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Curbing Gasoline Consumption through Public Transportation (PT) in Lagos State, Nigeria

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Abstract

Globally, the rapid increase in consumption of gasoline in transportation sector, arising from a car-dependent lifestyle of an increasing number of people, has been a source of concern to stakeholders and scholars in the energy sector. In particular, the rise of vehicles in Nigeria from about 150, 000 in 1983 to about 9 million in 2012, has exerted pressure on gasoline consumption. Records showed that Lagos State, the commercial and industrial hub of the country, has the highest level of motorisation, accounting for about 25 per cent of the volume of gasoline consumed in the country. The main objective of this paper was to examine the role of public transport (PT) in curbing the rising gasoline consumption in the state. Review of the literature indicated that the State Government is promoting the use of PT through the development of multi-modal PT system; energy efficiency of PT is greater than that of automobile; ridership of PT by motorists removes a large number of personal cars from the road; and the reduction in number of vehicles on the roads reduces traffic congestion. It was concluded that, all these can curb fuel consumption in the state. Finally, the paper highlighted the lessons policy makers in Lagos and other growing cities in the country can learn to promote the use of PT and curb the growing gasoline consumption in the country.

Keywords: Curbing, gasoline consumption, public transport, Lagos State and Nigeria.

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1. Introduction

Due to a number of reasons such as energy security (Martiskainen, 2007; Yergin, 2006), negative environmental impact (Monroe, 2003; Pridmore & Miola 2011; Shaheen & Lipman, 2007) and fear of oil reaching its peak (Graefe, 2009; Omer, 2009; Ting, Bin Mohammed, & Wai, 2011), stakeholders in the energy sectors have expressed concern about the rising consumption of gasoline and other energy. In particular, there is a consensus among scholars that concerted efforts should be made to curb the excessive consumption of gasoline in the transport sector (Litman, 2012a; Samuelson, 1990; Shaheen & Lipman, 2007). A number of strategies to address the growing fuel consumption has been discussed in the academic literature. These include: increasing fuel tax (Azarbaiejani, Hamedani, & Bahaloo, 2012; Kawase, 2011), improving vehicle fuel economy (Clerides & Zachariadis, 2008; Shiau, Michalek, & Hendrickson, 2009; Small & Van Dender, 2007), increasing the utilisation rate of public transportation (Hossain & Kennedy, 2008; Litman, 2011;Minett & Pearce 2011), changing people's attitude, lifestyle and behaviour (Pitts, Willenborg, & Sherrell, 1981; Ting et al., 2011), increasing parking fees (Calthrop, Proost & van Dender, 2000; Carr, 2008; Pridmore & Miola 2011), and so on. All these have been described as travel demand management (Eriksson, 2008; Schwanen & Mokhtarian, 2005) or mobility management (MM, Kyosuke & Genki, 2013).

Of all these strategies, use of public transport as a movement mode offers huge potentials to curb the increasing gasoline consumption in the transport sector in urban areas (Hossain & Kennedy, 2008; Minett & Pearce 2011). These studies have shown that traveling by public transportation, rather than by private vehicles consumes less gasoline. Therefore, transport policy-makers in developed and developing countries alike are concerned about the development of appropriate policy that would make vehicle owners to own fewer vehicles and/or drive less (Bailey, 2007; Hossain & Kennedy, 2008) to reduce fuel consumption and other external costs associated with automobile travel.

In Nigeria, the astronomical rise in vehicle population has put pressure on gasoline energy consumption. For example, Onolemenen (2013) reported that the number of vehicles in Nigeria increased from over 150, 000 in 1983 to about 9 million in 2012. This represents an increase of over 1, 600 per cent. This has led to increased gasoline consumption in the country. In particular, the demand for gasoline in Lagos State has been astronomical. For instance, Jaja (2010) estimated the fuel consumption of the 36 states in the country between 1971 and 2005 and reported that consumption in Lagos State grew from a low level of 122, 724 liters per annum in 1971 to 1,852,267 liters per annum in 2005, representing an increase of 1,409 per cent and accounting for 25 per cent of the total consumption in the country. Similarly, Lagos State Government (2013) indicated that the number of new vehicles registered in the State between 1995 and 2010 were 1,303,066. The high level of motorisation and gasoline consumption in the State reflects its huge population, which National Population Commission (NPC, 2006) estimated at 9.01 million and estimated to be 11.2 million in 2011 (United Nations Population Division, UNPD, 2011) and of course the beehive of economic and industrial activities in the State.

