Journal of Physical Science and Environmental Studies
Vol. 1 (1), pp. 1-9, June, 2015
ISSN 2467-8775
Review
http://pearlresearchjournals.org/journals/jpses/index.html

The global 50by50 goal of sustainable transport and the spatial implication of end-of-life/used vehicle dumps in Africa; a case study of Nigeria

Dukiya Jehoshaphat Jaiye[1]* and Adedeji Isiaka[2]

Accepted 22 May, 2015

[1]Department of Transport Management Technology, Federal University of Technology, Minna, Nigeria.
[2]Department of Development Control,Federal Capital Development Authority,Abuja, Nigeria.

ABSTRACT

Mobility of people, goods and information has always been fundamental component of human societies and immobility perpetuates individual poverty and nation backwardness. The threats of energy shortage and climatic change have among other things motivated the developed countries to replace out modelled automobiles with more environmental friendly ones. While Sub-Saharan countries are now the dumping ground for such out-modelled vehicles. This study examined the spatial implication of used/end-of-life vehicle trade on Africa with focus on Nigeria. The study finds out that in Abuja (Nigeria), there are approximately fourth two (42) used vehicles dealers occupying about 1.13km^2 of land, which is about 0.452% of the city's total land area. While in Minna, Niger state (Nigeria), there are seven (7) major vehicle dealers occupying about 0.14km^2 of land area; with other motor mechanic junk shops covering about 2.15km^2 lands in the town. It is therefore recommended that the Organization of Africa Unity (OAU) should as a matter of urgency impose capital punishment on violators of the ban on the importation of End-of-Life Vehicle (ELVs), while enhancing the pathway to home-built vehicles.

Key word: Transportation, waste trade, End-of-Life Vehicle, Land use, Sustainable transport.

Corresponding author.E-mail: duksat2000@futminna.edu.ng

INTRODUCTION

Climatic change and energy shortage are two growing related phenomena that are now threatening all the environmental spheres and national economy. This is therefore posing challenges to most scientists due to the impacts they have on people and the ecosystems on which man depends. Most scientists agreed that the warming in recent decades has been caused primarily by human activities that have increased the amount of Greenhouse Gases (GHG) in the atmosphere. Greenhouse gases, such as carbon dioxide is said to have increased significantly since the Industrial Revolution, mostly from the burning of fossil fuels for energy, industrial processes and transportation. In recent usage, especially in the context of environmental policy, the term "climate change" is often used with a presumption of human causation, as in the United Nations Framework Convention on Climate Change (IPCC, 2007a,b).

Traffic congestion on major overland road, rail corridors in urban areas necessitated the need to improve the balance between different transport modes, improve safety and mitigate the impact of transport on the environment. These are some of the key challenges set out in the European Commission's White Paper on

Figure 1. Examples of used EEE/V displayed for sale in Nigeria.

Transport "European Transport Policy for 2010: time to decide" (NRC, 2001, 2007, 2008, 2009; CEC, 2001, 2006). This and many other reasons propelled the exportations of out-modelled vehicles from Europe, America and other industrial nations to underdeveloped world.

There is now a paradigm shift in the scope and definition of waste trade as revealed in the trading between African countries and the technologically advanced industrialized world. Some decades ago, before series of national and regional accords, poor African nations have served as the dumping ground for toxic hazardous waste materials, i.e. barrels of containerized raw sewage, sludge, incinerated ashes, contaminated soils, chemical substances, acids, poisonous solvents from the industrialized world. As reported in Africa Waste Trade Cases by Irene (1996), for an extremely impoverished country like Guinea-Bissau, the prospect of earning $20 million, a substantial added percentage to national income was too difficult to pass up in a toxic waste trade deal.

The trend gradually shifted to the environmentally challenging end-of-life refrigerators, air conditioners and similar equipment. The ozone depleting substances in those devices have contributed significantly to the climate change. Figure 1 shows used vehicles for hinterland movement in Lagos, Nigeria. The Port of Antwerp is said to be the dominant Belgian port and an important gateway for trade with West Africa offering high capacities for both containers and car loading. Antwerp terminals also handle used cars in containers originating from the USA and destined for Africa. Belgian customs authorities assume that 90% of illegal waste shipments are conducted by co-loading electronic waste (e-waste) into used cars, (Öko,2010).

