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FUEL-EFFICIENT VEHICLES AND PETROL CONSUMPTION IN THE TRANSPORTATION SECTOR OF LAGOS STATE, NIGERIA

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ABSTRACT

The sustained growth in the economic activities and re-emergence of the middle-level income people in Nigeria have led to general increase in the number of personal vehicles on the roads. However, a large number of these are imported, fairly used vehicles, popularly called 'Tokunbo' in Nigeria. These vehicles are fuel inefficient because they consume fuel intensively. This paper investigated the effect of driving fuel-efficient vehicles on petrol consumption in the transportation sector of Lagos State. Data was collected from a valid sample of 1565 respondents

selected through a multi-stage sampling technique. The result of a correlation analysis showed that fuel-efficient vehicles can significantly reduce petrol consumption in the transportation sector of the state. This finding is instructive and the paper suggested the need for policy makers in Nigeria to enunciate appropriate policies that would encourage majority of motorists, currently driving used and fuel inefficient vehicles, to switch to new and more fuel-efficient vehicles to reduce their fuel consumption and carbon footprints in the state.

Keywords: Fairly used vehicles, fuel-efficient vehicles, petrol consumption, motorists and transportation sector.

Introduction

In marketing, authors, researchers, scholars and practitioners are concerned about consumption and usage of goods and services within and outside a social system. While marketing efforts are aimed at stimulating demand for and consumption of goods and services, excessive demand for and consumption of certain products (e.g. petroleum products) with limited supply can constitute a burden on the government and portend adverse effects for the people and the environment. Due to low local refining capacity in Nigeria, petrol is massively imported, gulping high foreign exchange. There is need to moderate and reduce consumption of this product by a growing population of vehicle owners, especially in Lagos state. Kotler and Keller (2015) described this as demarketing, discouraging excessive consumption of a product.

Statistics from the government shows that the number of vehicles plying Nigerian roads has increased significantly from 150, 000 in 1983 to nine million in 2012 (Federal Ministry of Information, 2013) and to 11.5 million in 2016 (National Bureau of Statistics, NBS, 2017). The Bureau further stated that private vehicles accounted for 45 per cent of the total vehicle stock on the road. Lagos State, the commercial and industrial hub of Nigeria, accounted for a large portion of these vehicles (Aminu & Olayinka, 2014a). The State had 1,303,066 new personal vehicles registered between 1995 and 2013 (Lagos State Government, 2013). This figure excluded the vast number of commercial vehicles including motorcycles, taxis, mini-buses, long-buses, heavy duty trucks and tankers.

More worrisome is the proportion of the fleet of vehicles in Nigeria that are fairly used imported vehicles, popularly referred to as 'Tokunbo' and Nigerian used vehicles. Preference for fairly used vehicles rather than new vehicles in developing countries such as the United Arab Emirates, Russia, Nigeria, Mexico, and Burma is very high. This is due to cost savings and greater product varieties of the vehicles (Coffin, Horowitz, Nesmith, & Semanik, 2016; Osunleke, Fagbenle, & Oyewola, 2012). For example, 74 per cent of the 410, 000 vehicles imported into the country in 2014 were used vehicles (PwC, 2016). Unfortunately, this is the general trend in Nigeria's annual vehicle importation, suggesting that about three quarter of the vehicles in the country are fairly used vehicles. This contrasts sharply with the situation in developed countries with a large stock of new, fuel-efficient vehicles (Barnard, 2016; Coffin *et al.*, 2016; Small & Van Dender, 2007).

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Although new vehicles are fuel-efficient, they are expensive and beyond the reach of majority of the middle-level class in Nigeria and many developing countries. For example, the least prices for the following brands of cars in Nigeria are: Kia Rio 2016 Model, N2.9 million; Hyundai Accent 2014, N3.8 million; Honda Civic 2014, N4.3 million; and Toyota Corolla 2014, N5.2 million (Autoguide, 2017). Though Kia Rio's price is lower than those of other brands, most car buyers in the country perceive it to be less fuel-efficient and lacks second-hand value. Due to the high prices of the more fuel-efficient cars, most Nigerian car buyers cannot afford them and instead patronise fairly used vehicles.