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Successive governments in Nigeria have been addressing the rising demand by increasing the supply of gasoline to meet up with the growing demand. For example, NNPC (2010) puts the supply of gasoline (both from local and imported sources) to the market at 4.6 billion liters in 1995; 7.9billion liters in 2000; 12.4billion liters in 2004; 8.7billion liters in 2005; 8.9 billion liters in 2007; 10.4billion liters in 2010; and 12.7 billion liters in 2010. However, this measure has done little to ameliorate the situation as a gap still exists between supply and demand, thereby causing frequent and sometimes, perennial gasoline scarcity in the country. Petrol demand is estimated to be 9.5 billion liters in 2006; 9.6 billion liters in 2007; 12.2 billion liters in 2008; 13.4 billion liters in 2009; 17.1 billion liters in 2010 (Petroleum Product Pricing Regulatory Agency, PPPRA, 2014). The rising demand over supply has resulted in frequent and perennial fuel crisis in the country. Currently, there is a lingering and biting fuel scarcity across the country beginning from February 18, 2014 and lasted for several weeks. This is just one of the several fuel crisis in the country. This situation has been attributed to many reasons. It has been suggested that the automobile dependent lifestyle of most Nigerian vehicle owners has increased gasoline consumption in the country (National Bureau of Statistics, NBS, 2013). This implies that many motorists in the country find it convenient to ride in automobiles than commuting in public transport. These motorists cruise in their automobile even to cover a short distance that can be covered by walking. Sadly, majority of these cars are used and fuel inefficient cars (Badmus, Osunleke, Fagbenle, & Oyewole, 2012).

In the light of the foregoing, motivating motorists to ride in public transport in Lagos State, the commercial hub of Nigeria would make vehicle owners to own fewer vehicles and/or drive less to reduce fuel consumption. While previous studies in the country have examined different areas of public transport (Adebambo & Adebayo, 2009; Agunloye, 2011; Basorun & Rotowa, 2012; Odufuwa, 2011; Ogunkoya, 2008; Okanlawon, 2007; Okoko, 2008; Onifade, Oladejo, & Oyedeji, 2010), gasoline conservation potentials of public transport appears to be an under-researched area. The only study that is close to the present one examined the predisposition of women in Akure to minimize car use (Okoko, 2008). This study made no effort to examine the fuel savings impact of such reduction in car use. This study fills this gap in the literature and makes an important contribution to the knowledge of understanding how public transport can help reduce fuel consumption in Lagos State, and by extension in the entire country. Therefore, the objective of the paper is to examine the gasoline conservation potentials of public transport in Lagos State. The remainder of the paper is structured as follows: section two provides an overview of gasoline conservation; section three examines the concept of public transport; section four looks at the fuel- saving potentials of public transport; section five briefly discusses two relevant theories to explain conservation behavior and use of public transport; and finally concluding remarks and policy implications are made.

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2. Gasoline conservation

Gasoline is a form of energy. Thus, energy conservation has been defined as consuming less energy for the purpose of achieving overall reduction in the amount of energy consumed (Gillingham, Newell, & Palmer, 2009; Sweeney, 2001; Ting et al., 2011; Wulfinghoff, n.d.). This definition has emphasised the need to consume energy wisely and avoid wastage. This suggests that energy conservation eliminates waste and encourages utilisation of less energy to achieve same result; and to guarantee continued and future supply of the energy. It is suggested that "an important motive of energy saving is to achieve the most efficient use of limited energy sources and to reduce unnecessary energy consumption and losses" (Aktamis, 2011: 245). Conserving energy therefore, provides the benefits of reduced energy costs, reduced greenhouse gas emissions (GHG) and conserved finite resources (Darmstadter, 1973; Gillingham et al., 2009; Ting et al., 2011).

