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Title	Impediments to Adopting Sustainable Transportation in Developing Countries – The Case of Tricycles in Nigeria
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Abstract	<p>The aim of this paper is to discuss the impediments to adopting sustainable transportation in developing countries using tricycles in Nigeria as a case study.</p> <p>Two Executives of Chongqing Beyond Company in China, Marketing Manager of Kayemel Tricycle in India, Brand Manager of keke POeT, the chairman of Tricycle Association, Idewu Routes, the chairman of Tricycle Association, Liverpool Routes and a member of Transport Committee, Obafemi Awolowo University (OAU) were interviewed. Data was also gathered through questionnaires for a total of fifteen drivers of different tricycle types on different route and a total of twenty passengers picked at random from Idewu Route, Liverpool Route and OAU campus.</p> <p>It was discovered under the lenses of relevant Green Marketing literature that the data supports some theoretical findings in their respective fields but also counters some other theoretic findings. It came to the conclusion that concept of dominant demand, commercial stakeholders' cooperation and effective quality program advocated by some of the green marketing literature are very effective marketing tactics in the success of green tricycles adoption in Nigeria.</p>
Keywords	Sustainable Transport, Tricycles, Stakeholder Cooperation, Dominant Demand, Quality Program
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ABBREVIATIONS AND TERMINOLOGY

AFV	Alternative Fuel Vehicle
CKD	Complete Knock Down
CO	Carbon Mono Oxide
CO ₂	Carbon Di Oxide
FEPA	Federal Environmental Protection Agency
keke	Tricycle
LNG	Liquefied Natural Gas
NAPEP	National Alleviation Poverty Eradication Program
nmVOC	Non-methane Volatile Organic Compound
NO _x	Nitrogen Oxides
OAU	Obafemi Awolowo University
POeT	POeTSolvers tricycle brand
SKD	Semi Knock Down
TCO	Quality and Environmental Label
VOC	Volatile Organic Compound



PICTURE 1.0: A frontal-side view of the prototype design for keke POeT Tricycle

1.0 INTRODUCTION

The concept “green” or “ecological sustainability” is not a priority in developing countries especially in Africa where issues like hunger, corrupt governance, infectious diseases, bad road network, portable drinking water, unstable electricity, poor communication system, etc are quite prominent. Due to this fallout, the ideal called “ecological sustainability” may have been kicked under the carpet, giving room to leaders that act like the proverbial Esau that sold his birthright for a morsel of porridge. Since The Brundtland report (WCED, 1987) defines sustainable

development as development that meets the needs of the present without compromising the ability of the future generation to meet their needs, developing countries should be the epicenter of the green revolution. The developing countries as the name implies is “developing” thus may have less congeal perspective than the developed world. The reality may not be in consonance with the aforementioned statement because the demand for ecological products and sustainable business activities is determined by an increase in the customer awareness concerning environmental issues, as well as by stricter regulations introduced by national governments especially in industrially developed countries (Polonsky et al, 1998). Consumer awareness (which is lacking in developing countries) may be the first driver to sustainable consciousness.

However, this report looks beyond consumer awareness noting that sustainability in marketing covers a diverse range of issues such as consumerism, environmentalism, regulation, political and social marketing (Carrigan and Attala, 2001): Some of the elements impeding sustainable transportation include the country’s commercial stakeholders’ cooperation, inadequate quality program by the suppliers of the sustainable transport and non-implementation of the concept called “dominant demand”.

Due to direct observation and participatory observation (Yin, 2003), tricycles in Nigeria is used as a case study. The commercial stakeholders include Tricycle Suppliers, Government, Tricycle Operators, Tricycle passengers, leaders (Chairmen) of local routes, Tricycle Manufacturers, Tricycle Spare Part Suppliers, Fuel Station Operators and Tricycle competitors.

1.1 TRICYCLES IN NIGERIA

The diffusion of tricycle brands in the Nigerian market can be attributed to the Federal Government's initiative in 2002 to ease transportation problems and create avenue for self-employment for the unemployed and the jobless (Sun, 2009). However, some states in Nigeria have decided not to adopt the tricycle (e.g. Edike, 2009) while some states have whole heartedly adopted its use (Imo, 2009). This commercial tricycle scheme is popularly known as "Keke NAPEP". Keke is a native word for tricycle while NAPEP is an acronym for National Poverty Eradication Programme (Josiah, 2008).