It is no longer news that Sub-Saharan Africa is suffering from biodiversity loss, alongside poverty, war, conflict, hunger, starvation, poor infrastructure, population pressure, and other development challenges. The predominant driving force behind the importation of these waste materials has been the desperate desires of these countries to enjoy those products and be at par socially in one hand, and at the other hand earn import duties in an attempt to alleviate the economic hardships as in Benin Republic where Nigerians go to smuggle vehicles to their country apart from those entering through the seaport. But the challenge now is the trade imbalances and how to manage the dumping of used out-modelled electronics and vehicles on the vast amount of used and unused lands available in many African countries.

REVIEW LITERATURE

The Challenge of Energy Shortage and Global Warming

When we talk of global oil reserves (known discoveries minus cumulative production), Jean (2006) is of the view that Political data display of oil reserves is always on the increase since 1950 till now, while from the technical sources (Scaroni 2006), oil reserves peaked in 1980 and that oil discovery was less than oil production. The truth is that finding new reserves is a nightmare for oil companies and that since 1980 the world oil production has been much higher than oil discovery. Further, IEA (2004) forecasted that energy demand will grow at an average rate of 1.1 % per year through 2030.

Light-duty vehicles generate one-third of global CO_2 emissions and about a third of U.S emissions, (Stott et al., 2004). The Global Fuel Economy Initiative was launched in early 2009. It set a target of improving the average fuel economy (in litre/100km terms) for the global light duty vehicle fleet by at least 50% by 2050 (50by50) and reducing CO_2 emissions from gasoline vehicles from 186g CO_2/km to 93g CO_2/km. A new vehicle fleet average fuel economy level of 4 L/100km by 2030, or something close to it, may be a useful target for most countries to aim at.

After many cars finish their period of service in one country they are moved to other country where they are used for additional years. Earlier studies estimated that in 2005, world trade in used automobiles totalled 5.7 million vehicles – 13% of total worldwide production of new vehicles during that year. ICFI finds that there is more of a "technology gap", though not too large between the new vehicles being sold in more developed and less

developed countries.

Technological responses to the Challenges

There are various governmental and technological responses to the global energy shortage and climate change challenges from the developed countries of the world that are examined below:

Biofuel Series: The global awareness of the fossil fuel combustion contribution to Green House Gases (GHGs) has brought about the discovery of alternative fuels, known as non-conventional or advanced fuels. Some well known alternative fuels include biodiesel, bioalcohol (methanol, ethanol, butanol), chemically stored electricity (batteries and fuel cells), hydrogen, non-fossil methane, natural gas, vegetable oil, and other biomass sources. According to an Independent Institute Research Fellow; Singer F. S (2011), the stimulatory effect on the market for ethanol and other bio-fuels has taken a sizable toll on some of the world's most vulnerable populations which has led to food riots in many developing nations and served to perpetuate poverty throughout the world, (ENDA 2007; FAO, 2004,2008; Biofuel watch, 2007).

Intelligent Transportation Systems (ITS): This refers to the application of communications and information technology to transport infrastructure and/or to vehicles to improve the efficiency of transportation networks (John, 2001). One of the unique qualities of (ITS) is its ability to address the basic movement needs and aspirations of people in an urban environment as well as relating it to the resources which are consumed by transportation systems as well as their accompanying resource capacities.

Sustainable Transport, Green Mobility and Smart City Paradigm

Sustainable urban mobility policies and plans place emphasis on transportation systems that is more benign in terms of their impacts on the environment. They notably promote none-motorised means (walking and cycling) and public transportation, and also aim to reduce the use of private motor vehicles, (Deen and Skinner, 1994). The World Bank Report (1996) defines sustainable transportation as embodying three main components:

i.) The economic and financial component, which includes issues of adequacy of transportation infrastructure funding, organisation, and scale.

ii.) The environmental and ecological component, which includes issues of how transportation investments and mode options influence travel and land-use patterns and how these in turn influence energy consumption, emissions, air and water quality, and habitats.

iii.) The social component, which emphasises adequate access to transportation services by all segments of society.

Green Mobility crusade

This notably promotes non-motorised means (walking and cycling) and public transportation, and also aims to reduce the use of private motor vehicles. The measures implemented represent a mixture of physical changes and user information systems that are designed to reduce traffic volumes and emissions, increase accessibility, improve safety, change travel habits and provide a better quality of life for all citizens. Urban mobility measures, therefore, fundamentally involve changing behaviour, (Shafaat, 2011).