Individuals that engage in energy savings are said to be manifesting conservation behaviour towards energy use. Monroe (2003) defined conservation behaviour as those activities that sustain a society. Curtailment and efficiency behaviours are two broad types of conservation behaviour (Gardner & Stern, 1969 as cited in Lehman & Geller, 2004). According to the authors, curtailment behaviour is all human activities that restrict the consumption of energy and requires repeated action. Use of public transportation is a good example of this behaviour. In contrast, efficiency behaviour refers to one-off behaviour involving the purchase and use of efficient devices, that offer repeated benefits with continued use. Purchasing fuel efficient vehicles and hybrid vehicles are a good example of this behaviour. Therefore, Pitts et al. (1981) explained that fuel consumption reduction may be effected through changes in lifestyle (curtailment behaviour) and/or by careful expenditure of capital (efficiency behaviour). Consistent with this, Omer (2009) suggested that conserving energy can be actualised by minimizing the energy demand, by rational energy use (curtailment behaviour), and by use of more green energies (efficiency behaviour). Thus, car owners should inevitably, engage in both behaviours to reduce fuel consumption, protect the environment and save the entire planet. However, the thrust of this paper is how the use of PT can help conserve gasoline, i.e. curtailment behaviour.

3. Public transport (PT)

Public transport (PT) has been conceptualised as all modes of transportation available to the public irrespective of ownership (White, 2002). PT provides mobility to those who cannot or prefer not to drive, including access to jobs, education, and medical services (Ferris, 2011). It plays a key role in moving people as well as sustaining economic activity (TCRP, 2011). It includes various activities that allow people to move in shared vehicles such as shuttle vans, local and intercity buses, and passenger rail (Litman, 2012b). It has been conceptualised as a social service for the poor (Garrett, 2004; Jones, Mock, & Cearley, 2006), for older individuals in Germany (Buehler, 2009) and in Greece (Tsekeris, 2012), lower income people in Pakistan (Wasif & Ghias, 2011) and in Nigeria (Basorun & Rotowa, 2012) and for workers (Carr, 2008; Srinivasan, Flachsbart, Dajani, &

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Hartley, 1981). It was found that a diverse group of travellers, self-employed, civil servants, students and higher-ranking professionals and directors ride in BRT in Lagos State (Lagos Metropolitan Area Transport Authority, LAMATA, 2009).

The foregoing analysis indicates that, unlike personal vehicles, PT is a shared mode, moving a few people (e.g. taxis) or a large number of people (e.g. mass transport or railway) on a shared basis and across a wide range of socio-economic strata, thus increasing the average occupancy rate of the mode more than what is obtainable with the private automobile.

A number of factors can promote the use of public transportation. One of these is higher price of gasoline (Lane, 2011; Litman, 2006; Polzin, Chu, & Raman, 2008; Millard-Ball & Schipper, 2011;Wilson, Stimpson, & Hilsenrath, 2009). Polzin et al. (2008) reported that the American Public Transportation Association (APTA) attributed an increase of 50 million trips by public transportation late 2007 in the U.S. mainly to gasoline price increases. Wilson et al. (2009) argued that an increase in gas prices may lead people to consider substitutes such as bicycles, walking and public transportation. In Nigeria, it was predicted that the sudden price hike in January, 2012 may hit employee car owners more, leading them to abandon their cars and switch to PT (Ekwere, 2012). Lower transport fare is also an important factor in PT ridership (Basorun & Rotowa, 2012; Chen, Varley, & Chen, 2011; Yanmuz-Tuzel & Ozbay, 2010). Yanmuz-Tuzel and Ozbay (2010) found that transport ridership, transport fare, and service rate are statistically significant in New Jersey. Chen et al. (2011) found that transport fare is an important factor that affects ridership of PT in the New York City region. In Lagos State, LAMATA (2009) noted that BRT fare is low and stable, while the fares charged by other buses are high and variable, and that the lower BRT fare is promoting BRT ridership in the State. Similarly, Basorun and Rotowa (2012) found that PT attracts low-class commuters in Lagos Metropolis because of its low fare.

In addition, high population and degree of urbanisation also affect ridership of PT (Carr, 2008; Dargay, Gately, Sommer, 2007; Hidson & Muller, 2003; Pucher, Peng, Mittal, & Korattyswaroopam, 2007). The consensus of the scholars is that private vehicle use per capita reduces with increased urbanisation, while ridership of PT is encouraged. For example, Hidson and Muller (2003) explained that large urban areas are not accessible without PT. Therefore, development of a good PT in the highly urbanised Lagos metropolis and motivation of all and sundry to ride in PT is sine qua non (necessary) to reduce fuel consumption in the State. Finally, transport service level can attract people to commute in PT (Polzin et al., 2008; Tsekeris, 2012). Polzin et al. (2008) found that services would need to double or triple to induce enough additional riders. Improving transport service requires investment in public transportation infrastructure (Hwang & Tseng, 2005; TCRP, 2011; Weisbrod & Reno, 2009). Unfortunately, transport service, quality and capacity is, generally very low in Nigeria (Adebambo & Adebayo, 2009; World Bank, 2012) because of lack of investment in facilities and infrastructure, and this is pushing many more Nigerians into car ownership.