However, fairly used vehicles guzzle fuel (Akanbi, Aworemi, & Amoo, 2013; Badmus, Osunleke, Fagbenle, & Oyewola, 2002; Jaja, 2010) and discourage fuel conservation (Aminu, 2015). Regrettably, Nigeria has been besieged with a crisis of shortage of petrol or gasoline, an important fossil fuel used to power passenger vehicles. Recent studies affirmed that Nigeria is plagued with a number of problems hindering regular supply of petrol (Aminu & Olawore, 2014; Ehinomen & Adeleke, 2012). Therefore, continued driving of used, old-modelled vehicles on Nigerian roads is a serious problem that policy-makers will need to tackle to reduce fuel consumption in the country and promote sustainability.

Fuel-efficient vehicles can help to reduce fuel consumption and achieve fuel conservation (Aminu, 2015; Clerides & Zachariadis, 2008; Small & Van Dender, 2007). Fuel-efficient vehicles consume a significantly less quantity of petrol than the old-modelled vehicles (Aminu, 2015).

This paper sought to understand the effect of fuel-efficient vehicles on consumption of petrol in Lagos metropolis. Though there is a copious research work on the energy conservation benefit of fuel-efficient vehicles in the western countries, there is a little work on this in Nigeria and many developing countries. In addition, the frequent energy crisis that has characterised the Nigeria's economy requires that we find solutions to this lingering crisis. Therefore, this paper extends the little knowledge on fuel-efficient vehicles and petrol consumption nexus in developing countries, with a focus on Nigeria. In doing this, the study specifically answered the question: Is the use of fuel-efficient vehicles significantly related to the reduction of petrol consumption in the transport sector of Lagos state, Nigeria?

Literature Review

Perspectives on petrol consumption in the transport sector

"Global demand for energy is increasing rapidly, because of population and economic growth, especially in emerging market economies" (Organisation of Economic Cooperation and Development, OECD, 2011, p. 1). In particular, the consumption of petrol mainly in

transportation, industrial and household sectors of the emerging and developing economies is witnessing unprecedented growth, thereby threatening the security of petrol supply for the present and future generation (International Energy Administration, IEA, 2008; Mazraati, 2007; Pridmore & Miola 2011; Shaeen & Lipman, 2007). Transportation sector is the world's major consumer of petroleum products accounting for about 67 per cent of total final consumption in 2012 (IEA, 2015), 41.5 per cent in Europe in 2015 (Eurostat, 2017), 72 per cent the U.S. in 2012 (Energy Information Administration, EIA, 2013) and increased to more than 90 per cent in the U.S. in 2016 (EIA, 2017), and about 78 per cent in Nigeria (Jaja, 2010).

The share of the transportation fuel, as a percentage of the total energy consumption as indicated above, suggests that transportation fuel accounts for a large proportion of the total energy consumption in these countries. IEA (2009) has projected that total energy consumption in transport sector will grow by 2030. Specifically, the share of the transportation fuel as a percentage of the total energy consumption in Nigeria is very significant at over 78 per cent, suggesting that Nigerians rely heavily on the use of petrol for fuelling their automobiles. Unfortunately, the capacity to meet the excessive demand locally is severely affected by the moribund state of the nation's four refineries, thus causing perennial fuel crises in the country (Aminu, 2014, 2015; Eme, 2011; Paki & Ebienva, 2011).

Concerns have been expressed over the present and future implications of the rapidly increasing energy consumption. The fears of the stakeholders are generally, in two folds: the fear of the hydrocarbon, a non-renewable and exhaustible resource nearing its peak and getting depleted soon, if energy consumption continues at the present and future higher pace (Graefe, 2009; Omer, 2009) and the negative environmental impact of this growing consumption in terms of greenhouse gas (GHG) emissions (Martiskainen, 2007; Monroe, 2003; Pridmore & Miola 2011). In developing countries, such as Nigeria, there is a further concern about the impact of the rising fuel consumption on petrol supply (security) for the major reason of a very low price of petrol (Nwachukwu & Mba, 2010; Omer, 2009).