Smart City Movement

Is another city management approach that has been introduced as a strategic device to encompass modern urban production factors in a common framework and to highlight the growing importance of Information and Communication Technologies (ICTs), social and environmental capital in profiling the competitiveness of cities. A city can be defined as ‘smart’ when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory action and engagement, (Caragliu et al. 2009; Giffinger et al. 2007; UCLG, 2012).

End of life vehicles /used vehicles importation into Sub-Saharan African countries

The number of end-of-life vehicles (ELV) emanating from 24 European Union (EU) Member States has been on the increase since the year 2005. For instance, in the years 2005, 2008 and 2010, it was 6.2 million, 12.7 million and 14 million in 2010 respectively as published by European Vehicle Market Statistics, 2013.

A considerable number of vehicles which are de-registered in the member States are exported as used cars. The issue of when does a used car ceases to be product and becomes waste according to the Waste Framework Directive is highly subjective and answered in different ways across EU member states. As a consequence, there are problems regarding the answer to the question if a trans-boundary shipment of a vehicle is subject to the provisions of the Waste Shipment

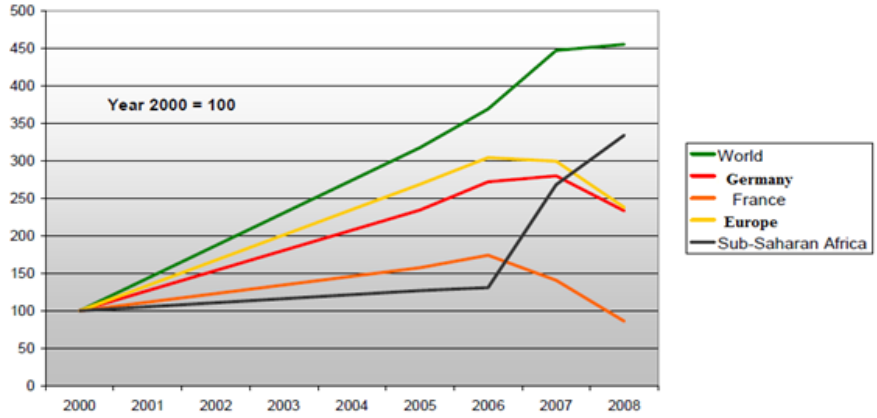

Figure 2. Vehicle imported into Sub-Saharan Africa 2000-2008. **Source**. Oko, 2010.

Table 1. Destinations of exported used cars in Africa.

Destination	Units
Eastern Africa	11,203
Middle Africa	86,561
Northern Africa	12,694
Southern Africa	816
Western Africa	186,960
Total	**298,234**

Source. COMEXT database.

Regulation No 1013/2006.

According to the Austrian "Die Presse", from the year 2010, 400,000 vehicles per year are shipped to Africa (some illegal) by the shipping company Grimaldi (Hamburg). It is also reported that 170,000 vehicles are shipped by Unikai in Hamburg, of which half of this is destined for Africa. This gives evidence that considerable quantities of ELVs are exported illegally from European Member States; predominantly to Africa. This is supported by the inspections activities carried out by IMPEL-TFS project in 2008, where several cases of illegal shipment of end-of-life vehicles were exported, mostly to African countries (EU on ELV, 2010), Figure 2.

Among the ELVs/used vehicles destined for African countries as shown in Table 1, West African countries receive the highest compared to that of South African. This has direct correlation to the poverty level and development of the countries. The complexity of trade with used and end-of-life is largely caused by socioeconomic circumstances that foster trade, which is, at least partially, illegal as captured in the EU Implementation and Enforcement of Environmental Laws reports (IMPEL, 2006). The increase in inter-Sub-Saharan vehicle trade and at the same time falling shares of Europe to Sub-Sahara vehicle trade indicates functioning markets between Sub-Saharan African countries and thus that import vehicles may not enter the countries of final destination. For vehicles, Nigeria is the first major destination country in West Africa.

AIM AND OBJECTIVES

The study aimed at assessing the spatial implication of the growth in second hand vehicle dumped in the sub-Sahara African countries with focus on Nigerian. This will help in proffering a policy and panning solution to ameliorate the menace through the following objectives:

i.) Assess the various governmental planning policies evolved in responding to the global environmental and economic challenges.

ii.) Examine the trend of ELV/used vehicles importation into Sub-Saharan African countries.

iii.) Assess the level of importation of ELV/used vehicles into Nigeria.

iv.) Examine the spatial implication of such accumulated ELV/used vehicles in some selected Nigerian cities.