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Due to these factors, PT ridership, either as a complement and/or an alternative to private vehicles in most developed and emerging economies, and few developing countries, has been growing. PT ridership has gone up by 25 percent since 1995 in the U.S. (Bailey, 2007), 2.1% from 2007 to 2008 in the U.S. (Leinberger, 2007 as cited in Millard-Ball & Schipper, 2011), increased in China and India (TCRP, 2011). In contrast, Millard-Ball and Schipper reported a decline in transport ridership in Japan from 1970 until 2000. They attributed this situation to increase in car ownership in the country during the period. In Nigeria, ridership of PT is increasing (Adebayo & Adebambo, 2009; LAMATA, 2009; Odufuwa, 2011; World Bank, 2012).

However, the increasing ridership in the State is largely among the low income earners (Basorun & Rotowa, 2010), who are not car owners and other middle income people. For example, LAMATA (2009) identified three categories of passengers that have been attracted to ride in BRT in Lagos State. These are: (i) 85 per cent of the passengers who previously rode in 'danfo' (the mini bus); (ii) 8 per cent who previously commuted in the larger 'molue' (commercial buses); and (iii) 4 per cent that previously travelled by car and an additional 2 per cent meeting their commuting needs by Taxi, 'Okada' (commercial motorcycle) and 'Kabu Kabu'(commercial vehicles not painted in the government approved colours). This analysis indicates that majority of the BRT commuters are people without cars. It further shows that the share of private car owners that have been attracted to travel by BRT is very low, suggesting that a large number of car owners may have the new bus system. NBS (2013) affirmed that the use of PT among car owners in Nigeria for work trip and social occasion is not popular.

In addition to developing road transportation, the State Government is also promoting water transportation in the state to take-off more vehicles from and ease congestion on the Lagos busy road. This is expected to ultimately result in reduced fuel consumption in the State. Ogunbiyi (2012) stated that the State Government has identified seven corridors for development and mass transportation. He listed these corridors to include Ijede-Badore, Badore-Admiralty-Osborne-Marina, Ikorodu-Marina, Ijegun-Egbe-Okokomaiko-Mile 2-Marina, Oke-Afa-Festac-Mile 2-Marina, Ajegunle-Marina and Iddo-Marina. This is yielding the desired result as Lagos State Waterways Authority (LASWA, 2014) is impressed that, despite the perceived phobia of Nigerians to travelling by water, an average of 1.8 million people commute by water monthly. Though this is grossly less than the share of the road transportation in the State, which is estimated by LAMATA (2013) to be 4.8 million monthly, but it is a fair performance and the State Government can do more to further increase its modal share in the State. For example, LAMATA (2013) estimated that more than 400 million passengers may have commuted in BRT since its inception in 2008, with average daily ridership of 180,000 passengers. Multiplying the average figure by 30 days will result in an average monthly ridership of 4.8 million passengers. This is just the share of BRT, excluding other means of road transportation. This is not surprising as road transportation accounts for over 90 per cent of domestic passengers and freight Lagos State Public-Private Partnership Office (LSPPPO, 2010).

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Water transportation provides the benefits of faster trips, safer trips and congestion reduction (Egeolu, 2014; Ogunbiyi, 2012; Ojo, 2014) and this is expected to reduce congestion on the Lagos road and attract more visitors to the State (Ojo, 2014). The reduced congestion would reduce the amount of fuel burned during driving.