It is noteworthy to mention that majority of commuters use buses, tricycles and motorcycles for movement while some use the taxis. The increase in urban population, particularly those residing in smaller settlements away from city centers is the primary reason why there is demand of the services of motorcycles and tricycles. Some passengers however prefer the tricycle to motorcycle as a result of its relative affordability, availability and safety (Sun, 2009).

In most cities in Nigeria, it is such that the city centre is congested with business premises while the fringes are occupied by low and medium income earners. Faced with this, commuters are forced to make longer trips on vehicles and trek longer distance of a consecutive estimate of two trips per person. With the above, it is clear that there is impending mobility crisis arising from demand/supply gap. The emergence of various modes of transportation gave rise to tricycles especially in view of its flexibility and the need to cope with socio-economic trends.

Most tricycle brands in Nigeria are motorcycles with side cars, which have the legal capacity of 5 passengers including the driver. Tricycles are a popular mode of public transportation among

commuters due to their high accessibility, availability, affordability, and convenience. Being much less expensive in fares than other vehicles, they play an important role in Nigeria's overall transportation system. Tricycles are the most convenient transportation in rural areas especially from the central town to the villages. Within big cities, they are usually located in smaller roads, lanes and alleys where other public transportation do not or cannot operate.

Despite the need to popularize the tricycles over the motorcycles, which are characterized by fatal crashes and other forms of vulnerabilities, these three wheel vehicle poses environmental and social challenges such as fine particles emission, noise, absence of paved roads, lack of parks and terminals on designated routes for hitch-free conveyance of passengers.

There are two general types of tricycles in operation in Nigeria; two stroke and four stroke powered tricycles. A two-stroke engine is an internal combustion engine which completes the thermodynamic cycle in two movements of the piston (compared to twice that number for a four-stroke engine) (Wikipedia, 2009). The two-stroke internal combustion engine differs from the more common four-stroke engine by completing the same four processes (intake, compression, combustion, exhaust) in only two strokes of the piston rather than four. This is accomplished by using the beginning of the compression stroke and the end of the combustion stroke to perform the intake and exhaust functions. This allows a power stroke for every revolution of the crank, instead of every second revolution as in a four-stroke engine. For this reason, two-stroke engines provide high specific power, so they are valued for use in portable, lightweight applications such as chainsaws as well as large-scale industrial applications like locomotives.

The two-stroke powered tricycles available in Nigeria are carbureted and carbureted-hybrid two stroke tricycle while for four-stroke powered tricycle, we have carbureted with both gasoline and diesel option and carbureted-hybrid four-stroke powered tricycle.