METHODOLOGY

Studies like this always require the use of both primary direct field survey and secondary data that address the

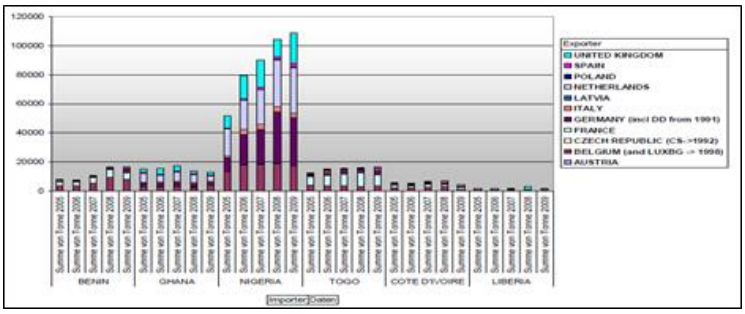

Figure 3. Seaborne import of vehicles designed to carry freight in tonnes 2005 – 2009. EUROSTAT data. Source. www.oeko.de

research subject area. On the field survey, real time remote sensing Google satellite imageries over the two towns selected for study were acquired. The high resolution imageries were subjected to image enhancement to analyse the major features, while Gamine 78 GPS model was used to carry out the field survey for location and area coverage coordinates capturing. The individual area coverage of car dumps and dealers were calculated using the on-screen area computation menu in Idrisi Ande GIS software.

Analysis of ELVs/used car importation into Nigeria

Socio-economic development in the oil-rich Nigeria paradoxically is a mirage with 71% of the population living on less than $1/day, (Amnesty International Report, 2004). The Buhari led regime in 1983 instituted austerity measures that caused severe hardship to the average Nigerian, while political corruption continued unabated, with politicians escaping to Western countries with millions of dollars of government money. Since then, only the government and few affluent people can afford to purchase new vehicle which led to the folding up of some local automobile assembling industries in the country. Hence the importation and smuggling of used vehicles flourish in the country. The quest for private car in the absence of functional mass transit system cum pride of life without capacity to manufacture it, Nigeria has become one of the world's leading destinations for used cars. Much of these vehicles are functional and provided in good faith by well-meaning exporters. But the brokers who arrange these exports often pad shipping containers with ELVs junk, essentially saddling African importers with vehicular garbage.

Nigeria currently spends about N550 billion on the importation of cars into the country annually according to the Minister of Information, Labaran Maku, and the Minister of Trade and Investment, Olusegun Aganga. The minister disclosed that as at 2012, Nigeria spent a total of N550 billion ($3.4 billion) and N660 billion ($4.2 billion) in 2010 on the importation of cars. He added that this showed that car importation takes the biggest share of the country's foreign reserves, followed by machinery.

Also, according to the Nigerian Automobile Manufacturers Association latest statistics, Nigerians imported 96,629 vehicles between January and September of 2012. A breakdown of the figures showed that 22,192 of the vehicles were new and 74,437 vehicles were used ones. For instance, out of the 37,061 used vehicles imported; 20, 448 buses/vans came in; 13,564 trucks, 1,939 SUVs and 1,425 pickups were imported during the period. The statistics also showed that the highest number of used vehicles came in January with 9,107 vehicles, followed by 8,900 used vehicles in February 2012. The month of March had the least figure, of 6,477 vehicles (Figure 3) with Nigeria leading among the other West African countries.

Although the import statistics for used vehicles is a bit fuzzy, the Director-General of National Automatic Council, Mr. Aminu Jalal, gave the total number of vehicles imported into the country annually as 280,000 units in 2012. He specifically said Nigeria was spending N400bn annually on the importation of 200,000 used and 80,000 new vehicles. Consequentially, in a desperate move to keep afloat, the management of the only surviving automobile assembly plant in the country, Peugeot Automobile Nigeria (PAN), has unveiled plans to embark on massive importation of used cars into the country. The company said that since there is a large market for used cars in the country, there is nothing wrong if PAN imported and certified such vehicles for the use of Nigerians. In fact according to PAN, "If ownership of used cars (Tokunbo cars) is the problem of Nigerians, we have plans to bring what we call certified second hand vehicles. It is good as it is done globally and not the road-side Tokunbo market that we have where you do not have the history of the vehicle".