Finally, the State Government is also integrating rail transportation with the road and water transportation, and this has an additional potential to curb petrol consumption in the State. LAMATA is rehabilitating the federal rail track and constructing light rail to diversify transportation and reduce pressure on road transport in the State (Salau, 2013). This is necessary in a megacity like Lagos to reduce the number of vehicles on the road, reduce traffic congestion and fuel consumption. High fuel consumption in the State has been partly blamed on poor road conditions, inefficient urban mass transit and railways and high level of motorisation (Akanbi et al., 2013; Asaolu, Awe, & Sholotan, 2010; Jaja, 2010). It is also believed that the rail fuel efficiency is higher than that of bus and passenger vehicles (Litman, 2012b). The ongoing light rail project in the State that links Badagry with the Lagos Island, when completed, would move a large number of commuters along the corridor, makes car owners to drive less and further helps conserve fuel in the State.

4. Curbing gasoline consumption through public transportation

There is corpus research on the effect of PT ridership on gasoline conservation in the extant literature (Litman 2012a; Litman, 2012b; Tseng & Shiau, 1987; Seaborn, 1995; Srinivasan et al., 1981). Some of these studies have lauded the energy efficiency of using public transport as an alternative mode to private vehicles (Bailey, 2007; Litman, 2012a; Litman, 2012b). The development of high quality PT, as a substitute to the automobile has considerably increased energy efficiency (UITP, 2006). Japan promotes energy conservation in transportation by motivating a modal shift to public transportation, with expected pay-off of 11200-12200 million liters reduction in crude oil (Shiel, Jeffers, & Dyar, 2011).The efficiency of PT over a private mode is further emphasised with the argument that PT is many times more efficient than travelling in automobile, and that increasing its ridership is conserving and can conserve fuel in the transport sector. It is further stressed that improving the alternative modes to automobile reduces household vehicle ownership by 10% (Litman, 2012a). This efficiency is a function of vehicle load factors. For example, it is noted that a bus carrying seven people has almost two times fuel efficiency of an average automobile, and a bus with 50 passengers is about ten times as energy efficient. Rail is about three times as energy efficient as diesel bus (Litman, 2012b).

Inevitably, the fuel efficiency of PT arises from its high vehicle occupancy rate, implying that PT such as bus, rail, airplane, etc., can carry multiple passengers at a time. For example, it is argued that the motives of many urban policies are to discourage automobile transportation and promote alternative transport modes with high average occupancy rate, thus considerably consuming less energy per unit (Seaborn, 1995). High-capacity PT is more ecology friendly, consuming less fuel and emitting less pollution (Satiennam, Fukuda, & Oshima, 2006). PT can achieve fuel efficiency

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and savings, because it can carry multiple passengers at a time, resulting in the reduction in traffic congestion from fewer automobiles on the roads, and can use varied sources of energy (Bailey, 2007). Hossain and Kennedy (2008) claimed that the increased modal shift in favour of PT can result in fewer cars utilising the same road space with a possible speed advantage and fewer flow breakdown situations. He concluded that this significantly reduced energy consumption. Finally, Galicia, Cheu, Machemehl, and Liu (2009) cited GTZ (2006) as stating that a single BRT Bus may replace as many as 50 cars along the corridor, thus conserving gasoline and mitigating the amount of emissions released to air.

Furthermore, the reduction in the vehicles miles traveled (VMT) and in vehicle ownership, due to higher ridership of PT, can abate fuel consumption (Bailey & Mokhtarian, 2008; Huo, Yao, He, & Yu, 2011; Litman, 2011; Polzin et al., 2008). According to Polzin et al. (2008) improvements in PT can make some households reduce the number of cars owned and make them avoid buying their next automobile, thus reducing automobile travel and fuel consumption and providing financial savings. Bailey and Mokhtarian (2008) believed that by reducing the vehicle miles traveled, public transportation reduces energy use and emissions in the transport sector. Huo et al. (2011) advocated for effective PT to reduce the growing stock of light duty vehicles (passenger cars) in China, noting that the use of PT will play a significant role in moderating oil consumption. They suggested that an efficient PT can compete with private cars and discourage car owners from driving their cars. In addition, Litman (2011) indicated that high quality PT can result in the additional vehicle travel reductions by providing a stimulus for more compact, transport-oriented urban development that promotes fewer vehicles ownership and less driving than they would in more automobile-oriented neighborhoods. Finally, FTA (2013) affirmed that PT can reduce travel demand and save energy.

Litman (2012a; 2012b; 2012c) summarised a number of strategies relating transport use to gasoline consumption savings. These include strategies that shift travel from automobile to transport using existing transport capacity; strategies that improve fuel consumption or reduce emission rates of transport vehicles (for example, retrofitting older diesel buses with cleaner engines or alternative fuels); strategies that reduce the total amount of congested driving; and strategies that create more accessible land use patterns, and so reduce per capita vehicle mileage.