1.1.1 The Supply Chain of Tricycles in Nigeria (using keke POeT as a case study)

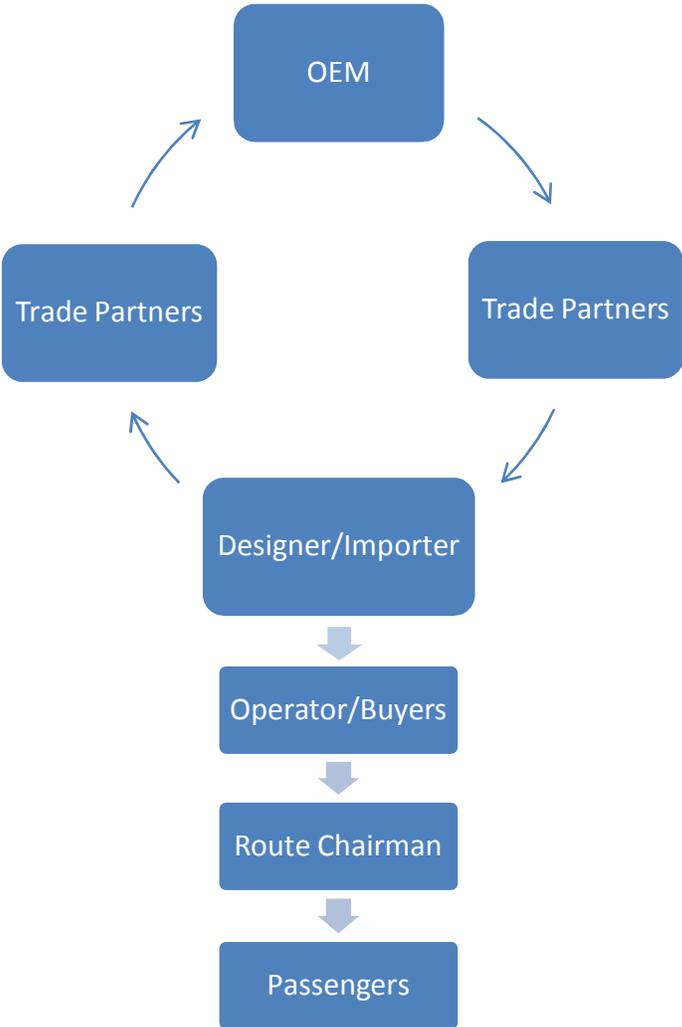


Figure 1.0: the Supply Chain of keke POeT Tricycles in Nigeria

Figure 1.0 above depicts the supply chain of most tricycles in Nigeria. Every order or designs are initiated by the importer/designer from Nigeria to the Trade Partners in China but for countries like India, the importer speaks directly to the factory and the tricycle designs are preset. The supply chain above represents the case of keke POeT: The keke POeT is one of the very few demand shapers for sustainable tricycles in Nigeria. The keke POeT is a carbureted-hybrid 4-stroke powered tricycle. It is designed by the POeT Solvers Team in Nigeria but manufactured by OEMs in China. All designs are sent to the OEM in China through Trade Partners (Chongqing Beyond Company Limited) who are in charge of deal negotiations. Manufactured tricycles are imported from China and sent to the POeT Solver's Warehouse. Wholesalers and retailers alike procure keke POeT for distribution. All commercial tricycles operate in routes and each route has a management body headed by the chairman. In Lagos, which is the commercial nerve center of Nigeria, there are over a hundred routes operating and each route has its own rules. The drivers (the consumers) buy the tricycle mostly on hired purchase and register with the Chairmen of the routes they want to ply; they get their returns from passengers (the end consumers) of the tricycles.

Understanding the supply chain of keke POeT is paramount to this paper and would aid readers understand more of the adoption process of sustainable tricycles and stakeholders involved. Moreover, this paper also investigates some of the commercial stakeholders involved in tricycles in Nigeria highlighting on the impediments to adopting sustainable transportation in Nigeria.

2.0 RESEARCH PURPOSE AND QUESTION

The purpose of this paper is to discover the impediments to consumer adoption of sustainable transportation in developing countries using tricycles in Nigeria as a case study. This paper would attempt to answer the following questions below:

1. Can sustainable tricycles market be developed in Nigeria considering cost implications and green marketing guises?
2. What is/are the most effective strategy for developing sustainable tricycles market in Nigeria?
 - a. What role does innovation play to convince Nigerian consumers?
 - b. How does geographical location play a role in consumer adoption of sustainable transportation?
3. How does quality control program influence consumer adoption of sustainable tricycles?

3.0 METHOD

Given the exploratory nature of this report, a qualitative case study approach was adopted (Yin, 2003). Sustainable tricycle brands in Nigeria were investigated. In order to investigate the research objectives stated above. Primary data and secondary data have been collected and analyzed. The first stage of the research process was an extensive search of articles, reports,

journals, books and professional information concerning sustainable transportation, tricycles and green marketing.

In the second stage of the research, evidence was collected through the following sources; documentation, interviews, direct observation, participatory observation and physical artifacts (Yin, 2003). Interview protocols were developed (Becker, 1998; Merton et al, 1990; Rubin and Rubin, 1994; Yin, 2003) for two Executives of Chongqing Beyond Company in China, Marketing Manager of Kayemel Tricycle in India, Brand Manager of keke POeT, the chairman of Tricycle Association, Idewu Routes, the chairman of Tricycle Association, Liverpool Routes and member of Transport Committee, Obafemi Awolowo University (OAU). Data was also gathered through questionnaires for a total of fifteen drivers of different tricycle types on different route and a total of twenty passengers picked at random from Idewu Route, Liverpool Route and OAU campus.