Environmental and Socio-Political implications of used cars' dumps in Nigeria

In term of air pollution impact of imported ELVs/used cars, Sulphates emissions are of major concern. For

Table 2. Area Coverage by major ELVs/used Vehicle Assemblage in Abuja, Nigeria.

Name	Area Covered (m^2)	Location: Eastern/Northern
Pacific motors	519.12	326069/1008178
Ken lupa	486.62	326187/1008175
Jazzy motors	319,12	326365/1008167
Abuja motors	2121.16	326606/1008155
Mtech motors	2001.11	326633/1008153
Jabi 1 motors	3012.72	325923/1005248
Jab motors	1512.12	328568/1008092
Jab 2 motors	998.98	329230/1008686
Okche motors	1549.42	333756/997873
A motors	4941.12	334545/998474
Mansel motors	2111.12	334386/998327
Kia-Dana motors	3541.12	335094/999144
Ineh-mic motors	1054.12	334880/998885
Victory motors	3471.82	330693/1008151
Katape motors	5970.05	327591/1008185
Auto plaza exodus	16538.59	322432/1008714
MA Bature motors	2371.22	322133/1008756
Dustse motors	1919.01	320095/1009844
Arthom motors	1515.15	319366/1009972
Dut motors	6034.76	319787/1010028
Dotal motors	3453.12	319658/1010116
DCT motors	1368.39	319457/1010254
Gwari motors	2594.35	324979/1008263
Embassy motors	912.59	325041/1038235
MD Truck	2921.11	325128/1008233
Kamama motors	3119.15	325659/1008206
Spencer motors	3471.15	325723/1008202
Izasis motors	4009.21	319869/1009873
Shansa motors	3949.25	320249/1009609
Yeco Alafemi	5079.49	320541/1009361
Hill crest motors	2021.81	323135/1008537
Exodus motors	3434.00	315212/1010748
Total motors	11963.68	314623/1010759
More motors	3040.00	314169/1010699
Jabi motors	2000.00	313160/1010536
Dadei motors	308.50	308602/1007541
Flags motors	4523.54	308025/1006971
Acak-Aze motors	590.452	313471/1010389
Kalo motors	5009.42	315062/1010625
AMS motors	4869.92	318529/1010710
Freedom motors	18123.22	316282/1010768
Anmu motors	5071.43	318624/1010714

Source: Author's filed survey, 2013.

engines operated with premium leaded gasoline (up to about 3ml/gal tetraethyl lead additive) the vehicle mass emissions range from about 0.1 to 0.5g/mile, Okeke and Ajayi (1997). These values are significantly larger than mass emission from vehicles operated with unleaded fuel. Ajayi and Dosumu (2002) in another study revealed that between the year 1988 and 2005, Nigeria imported roughly about 379,334 used vehicles which emitted about 1,518,136 NOx, 34,158,060 CO, and 6,072,544 HC pollutants into the atmosphere. Agbo (2011) in his own study of ELV recycling observed that, nowadays, many vehicles are designed not to be disassembled in order to save on initial cost and discourage user ingress due to liability problems, while others are produced as modular units.

Spatially, the determination of land use allocation by the market forces is anti sustainable city development as it is in most Nigerian urban centres. Used vehicle dealers are now occupying most urban open spaces and reserved areas for the display of their wares. Abuja, the federal capital city of Nigeria is located within the Federal Capital Territory (FCT) as a planned city. It officially became Nigeria's capital on 12th December 1991 (replacing Lagos which is similar to Brazil building its capital at Brasília) with an estimated population of 776,298 as at 2010 (National Bureau of Statistics, 2008), has a total area

Figure 4. Used vehicles displayed for sale along Kubwa express way, Abuja.

Figure 5. ELVs/used cars major area coverage in Minna.

Table 3. Area Coverage by major ELVs/used Vehicle Assemblage in Minna, Nigeria.