5. Relevant theories

This section presents two theories to explain conservation behaviour and the use of public transport. The degree to which a nation and its entities achieve considerable petrol conservation is obviously determined by the willingness and ability of individuals to key into the vision of energy conservation and engage in behaviour that can result in curtailment of petrol consumption. There are a number of theories that are appropriate to explain and/or predict the consumer energy-saving behaviour. Some of these theories are the theory of reasoned action (TRA; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), value-beliefs-norms (VBN) theory (Stern, Dietz, & Abel, 1999; Stern, 2000) and norm activation model (Schwartz, 1977; & Schwartz, 1981).

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We employ value-beliefs-norms (VBN) theory (Stern, 2000; Stern, Dietz, & Abel, 1999) to explain petrol conservation behaviour in Lagos State. VBN theory is a model of environmentally significant behaviour used to evaluate the relationship between environmental concern and behaviour. The theory contends that personal moral norms are the antecedent of people's general predispositions to pro-environmental action. The theory viewed energy savings behaviour as a pro-social behaviour (i.e. behaviour that is exhibited by people, who are genuinely concerned about the effect of excessive consumption of energy on the people, society and environment) and postulated that the basis for a personal environmental behaviour lies in a conjunction of values, beliefs, and personal norms that prompts individuals to act in ways that are in the best interest of the environment (Stern, 2000). For example, environmentally-conscious people in the State will be concerned about their excessive consumption of petrol that may limit the availability of the product for the use of present and future generation, and thus may hold conservation value.

It has been empirically shown that the VBN chain of variables was a strong predictor of three different types of non-activist pro-environmental behaviour, namely environmental citizenship, private-sphere behaviour, and policy support (Stern et al. 1999). Ibtissem (2010) concluded that VBN theory relates conservation behaviour to the personal norms reflected in individual value and belief system. There are a number of empirical studies on VBN theory. Steg, Dreijerink, and Abrahamse (2005) found that biospheric values were significantly related to feelings of moral obligation to reduce household energy consumption, when intermediate variables were controlled for. Similarly, Kaiser, Hubner, and Bogner (2006) found that the theory of planned behaviour's(TPB) intention accounted for 95% of people's conservation behaviour and VBN's personal norms accounted for 64%.

Numerous theories have been developed to explain why people intend to and/or use public transportation to satisfy their commuting needs. One of these theories is the theory of planned behaviour (TPB). TPB was developed by Ajzen (1991) as an extension to the earlier theory of reasoned action (TRA, Ajzen & Fisbein, 1980), and which according to Javidnia, Nasiri, and Jamshid (2012) is an effort to provide a better prediction and interpretation of human behaviour. TRA suggests that a person's behaviour is determined by his/her intention to perform the behaviour and that this intention is, in turn, is a function of his/her attitude towards the behaviour and his/her subjective norm (Ajzen & Fisbein, 1980). The theory identifies intention as the best predictor of behaviour. Ajzen (1991) added a new construct, perceived behavioural control (PBC) in order to explain situations in which an individual does not have absolute control over his/her intended behaviour. According to Ajzen, a central factor in the TPB is the individual's intention to exhibit a given behaviour. He argued that intentions precede and motivate a behaviour, noting that they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behaviour. He strongly believed that the stronger the intention to engage in a behaviour, the more likely should be its performance. This suggests that transitship behaviour of the Lagos motorists is an antecedent of their intention. The more positive their intention is the higher the propensity to commute in public transport.

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Bamberg and Schmidt (2000) explained that TPB is useful in explaining a situation where an individual has a choice to make on alternative courses of action, consider the likely consequences of these alternatives, the normative expectations of people, who are most likely to affect the decisions made, and the required resources and potential obstacles to the decisions. Extending this to the choice of making use of public transportation or private cars by individuals, we can argue that TPB provides a basis for motorists to choose between driving their cars and travelling by public transport; if they choose to travel by public transport, they will evaluate the outcomes/results of such decision in terms of the walking distance between their homes and terminal, waiting time at the terminal, convenience and comfort of the ride, speed of the journey and conduct of the bus drivers. Alongside this, the individuals will also need to consider the expectations of many people (e.g. the spouse, friends, relations, children and colleagues), who can potentially influence the decision to ride in public transport. Where the experience associated with the ride is positive and reinforcing and the normative expectations of close associates conform to the behaviour of the individuals, they might be motivated to increase their ridership of public transport. This will reduce the number of vehicles on the road and result in fuel conservation.