The interview with the two executives of Chongqing Beyond Company in China took place in their offices in Chongqing, China. Interview questions were sent to the two executives prior to the appointment to make them very comfortable with the questions. The interviews were semi-structured because of familiarity but it had strong official undertone. The executives were interviewed together for about 2 hours and their answers were recorded on paper.

For Kayemel Tricycles, India, a letter stating the purpose of the study as well as interview question was sent to the Marketing Manager, followed by personal phone calls to schedule date and time for the interview. The interview was held online through Google Talk chat software via the internet and it took about 1 hour.

Series of interviews were conducted with the Brand Manager of keke POeT. All appointments were held in their office in Apapa. Interview questions were also given to the brand manager prior to the appointment to make him very comfortable with the questions. The interviews were not structured because of familiarity and the role of independent consultant for the company made it easy to access the Brand Manager. However, all answers given by the Brand Manager were documented.

Questionnaires were given to 5 drivers/operators on each route (Idewu Route, Liverpool Route and OAU Campus). The five operators answered the questionnaires together in their secretariat but each tricycle operator was given each questionnaire to fill. Questionnaires were also developed for passengers but they were given at random and only a total of 20 passengers filled the questionnaires (2 from Idewu Routes, 5 from Liverpool and 13 from OAU campus).

For OAU, a letter stating the purpose of the study as well as interview question was sent to the Coordinator of Transport Committee, followed by personal phone calls to schedule date and time for the interview. A member of the committee attended to my questions. The interview was held in their office in Ife and it was well structured.

3.1 QUESTIONNAIRE DESIGN

The questionnaire was prepared in English language. The respondents were informed about the purpose of the interview and were assured that the data provided was strictly for the purpose of the research and would be kept confidential.

The questionnaire included 15 close ended questions for the tricycle operators and 8 close ended questions for the tricycle passengers. The questions were targeted at finding the general preference of tricycle operators and passengers at defined circumstances. The brand of the tricycles rather than the displacement/engine types were used in the multiple choice answers provided; this is for easy recognition of the tricycles amongst the passengers and operators alike.

The questions were read out to the operators in native language and the answers were marked to correspond to the feedback.

3.2 RESEARCH QUALITY

Due to systematic and random errors coming from the researcher, stakeholders and the data collection instruments, the results of the research cannot be 100% accurate. Though interviews are essential sources of case study information (Yin, 2003), they appear to be guided conversation rather than structured queries – one may be pursuing a consistent line of inquiry but your actual stream of questions is likely to be fluid rather than rigid (Rubin and Rubin, 1995). This may increase redundancy in information acquired leading to ambiguity and “focus” problems. It should also be noted that interviews are subject to common issues of bias, poor recall and inaccurate articulation.

However, corroborating interviews with direct and participatory observation strengthens the quality of this research: Most of the sites were visited and photographs were taken. Although being a participant has its advantages, special care was taken to avoid potential biases: assuming positions or advocacy roles contrary to the interests of good scientific practice; following a

commonly known phenomenon and becoming a supporter of the organization being studied; not taking notes due to sufficient time and raising questions about events from different perspective; finding it difficult to be at the right place at the right time; either to participate in or observe important events (Yin, 2003).

Documentations and Physical artifacts in form of tricycles were collected for review.

3.3 LIMITS OF STUDIES

1. The case of sustainable tricycle adoption in Nigeria is an ongoing research that started in 2008.
2. It is noteworthy to mention that I was an independent consultant for POeT Solvers Limited, the makers of one of the tricycle brands in Nigeria called keke POeT. This deepened my knowledge in the tricycle business and also increased my familiarity with aforementioned company but in this report, I tried to be as objective as possible in my observations.
3. Not all the economic stakeholders in Nigeria were interviewed to get their perspective on sustainable tricycle adoption; inferences were drawn from the ones we could get.