Name	Area Covered (m^2)	Location: Eastern/Northern
Gwari motors	40000.10	63233.42/93908.50
TeeJay motors	6000.26	63232.70/93816.71
Yasidac motors	5000.11	63225.99/93828.32
Mustapha motors	5000.01	63352.72/93526.37
Ok motors	6000.21	63357.68/95313.72
Western bypass	34000.28	63353.98/93450.31
City motors	26000.21	63351.38/93453.05
Western by-pass 1	15000.14	63226.44/93521.61

Source: Author's filed survey, 2013.

coverage of the city as 250km^2. But because it is the city of the affluent people, most of the vehicle dealers have their branches scattered all over the city taking possession of any available open space for the display of their goods.

The approximate total area coverage of these dealers is 1.53km^2 (about 0.62% of the city land area) for such car dealer open market operation (Figure 4) and table 2 for the geographical locations of the major vehicle dealers and their area coverage. This is apart from the ELVs and private car junks at mechanic workshops and organization yard; virtually all private and public structures are landscaped with one or more ELVs in the city (Author's field survey 2013)

In Minna, the state capital of Niger State that is about 200km from Abuja, which has an estimated urban land area of about 100 square kilometres and a population of about 300,000 in 2006 (NPC, 2010). There are about seven (7) major vehicle dealers occupying about 0.14km^2 of land while other motor mechanic junk shops cover about 2.15km^2 in the town, see Figure 5 and table 3. This is also apart from the ELVs and private car junks at mechanic workshops and organization yards. The unfortunate thing is that these junks of ELVs are the abode of criminals and dangerous reptiles.

RECOMENDATION

The federal government should as a matter of urgency ban the importation of ELVs as the country does not have the environmental friendly technological capability to

recycle those used cars and ELVs.

If African countries will ever be economically sustainable and financially independent, the proposed ban on used vehicles aimed at reducing the huge amount expended annually should be doggedly implemented urgently to redress the trade deficit that is currently sky rocketing, (Kumolu, 2013).

The government should as matter of urgency place capital punishment on used vehicle smugglers across African countries border that is higher between Nigeria and other West African countries.

The Nigerian engineers, who were at the recent Shell Eco-Marathon in Rotterdam, Netherlands study trip to design, build and test ultra-energy-efficient and environment-friendly vehicles by 2014 should be empowered to realize the country's home-built vehicle dream.

The industrialized developed countries should develop a strategy to upgrade those useable deregistered vehicles; while at the same time be ready to pay the price of recycling those ELVs because the destruction of environment in African through informal recycling activities will boomerang globally (Climate change).

REFERENCES

(2007). Smart cities,Ranking of European medium-sized cities. http://www.smart-cities.eu/. Vienna: Centre of Regional Science.

Agbo COA (2011). Recycle Materials Potential of Imported Used Vehicles in Nigeria.Niger. J. Technol.,30(3):118-129.Availabe on http://diepresse.com/home/wirtschaft/international/492556/print.do

Ajayi AB, Dosunm OO, 2002. Environmental hazards of importing used vehicles into Nigeria. In the Proceedings of International Symposium on Environmental Pollution Control and Waste Management 7-10 January 2002, Tunis (EPCOWM'2002), pp.521-532.

Amnesty International 2004. Nigeria: human rights and oil in Nigeria. http://web.amnesty.org/library/Index/ENGAFR440232004?open&of=ENG-398 (accessed October 2007).

Biofuel watch, 2007. Agrofuels: towards a reality check in nine key areas.Available on http://www.corporateeurope.org/docs/AgrofuelsRealityCheck.pdf

Brussels Commission of the European Communities, 2006.Keep Europe moving – Sustainable mobility for our continent, Mid-term review of the European Commission's 2001 Transport White Paper. Communication from the Commission to the Council and the European Parliament. Brussels. Science and Technology for Sustainability Program Policy and Global Affairs; Summary of a Workshop. http://www.nap.edu/catalog/12806.html

Caragliu A, Del Bo, C, Nijkamp P (2009). Smart cities in Europ". Serie Research moranda 0048 (VU University Amsterdam, Faculty of Economics, Business Administration and Econometrics).

Deen TB, Skinner RE, 1994. A paradigm for addressing change in the transportation environment Transportation Research News. p.174.