The response of successive governments to the rising consumption of petrol in Nigeria has been to augment the little output from the domestic refineries with massive imported petrol (Organisation of Petroleum Exporting Countries, OPEC, 2000). However, this has not addressed the crisis. A more practical approach to demand side management, in terms of inducing fuel conservation behaviour among the motorists, will appear to offer a better solution to the Nigeria's fuel crisis (Aminu, 2014, 2015). One way of reducing fuel consumption and achieving fuel savings is through the use of fuel-efficient vehicles (Clerides & Zachariadis, 2008; Gallagher, Collantes, Holdren, Lee, & Frosch, 2007; Shiau, Michalek, & Hendrickson, 2009; Small & Van Dender, 2007).

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There is copious research on the the effect of fuel-efficient vehicles on petrol consumption in the transport sector. The need to reduce petrol consumption rate has led many countries in the North America, South America, Europe and Asia to impose and implement stringent national standards on fuel economy that new vehicles should meet (Bashmakov, 2009; Small & Van Dender, 2007). This initiative has led to the emergence of new and more fuel-efficient vehicle models that consume a considerably less amount of petrol than the conventional vehicles and promote fuel conservation (Aminu, 2015).

Pitts, Willenborg, and Sherrell (1981) noted that the petrol price hike of 1978-79 led to the manufacturing of fuel-efficient vehicles. Litman (2011) argued that driving fuel-efficient vehicles remains the most efficient way to save petrol. Pitts *et al.* (1981) argued that the mandated fuel economy was significant in the reduction in petrol consumption in the U.S. in the late 1977 and early 1978. They attributed this to smaller, more efficient engines and utilisation of lighter materials in manufacturing the new vehicles.

Witts (1997) opined that intuitively, reduction in road fuel consumption can result from lower miles traveled and/or from increased fuel efficiency. He attributed the fuel efficiency to smaller engine size, more fuel-efficient driving behaviour, and a switch to smaller vehicles. The author concluded that policies targeted at improving fuel economy standards may produce a better result than policies that raise petrol price. Franco (2009) considered the prospect of higher fuel economy standards in the US and forecasted a downward trend in future petrol demand and consumption. Litman (2012) affirmed that cleaner vehicles save fuel and reduce emissions and usually reduce fuel costs.

The fore-going indicates that vehicles with higher fuel economy reduce fuel consumption. The review indicates that the fuel efficiency technology in the new cars makes fuel consumption to be reduced with more vehicle miles traveled (VMT), thus resulting in fuel savings. This implies that the most significant impact of fuel efficiency is on VMT. Fuel-efficient vehicles reduce, on average, the amount of petrol consumed for every VMT.

In contrast, studies have challenged the fuel-savings benefit of fuel-efficient vehicles and instead suggested using alternative strategies to reduce fuel consumption. For example, Kleit (2012) advocated the use of petrol tax instead of relying on fuel economy to achieve fuel savings. The author argued that tighter standards would lead directly to smaller cars and therefore, carnage (accident) on the highways and have potential adverse effects on traffic congestion. More stringent standards would reduce oil consumption and carbon-dioxide emissions, but not quite as much as one might expect because of the re-bounce effect (see also Kleit, 2002). A re-bounce effect referred to the take-back effect resulting from the reduced prices of petrol due to the improved economy of devices (Morton & Griffiths, 2012; Small & Van Dender, 2007). A more stringent fuel-efficiency standard would further improve the fuel economy of new vehicles, make

driving less costly, increase VMT and cause traffic congestion (Small & Van Dender, 2007; West & Williams III, 2005).