4.0 LITERATURE REVIEW AND THEORETICAL BACKGROUND

4.1 Sustainable Transportation

Sustainable transport means finding ways of meeting transportation needs that are economically viable, environmentally sound and socially equitable (Tegart and Jolley, 2001; World Bank, 1996). World Bank (1996) further defines the above concept in the following way: “Economic and financial sustainability requires that the resources be used efficiently and that assets maintained properly. Environmental and ecological requires that the external effects of transports be taken into account fully when public or private decisions are made that determine future development. Social sustainability requires that the benefits of improved transport reach all sections of the community”. Simultaneously achieving these three goals (economical viability, environmentally sound and socially equitable) is not always easy, and difficult trade-offs may be required but Byrne and Polonsky (2001) submits that for sustainable transportation to work, all stakeholders groups that impact the commercial adoption must cooperate together. Chilton (2000) affirms Byrne and Polonsky’s (2001) submission saying that achieving broad based sustainable solution requires multiparty action, thus a network or systems approach involving all interrelated stakeholder is essential. Yosie and Herbst (1998) takes it to a different level and states that, “Stakeholders involvement in environmental decision making by the government and industry is inevitable and will continue to expand”. This means that for sustainability to function, adversarial stakeholder behavior would need to lessen. Byrne and Polonsky (2001) grouped these stakeholders into six broad categories:

1. Government
2. Corporate (the potential producers)

3. Collaborators
4. Competitors
5. Activist Group and
6. Consumers

1. Government

Successful adoption of sustainable products can be achieved with what Hollander (2003) calls dominant demand tactics; dominant demand refers to the phase in the history of a social or sustainable innovation when a coalition of demand shapers and other actors on the “demand side” agree (by law, contract, scientific consensus, credible labeling or otherwise) that a technical/organizational response to a demand for a sustainable solution (in the abstract sense) is good enough so that it shall be rewarded by making the market coalesce (Hollander, 2003). Chief amongst these tactics is government involvement and they include regulations, policies, contracts, tax, subsidies and public procurement.

Government Regulation is a very effective way of creating demand for green product/service especially at the end of the diffusion process when it is necessary to get the laggards in line and also very important in the early stages (Hollander, 2003). Hollander (2003) also describes some of the intricacies of creating dominant demand via regulation; the demand shaper might lose her impact on the process because the process might be time consuming and inflexible. These regulations include proposing a limit or even prohibiting greenhouse gas emissions and noises by automobile.

According to ADB (2005) research on air and noise pollution reduction on tricycles in Quezon and Puerto Princesa cities of Philippines, the recommendations are all in the purview of government regulation: Local Government Unit-led maintenance program for tricycles; mandatory orientation of tricycle drivers; tricycle volume reduction program; restriction on new and renewal tricycle franchise application with engines more than 15 years and promotion of alternative transportation.

Government regulation is pivotal to sustainable transport adoption but not absolute. According to Byrne and Polonsky (2001) on Alternative Fuel Vehicle (AFV), “government groups may enact and enforce legislation, easing the transition from the traditional fuel vehicle to various forms of AFVs. However, there must be a corporate willingness to produce, and provide fueling options for, AFVs; otherwise end-users will not have the option of purchasing an AFV. Even if these occur there must also be consumer demand, which might involve consumers radically re-evaluating how, they use automobile”

Another dominant demand tactics is contracts; this provides continued impact for demand shapers; it is mainly relevant when discussing questions with a strong and clearly visible element of social sustainability (Hollander, 2003). Recent example can be found when the automakers in the United States wanted financial bailout and the legislative arms signed a contract with the automakers to produce hybrid cars. Although hybrid cars are false summit to green innovation, they are however a step in the right direction.

Public procurement is a very important way to convince the public of the effectiveness of green products/service. A government body like the Swedish Agency for Administrative Development

to tie state procurement in the 1980's to the demand levels of TCO represented a major reward to enviro-progressive producers (Hollander, 2003)

Taxes and Subsidies is a very important way of giving green products/service an edge over their competitors by reducing the cost of green products through tax rebates and subsidy. This encourages other companies to go green.