ENDA, 2007. Biofuels for Africa: An illusion or a sustainable option to reduce energy vulnerability and alleviate poverty. http://www.endaenergy.org (accessed June, 2011)

European Transport Policy (EU) on ELV, 2010. Economic and Scientific Policy Environment, Public Health and Food Safety End of Life Vehicles: Legal Aspects, National Practices and Recommendations for Future Successful Approach. IP/A/ENVI/ST/2010-07. http://www.abendblatt.de/politik/deutschland/article165432/Erste-Betrugsfaellemit-Altautos.html)

European Vehicle Market Statistics, 2013. Pocketbook http://www.theicct.org/sites/default/files/publications/EU_vehiclemarket_pocketbook_2013_Web.pdf

Food and Agriculture Organization (FAO), 2004. Unified Bioenergy Terminology (UBET).

Food and Agriculture Organization (FAO), 2008. Special report: markets, prices, food situation and prospects for Benin, Niger and Nigeria. http://www.fao.org/docrep/010/ai464e/ai464e00.htm ftp://ftp.fao.org/docrep/fao/007/j4504e/j4504e00.pdf

Giffinger R, Christian F, Hans K, Robert K, Nataša P, Evert M

IMPEL, 2006. IMPEL-TFS Seaport Project II: International Cooperation in Enforcement Hitting Illega Waste Shipments. Project report September 2004 – May 2006. June 2006. http://www.weee-forum.org/doc/key_figures_2008.pdf

IMPEL, 2008. IMPEL-TFS Enforcement Actions I: Enforcement of EU Waste Shipment Regulation "Learning by doing". June 2008. Final Report.

IMPEL, 2009. IMPEL Project Practicabillity and End forecability of the

International Energy Authority (IEA), 2004. Biofuels for transport: an international perspective. Paris, France. Available www.iea.org/textbase/nppdf/free/2004/biofuels. Pdf.

IPCC ,2007a. Summary for Policymakers. In Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (M. L. Parry, O. F. Canziani, J. P Palutikof, P. J. van der Linden, and C. E. Hanson, eds.), Cambridge University Press, Cambridge, United Kingdom.

IPCC, 2007b. Summary for Policymakers. In Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, and H. L. Miller, eds.), Cambridge University Press, Cambridge, United Kingdom, and New York.

Irene B, 1996. Africa Waste Trade Cases. http//www1.amerinan.edu/Ted/3_2_afriawastetrade.HTM

Jean L,2006. Fossil fuels: what future A paper presented at Beijing Workshop On "Global Dialogue on Energy Security" on 16-17 October 2006, organized by The Dialogue International Policy Institute, China Institute of International Studies, Beijing.

John N, 2001. Technology and transportation: The dynamic relationship. Discovery Institute, Vol. X No. II. www.discovery.org

National Research Council (NRC), 2001. Climate Change Science. An Analysis of Some Key Questions. National Academy Press,Washington, D.C.

National Research Council (NRC), 2007. Evaluating Progress of the U.S. Climate Change Science Program: Methods and Preliminary Results. National Academies Press,Washington, D.C.

National Research Council (NRC), 2009. Understanding And Responding to Climate Change. Available on http://www.ethanolrfa.org/industry/statistics/#

NRC (2008). Transitions to Alternative Transportation Technologies— A Focus on Hydrogen. Pdf request from National Academy of Sciences. http://www.nap.edu/catalog/12222.html.

Okeke BO, Ajayi AB (1997).A Quantified Study of Environmental Pollution Emanating from Imported Second-hand Cars, Refrigerators, and Air conditioners in Nigeria (1988-1992). M.Sc. Thesis. University of Lagos, Lagos,Nigeria.

Öko I, 2010. Component 1: Flows of used and end-of-life e-products from Germany, The Netherlands and Belgium. Institute for Applied Ecology. Available on www.oeko.de

Scaroni, 2006. Access to energy to Markets, Technology and Capita. 2nd International Energy Business Forum III Session: http://www.eni.com/en_IT/attachments/media/speeches-interviews/04ENG-Doha-Ago2006-Paolo-Scaroni.pdf

Shafaat A (2011). Towards green mobility. In Khaleej Times Online 14 April 2011.

Singer FS (2011). Good Bye, Kyoto (American Thinker).The Lighthouse,13(11).

The Committee of Digital and Knowledge-based Cities of United Cities and Local Governments (UCLG),Bilbao, 2012. Smart Cities Study: International study on the Situation of ICT,Innovation and Knowledge in Cities.

WEEE Recast Proposal, 2009.
World Bank (1996). Sustainable transport: priorities for policy reform. Development in practice series, The World Bank, Washington, USA.