Empirical review

There is a litany of empirical studies on the positive impact of fuel-efficient vehicles on petrol consumption. Goldberg (1998) found that fuel-efficient vehicles are more effective in considerably curbing fuel consumption in the U.S. than increasing fuel price through tax. Kleit (2004) modelled the long-run impact of higher Corporate Average Fuel Efficiency (CAFÉ) standards and found that increasing the standards by 3.0 mpg would reduce petrol consumption by about 5.2 billion gallons per year. Clerides and Zachariadis (2008) investigated the international analysis of the effect of standards and fuel prices on automobile fuel economy and found that fuel economy standards have improved fuel efficiency in the US, Europe and Japan. They found that the impact of an efficiency standard on new-car fuel consumption in Europe and Japan was more pronounced than that of a rise in fuel prices. Samano (2012) estimated a welfare comparison between two Federal policies in the US – petrol taxes and fuel efficiency policy - aimed to reduce petrol consumption. The results showed that fuel efficiency policy is more effective in curbing growing petrol consumption.

Conversely, studies have found no positive effect of fuel-efficient vehicles on fuel consumption reduction. Thorpe (1997) estimated fuel economy standards, new vehicle sales, and average fuel efficiency. The simulation estimations results showed that since the passenger car standard is initially binding on the U.S. auto-maker, it causes the affected vehicles' prices to increase, and the increases in prices encourage substitutions towards less fuel-efficient vehicles. The author concluded that fuel efficiency standards might have contributed to the observed decrease in the average fuel efficiency of new automobiles in the United States since 1987. Austin and Dinan (2005) estimated annual costs of reducing long-run petrol consumption by 10 per cent via a 3.8 miles per gallon increase in the fuel economy standards. Their results indicated that petrol tax would produce greater immediate savings by encouraging people to drive less than driving more fuel-efficient vehicles. They concluded that fuel-efficient vehicles are ineffective in reducing fuel consumption in the U.S.

From the foregoing review, there is no study from Nigeria that has investigated the relationship between driving fuel-efficient vehicles and reduction in petrol consumption in the country. This paper fills this gap in the literature and contributes to the literature on petroleum consumption.

Theoretical framework

The Rational Choice Theory (RCT) by Homans (1961) was adapted to explain why consumers choose and buy fuel-efficient vehicles over fuel-guzzlers. RCT is based on the assumption that individuals are rational and will make a choice by considering and comparing the costs and benefits of alternative courses of action. The choice made maximises the individuals' expected

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level of satisfaction (see also Banister, Pucher, & Lee-Gosselin, 2007; Henning & Karlsson, 2011; Homans, 1961; Wilk, 2002). For example, Henning and Karlsson noted that the individuals carefully and consciously make choices, suggesting that the theory is often used to explain social or economic behaviour. Banister *et al.* posited that the theory assumed that each individual is completely knowledgeable about the alternatives and is able to make a rational choice. Gausset (2013) asserted that the theory explained the choice behaviour of an individual facing two options, leading him/her to choose what is in his or her best interest.

Thus, the foregoing assertions indicate that RCT is suitable to explain the socio-economic behaviour of individuals/consumers, who at any point in time, are confronted with decision-making situations, and who need to make a choice between alternatives (for example smaller, fuel-efficient vehicles or larger, utility sport vehicles, SUV). Invariably, consumers will choose a product that lowers their costs and/or increase the benefits they derive. In Nigeria, an increasing number of vehicle owners are purchasing big, fuel-guzzling SUV over the smaller, fuel-efficient vehicles due to the bad roads in the country; and fairly used imported vehicles over brand new vehicles due to their affordability. In each of these cases, the buyers may not be rational in their choice as their purchase decisions increase petrol consumption and cost of fuelling the vehicles over time. Ultimately, this results in higher maintenance costs for these choices. It is expected that as the economic circumstances of many middle class improve in Nigeria, more motorists will become more rational and switch to more fuel-efficient vehicles.