2. Corporate

Corporate stakeholders are the current (and potential) producers of sustainable transport systems. The technology for various types of sustainable transport already exists; it is really only a question of which one is most market-applicable, for which answer must consider the interplay of corporate commitment, government requirements, and consumer need/want satisfaction (Byrne and Polonsky, 2001).

ADB (2005) cited a number of technology options to consider for sustainable tricycles including retrofitting to direct injection systems; shift to alternative fuels such as gasoline-ethanol blends, compressed natural gas, liquefied petroleum gas, and two stroke oil interventions such as use of premix oil-gasoline fuels, high quality oil and plant based oil among others. In the long term, hybrid electric tricycle, electric tricycle and four stroke powered tricycles are in consideration for sustainable tricycle (ADB, 2005) but Biona and Argamosa (2006) submits that retrofitting two stroke powered tricycle to direct injection technology provides the most promising medium term position.

3. Collaborators

For the producers of sustainable transport, these collaborators may include fuel suppliers, infrastructure providers, suppliers of materials, alternate fuel suppliers, and labor, and market distributors. Clift and Wright (2000) assert that in many situations, collaborative stakeholders hold the key to most large-scale environmental enterprises in the twenty-first century.

Providers of infrastructure are key collaborators and can supply range of support inputs such as recharging stations, special lanes for bicycles, tricycles and involve the broadest systems approach to solving complex environmental issues (Lober, 1997). Another key collaborator group involves the producers/suppliers of necessary materials and parts because full-scale production of sustainable transport may only be cost effective when outsourced.

Another very important discuss in sustainable transport is that downstream maintenance systems for AFVs are developed to ensure a long-term market viability of new vehicle (Ewing and Sarigollu, 2000). Suitable sustainable distribution outlet is also an important consideration in the collaborative group because care must be taken that the target market(s) have sufficient access to sustainable transport products (Zikmund and d'Amico, 1998).

4. Competition

When developing and distributing innovative product, the competitive climate must always be considered (Grant, 2005; Porter, 1985; Kotler and Keller, 2006; Foster and Kaplan, 2001). Competition for sustainable transportation can include a diverse range of entities but for the purpose of discussion, this paper limits itself to existing tricycle producers and fuel producers. In order to economically mass produce sustainable transport products, it is imperative that all existing and potential entrant of sustainable transport producers must check against traditional transport producers (Ottman, 1998). This means that if the market is relatively small, then it may be worth considering alliances amongst competitors to ensure that market is not oversupplied, resulting in players rapidly entering and leaving the market.

Another group of competitors to sustainable transport are producers of traditional fuel transportation. The best way to tackle this competition is to form alliances with these traditional fuel producers to establish alternative fuel stations. These traditional fuel producers may redefine themselves as “energy” providers, encompassing alternative fuel within the product line. Thus competition should not be seen as a barrier but rather as a potential for partnership (Fisk, 1988, Ottman, 1998)

5. Activist Groups

Activism may invoke direct consumer response, public relations and media coverage, or even legal means in order to be heard (Ewing and Sarigollu, 2000; Ottman, 1998). The pressure caused by activism is related mostly to safety issues (Boivie, 2007; Stern, 1999). Boivie (2007)

analyses how a small development unit of a Swedish Trade Union Federation – TCO – has been able to exert a major influence on the global IT environment through environmental labels TCO 92, TCO 95, TCO 99 and TCO '03: The TCO labeling system includes requirement within four areas – energy efficiency, environment, low electromagnetic field and ergonomics.

The importance of labeling to create dominant demand can be exemplified through TCO four generations (92, 95, 99, 03) which have pressured providers of sustainable innovation to move on to “higher altitude summits” (Hollander, 2003). Boivie (2007) enumerates how effective the TCO labeling tactical approach is to Visual Display Unit (VDU); saved energy and saved approximately 25 million tons of carbon dioxide in (2006); reduces brominated and chlorinated flame retardants on VDU; improve visual ergonomics and picture quality and reduce electric and magnetic field significantly compared with normally occurring “radiation levels”.

