for acceptability considering that some respondents were of the opinion that but for these issues and government's low level of interest in maintaining existing roads, they would have supported the development of such schemes.

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