Methods

The study was undertaken in Lagos metropolis and employed a cross-sectional survey design, using a questionnaire as the research instrument for the purpose of data collection. Similar studies on energy conservation have employed a cross-sectional design (Kishi & Satoh, 2005; Ozaki & Sevastyanova, 2011). The estimated study population was 1, 303, 066 car owners (using 2010 new car registration statistics available as at the time of the survey) in the 20 Local Government areas of Lagos State (Lagos State Government, 2013). This is consistent with the population used by Gillingham (2011), who used all new vehicle registrations in California between 2001 and 2009 to provide empirical evidence of consumer response to petrol price changes in the state.

A sample size of 2, 455 was used, determined by Yamani's (1967) formula. A large sample size is necessary to increase the generalisation of the findings of a study (Saunders, Lewis, & Thornhill 2007). A multi-stage sampling technique was used to select the sample. The first stage in this study involved recognising each of the 20 Local Government Area Councils in the study area, as a cluster. A sample of six clusters (i.e. six Local Government Area Councils) was randomly selected from the complete list of all Local Government Area Councils in the State. At the Secondary Sampling Unit (SSU), housing estates in the six council areas were randomly

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selected from a list of registered estates (obtained from Lagos State Ministry of Housing and Lagos State Development and Property Corporation, LSDPC). At the last stage, households with vehicle ownership within the selected housing estates in the six Local Government areas were also selected through a simple random technique from a list of vehicle owners developed by the researchers. The list was obtained from Landlord/Tenant Associations in the selected housing estates.

The questionnaire had four sections in the following order: respondents' socio-demographic characteristics; respondents' vehicle and petrol consumption information; respondents' petrol consumption rate and respondents' attributes of fuel-efficient vehicles. The questionnaire also used an adjusted Likert Scale format. The Likert scale statements were rated along six continuum, ranging from 1-6. 1 represents *strongly disagree*, while 6 represents *strongly agree*. Out of 2,455 copies of questionnaire distributed, 1,565 copies were retrieved, representing 63.7 per cent. The high retrieval rate of the questionnaire was because the questionnaire was self-administered by the field workers, who administered the questionnaire on the respondents and collected the completed questionnaire immediately.

The questionnaire was validated by some senior and erudite faculty members in the Babcock Business School (BBS) of Babcock University. Where necessary, adjustment to the questionnaire was made to reflect their observations and suggestions. Their comments enhanced the validity of the final questionnaire.

A pilot study was carried out at Isolo Housing Estate on a purposive sample of 200 respondents, representing about 10% of the sample for the study. One hundred and fifty seven (157) copies of the questionnaire were usable. Cronbach's Alpha was used to determine the internal consistency (reliability test) of the items in the questionnaire. Cronbach's Alpha reliability coefficient normally ranges between 0 and 1 with higher values indicating higher reliability among the indicators (Cronbach, 1951; Nunnally, 1978). Cronbach's Alpha for petrol consumption reduction (PCR) was 0.668 and for fuel-efficient vehicles (FEV), 0.646. The two values are in excess of a minimum value of 0.60 recommended by Nunnally (1978). All the items in the scale have a good internal consistency, suggesting that they are a good measure of the constructs and can be replicated by future researchers. This is shown in table 1 below. The main data was collected in February 2014. This paper was a part of a larger PhD thesis of one of the authors.

Table 1:

Reliability of the Research Instrument

Constructs	No. of Items	Cronbach's Alpha
Petrol consumption reduction	10	0.668
Fuel-efficient vehicle	13	0.646
Source: Pilot study.		

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The hypothesis for this study is stated as follows:

H0: The use of fuel-efficient vehicles cannot significantly reduce petrol consumption in the transport sector of Lagos State.

The data were analysed through Pearson Product Moment Correlation (PPMC).