There are a number of empirical studies on TPB to predict the behaviour of motorists and motor cycle riders to switch to public transport (Chen & Chao, 2010; Heath & Gifford, 2002; Zhao et al., 2011). Heath and Gifford extended the TPB to predict and explain the use of public transportation among Canadian university students. Their study investigated the impact of the introduction of the universal bus pass (U-pass) program on car-use reduction for university students and found that there was a significant rise in bus ridership among the Canadian university students with the implementation of the U-pass. Zhao et al. (2011) examined the psychological factors influencing public transport use behaviour in China, using TPB. The correlation analysis and regression models showed TPB well explained public transport use.

6. Concluding remarks and policy implications

The growing stocks of vehicles, especially in Lagos State have increased the consumption of gasoline in the State. The paper has highlighted the potentials of PT in curtailing the fuel consumption in the transport sector of the State. It is argued that fuel efficiency of PT is higher than that of private vehicles. For example, it is noted that one BRT Bus can replace about 50 cars on the highways, and the fuel savings benefit of this in an urban city like Lagos can be enormous. It is therefore, proposed that encouraging motorists in the State to park their cars and ride in PT by providing high quality PT and high transport services would help reduce the number of vehicles on the highways. The Lagos State Government, in collaboration with the World Bank, initiated the Lagos Urban Transport Project (LUTP) to create an efficient and effective integrated inter-modal mass transport system in the State that supports a sustainable development befitting an urban area like Lagos. This includes ferry services, rail mass transport and BRT. While the rail mass transport project is ongoing, the BRT scheme and ferry services have taken off, attracting majority of

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commuters, who previously travelled by "Molue" and "Danfo" and very few car owners. Therefore, it can be concluded that with the right investment, higher transport service and capacity and service quality, increasing PT ridership among motorists in the State has the potential to reduce fuel consumption.

Policymakers in Lagos and other States facing rapid urbanisation in Nigeria have a number of lessons to learn from this paper. First, the low modal shift of four per cent, according to LAMATA (2009) by car owners to BRT suggests that they may have perceived its service level and quality as low and required to be improved upon. In this regard, the policy makers in the State will need to work with the operators of the bus to maintain the existing rickety buses and introduce new and modern fleet of buses. For example, to attract more car owners to ride in BRT, the operators should acquire a new and modern fleet of buses with air-conditioners and other innovative features that make passengers more comfortable. Menckhoff (2005) noted that despite high car ownership in Curitiba city, Brazil, it uses less gasoline per capita than other Brazilian cities, partly because more people walk and/or use PT. Similarly, an empirical research by Schwanen and Mokhtarian (2005) showed that despite the increased use of a personal mode for commuting in North San Francesco, many residents chose to also ride in PT.

Furthermore, the policy makers should intensify their efforts in developing more operation routes for the ferries. This has the capacity to attract more motorists to water mode of transportation and increase the current monthly average of 1.8 million passengers commuting in ferry substantially. In addition, they should consider multi-media campaigns to promote a sustainable transport behaviour in all and sundry. They should extend the current "conserve energy, safe money" campaign of the State Government to gasoline conservation. This is likely to make some people feel responsible to protect the environment and modify their car-dependent lifestyle in favour of PT ridership. Studies have found a positive relationship between environmental knowledge, responsibility, attitude and pro-environmental behaviour (Kim, Jeong, & Hwang, 2012; McMakin, Malone, & Lundgren, 2002).

Finally, the 11 per cent of students that currently ride in BRT, according to LAMATA's (2009) survey can also be considered low, and policy of lower transport fare, if not free ridership for students, should be considered by the government. This becomes necessary to promote pro-environmental attitude formation among the young in order to catch them young. This may have a greater and long-term effect on the children's attitude towards energy conservation and may complement the present Energy Kid Club established by the State Government in some schools in the State.

In spite of the contribution of the paper to the literature, it has some limitations. The major limitation is that it is a reviewed article. It is our desire to extend this paper in the future by empirically testing the variables of the two theories employed to explain both conservation and public transit behaviour.

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