Apart from labeling, it is also possible that firms may be more successful bringing about green products by cooperating with activist group (Hartman and Stafford, 1998) providing each group’s autonomy cannot be compromised. The case revealed by Hollander() of an NGO initiated sustainable innovation is a typical example where the Swedish Society of Nature Conservation teamed up with Fujitsu Siemens to provide the first environmentally friendly computer motherboard free of Brominated Fire Retardant.

Another effective way of ensuring adoption of sustainable transport is through the mass media: There is no stronger way to create dominant demand than to create awareness of environmental issues. Consistently and tenaciously promoting green causes in the media will eventually cause a favorable shift in the minds of the consumer towards green products/services.

Activism can also take the form of Scientific Consensus where group of notable scientist publicly lean towards sustainable transport: This is another very important way of creating dominant demand; Hollander (2003) highlights a good example of how scientific consensus played a role in the success of mercury- free coatings for seeds in Sweden of the 1960s.

6. Customers

Consumer adoption of environmentally-linked business activities and expectations, are notoriously difficult to predict (Ottman, 1998; Carrigan and Attala, 2001). Carrigan and Attala (2001) deepens this argument further by concluding from their research that most consumers pay little heed to sustainable considerations in their purchase decision-making behavior. It further asserts that although consumers may express a desire to support ethical companies and punish unethical companies, their actual behavior often remain unaffected by ethical concerns.

Despite Carrigan and Attala's (2001) assertion, there are many other earlier literatures that believe that products were purchased on the basis of its' ethical reputation (Mason, 2000; Forte and Lamont, 1998; Creyer and Ross, 1997). In order to balance these literatures' assertions based on their research and studies, Boulstridge and Carrigan (2000) introduces a new element into the argument by saying consumers may express willingness to make ethical purchases but the reality is that social responsibility is not the dominant criteria in their purchase decision; in terms of vehicular concerns; price, maintenance availability/cost, range of vehicle, power/acceleration, fuel availability, refueling, recharging time, stylistic and socio-cultural considerations, safety and

“greenness” (or provable non-polluting characteristics) (Ewing and Sarigollu, 2000) of the products outweigh ethical criteria in consumer purchase behavior. Hence, consumer requirements regarding these impediments must be taken into account when contemplating mass production of sustainable transport product.

It is noteworthy that Sustainable transport producers are themselves consumers, as they make purchase decisions from a range of options, from sustainable raw materials to non-polluting process. In addition, they determine what proportion of resources will be allocated to more efficient, less wasteful production (Byrne and Polonsky, 2001). Therefore, it is critical that a total systems approach considers both upstream and downstream consumers.

Consumers play the major role in the existence of any firm so ways to improve consumer purchase behavior of green products should be taken seriously. When considering the other stakeholders in the process, though, it is clear that many impediments to the purchase decision must be overcome before market presentation to the consumer, considerably easing the likelihood of adoption.

Carrigan and Attala (2001) outlines some key points for companies interested in ethical and green marketing to improve consumer purchasing behavior towards it;

1. Consumers express willingness to purchase ethically but do not wish to be inconvenient in order to do so.
2. Many consumers are cynical about differentiation between companies on ethical grounds. Companies need to find ways to convince consumers about their ethical integrity.

3. Consumers need to be convinced that their purchase behavior can make a difference in ethical terms in order to be persuaded to buy.

4.2 Green Marketing – Guises and Disguises

Apart from Carrigan and Attala's (2001) findings, other managerial research identified the significant gap between consumer concern and actual purchasing (Crane, 2000; Mintel, 1995; Peattie, 1999). Consumers are very important towards companies' sustainability plan so companies must discover what causes the existence of this significant gap. One of the causes highlighted by Peattie and Crane (2005) is consumer's distrust in companies green initiatives and highlights five failed manifestation of green marketing:

1. **Green Spinning:** This is a situation when companies go out on a public relations (PR) offensive to counter criticisms of their green stance using glossy brochures, lobbying and countless press releases in order to persuade the skeptical public of their environmental credentials. Peattie and Crane (2005) identifies this approach has not being holistic but compartmentalizing green marketing within the PR function, a place where there is little opportunity to affect product, production or policy decision. There is also a degree of conservatism amongst practitioners of green spinners where they fail to go out and debate with, engage and listen to various stake holders group suggest a rigid adherence to common practices and established mindset. By seeking to discredit dissenting voices, they made the classical marketing error of looking inward when many answers to be found were based on looking outside of the organization.