Results and discussion

Results

Table 2:

Descriptive statistics

Variables	Frequency	Percentage	Variables	Frequency	Percentage
Sex:			Occupation:		
Male	1103	70.5%	Public sector	406	25.9%
Female	462	29.5%	Private sector	519	33.2%
Total	1565	100.0%	Self-employed	640	40.8%
			Total	1565	100.0
Age:			Monthly income:		
21-30 years	460	29.4%	Less than N100, 000	744	47.5%
31-40 years	706	45.1%	N101, 000-N200, 000	543	34.7%
41-50 years	297	10.0%	N201, 000-N300, 000	115	7.3%
Above 50 years	102	6.5%	N301, 000-N400, 000	65	4.2%
Total	1565	100.0%	N401, 000-N500, 000	52	3.3%
			Above N500, 000	46	2.9%
			Total	1565	100.0%

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Marital status:			Automobile status:		
Single	438	28.0%	New vehicles	287	18.3%
Married	1127	72.0%	Imported used vehicles	1012	65.1%
Total	1565	100.0%	Nigeria used vehicles	266	17.0%
			Total	1565	100.0%
Level of education:					
O' Level	103	6.6%			
ND/NCE/A' Level	242	15.5%			
HND/B.Sc./BA	858	54.8%			
MSc/MA/MBA	327	20.9%			
PhD	35	2.2%			
Total	1565	100.0%			

Source: Fieldwork.

The table shows that a large proportion of the participants, 71%, are male. Majority of the respondents, 45 %, fall into an age category of 31-40 years. A large number of the respondents, 72%, are married. Majority of the respondents, 55%, have a minimum qualification of first degree or its equivalent. In terms of the occupation of the respondents, 41% are self-employed. With respect to the monthly income of the respondents, 48% earn below N100, 000 monthly. Finally, 66% of the entire subjects drive imported used vehicles.

Test of hypothesis H0: Use of fuel-efficient vehicles cannot significantly reduce petrol consumption in the transport sector of Lagos State.

Table 3: *Pearson Product Correlation for the relationship between use of fuel-efficient vehicles and petrol consumption reduction*

		Petrol consumption reduction	Fuel-efficient vehicles
Petrol consumption reduction	Pearson Correlation	1	.585**
	Sig. (2-tailed)		.000
	N	1565	1565
Fuel-efficient vehicles	Pearson Correlation	.585**	1
	Sig. (2-tailed)	.000	

** . Correlation is significant at 0.01 level (2-tailed).

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Source: SPSS Output, 2014.

The table shows the correlation of the use of fuel-efficient vehicles with petrol consumption reduction. The correlation co-efficient (r) is .585 and the level of significance is 0.01 ($p < .01$). The table shows that the p-value is 0.000, which is less than 0.01. Therefore, the hypothesis is rejected and it is found that ($p < .001$, $r = .585$) fuel-efficient vehicles can significantly reduce petrol consumption reduction in the transportation sector of Lagos State. The co-efficient of determination (r^2) = $(.585^2) = 0.3422$. This indicates that 34.22 per cent of the variance in petrol consumption reduction by Lagos motorists can be explained by variance in the use of fuel-efficient vehicles, while the remaining variance (about 66%) cannot be explained by this factor, but may be accounted for by other factors not covered in the paper.

Discussion of finding

The finding that the use of fuel-efficient vehicles is significantly and positively correlated with petrol consumption reduction in the paper demonstrates that motivating motorists in Lagos state to use fuel-efficient vehicles would mitigate the high consumption of petrol currently recorded in the State. Jaja (2010) found that Lagos state accounted for over 25 per cent of fuel consumed in the transport sector in Nigeria. This finding is not surprising as it is consistent with the alternative policy measures, petroleum subsidy removal and imposition of petrol tax that raise petrol price (Aminu, 2018), used in developed countries and which can also be used in Nigeria to reduce driving and consequently petrol consumption. Therefore, the potency of this strategy to reduce the rising petrol consumption in Nigeria, with emphasis on Lagos state, has been validated by this paper. Interestingly, a large number of the respondents agreed that they would choose fuel-efficient vehicles in future over the fairly used vehicles they are driving currently, if their prices are affordable; and if there is low-cost and flexible auto financing by their banks. This is against the background that over 65 per cent of the respondents currently drive used vehicles.

This finding is supported by the empirical results of previous studies on fuel saving potential of fuel-efficient vehicles (Berkowitz, Gallini, Miller, & Wolfe 2008; Clerides & Zachariadis, 2008; Goldberg, 1998; Kleit, 2004; Small & Van Dender, 2007; Witts, 1997). Goldberg found that fuel-efficient vehicles are more effective in considerably curbing fuel consumption in the U.S. than increasing fuel price through tax. Kleit found that increasing the standards by 3.0 mpg would considerably reduce petrol consumption by about 5.2 billion gallons per year. Similarly, Small and Van Dender found that Americans responded to fuel prices by purchasing new and fuel-efficient cars, which reduced fuel consumption substantially. Berkowitz *et al.* found that households' petrol consumption in Canada is significantly affected by changes in new vehicle fuel economy.

Conversely, the finding of the present paper contradicts the findings of other similar studies (Mayo & Mathis, 1988; Shiau *et al.*, 2009; Small & Van Dender, 2007). Mayo and Mathis found

that the mandatory fuel efficiency standards in automobile in the U.S. are not significant in reducing demand for petrol between 1977 and 1983. In Canada, Gallini found that fuel conservation benefit of fuel-economic vehicles is negligible as only less than 1 per cent of the motorists adopted more fuel-efficient vehicles.

Conclusion and implications

The level of vehicle ownership in Nigeria is high with many motorists buying and driving used vehicles due to their affordability. Used vehicles are fuel-inefficient because they use fuel intensively. This has resulted in excessive consumption of petrol in the transportation sector. The high consumption level has greater implications for energy security for the entire country in terms of regular and guaranteed supply of the critical resource; petrol resource is a depletable and non-renewable resource. Therefore, the transportation sector of Lagos State, due to its size, offers a high potential for significantly reducing petrol consumption and conserving the critical resource. The paper investigated the potency of using fuel-efficient vehicles to reduce the excessive fuel consumption in the transportation sector of Lagos state. Analysis of the data set for the paper revealed that fuel-efficient vehicles can significantly reduce fuel consumption in the transportation sector of Lagos state. It is hereby concluded that encouraging more vehicle owners in Lagos State to drive fuel-efficient vehicles would help reduce the current high petrol consumption in the state, in particular and Nigeria, at large.

The finding of the paper has a number of practical implications. Firstly, curbing petrol consumption by driving fuel-efficient vehicles implies that motorists would save money by using less fuel. This is more so with the high price of a litre of petrol in Nigeria. The money so saved can be used to meet other essential needs of the motorists. European Commission (EC, 2006 cited in Aktamis, 2011) noted that an average European family would save between 200 and 1000 Euro annually from saving energy. In Nigeria, the Lagos State Government lunched an initiative called "conserve energy, save money" , aimed at encouraging conservation behaviour among Lagosians (Lagos State Electricity Board, LSEB, 2014). Secondly, excessive consumption of petrol has some externalities (external damages), which include emissions of GHG, which devastates the environment (Aminu & Pearse, 2018; EIA, 2013; Jaja, 2010; Kishi & Satoh, 2005). The high GHG emissions pose serious obstacles to the human socio-cultural and economic activities around the globe. The use of fuel-efficient vehicles can substantially reduce fuel consumption and abate CO₂ and other anthropogenic emissions in the state. This will, in turn, help improve air quality and health conditions of humans and other species (Aminu & Pearse, 2018). Obviously, an improved health condition of Lagos residents will reduce the wage bill the State Government incurs on health complications arising from respiratory and other illnesses caused by vehicle emissions. Finally, the finding has implications for the Nigerian automobile industry. The industry, with the take-off of local assembly of vehicles in April, 2014, will shift from the import-dependent to the local assembly-driven, thus attracting major auto manufacturers to set-up assembly plants in the country, from where low-cost vehicles, including mass transit buses, can be produced. This would stimulate demand for locally assembled vehicles and reduce the high costs of importing both new and fairly used vehicles into the country, which

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have been estimated to cost almost N500 billion annually (Nigerian Bulletin as cited in Aganga, 2013). In response to this policy, some foreign auto-makers have established assembly plants in the country.

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