2. **Green Selling:** In this scenario, the same products continued to be produced but green themes were added to promotional campaign in order to take advantage of any environmental concerns of the consumers. They hardly seek alternative products but focused on identifying environmental benefits of existing products. Facile, meaningless and unproven green claims were slapped on unchanged products in failed attempts to boost sales, leading to mounting consumer cynicism and suspicion, and concern about a potential consumer backlash. Some firms have developed certification programs to authenticate their claim independently to gain consumer confidence but there are now different logos allegedly certifying various environmental benefit and consumers are understandably confused.
3. **Green Harvesting:** Many companies go green to save cost; energy and material input efficiencies, packaging reductions, and logistic rationalization provide strong incentive for firms to develop their environmental programs. Green harvesting symbolizes deep cultural fixation on cost reduction, short-term profitability, and shareholder value; this tend to exemplify a typical conservative, finance orientation. If companies were to move into a green position, they had to embrace more radical change and invest more management time and money to achieve it (Shelton, 1994).
4. **Enviropreneur Marketing:** This is environmental entrepreneurs; this scenario occurs when companies in their rush to bring greener offering to the market and in their belief in the inherent worthiness of such products, the enviropreneur forgets the key constituency – the consumer. They rely on studies that suggest that consumers were ready, willing and able to buy green alternatives but consumers wanting greener products is not the same as knowing exactly which products consumers are going to buy, what kind of price-

performance trade-offs they may be willing to accept and what kind of marketing approach they will respond to. The issue with this approach is that the companies are working from a production orientation; producing the most environmental benign products rather than products that consumers actually wanted. This product end up being over-priced, under-performing or just too worthy.

5. **Compliance Marketing:** This green marketing disguise occurs when companies' environmental initiatives do not go beyond responding to regulations. They comply with environmental legislation as their opportunity to promote their green credentials. Compliance in green marketing is a very conservative guise – the company seeks to travel the path of least change and will only go beyond compliance when there is a very real expectation of imminent legislation. These companies are however facing the wrath of pressure groups who label them as hypocrites who comply with legislative regulations but lobby the government to avert stricter green measures.

4.3 Impediments to Sustainable Transport Adoption

Byrne and Polonsky (2001) assert four major impediments to sustainable transport procurement as they relate to all stakeholder actions, not just consumers. These impediments can be grouped into four broad categories; regulatory, resources, infrastructure and vehicle characteristics. These

impediments relate to each of the aforementioned stakeholder groups and in most cases can only be overcome with a cooperative systems approach to the problem (Byrne and Polonsky, 2001).

1. Regulatory Barriers

Sustainable programs introduction has been delayed by automobile manufacturers citing cost-ineffectiveness due to the unlikelihood of consumer adoption but with strong regulatory policies like reduction in emissions, even in some cases, zero emission for new vehicles (Ewing and Sarigollu, 2000), sustainable transport has a chance of succeeding. Byrne and Polonsky (2001) quotes one recent poll in California, designed and conducted by environmental activist groups, estimated potential demand for electric vehicle (at a reasonable price) at between 12 percent and 18 percent of the market for new cars (Ball, 2000). This indicates consumer support for emission-based government requirements.

Government intervention like vehicle subsidies, tax credits, fuel subsidies, and special traffic benefits such as sustainable transport-only commuter lane may remove purchase barriers like cost for consumers. Unfortunately, most government fails to provide rewards or reinforcement incentives for greening and sustainability (Byrne and Polonsky, 2001). This provides limited incentive for consumer to change purchase behavior, as traditional vehicle are still the most cost-effective and convenient option, and while environmental sensitivity remains a worthwhile goal it is somehow ethereal (Ewing and Sarigollu, 2000; Fisk, 1998). In the light of the above, regulatory encouragement of sustainable transport may be an important tool of removing one potential impediment to consumer purchase.

2. Resources

The marketability of sustainable transport is dependent on the availability of resources sufficient to bring alternative technologies to the market (Byrne and Polonsky, 2001). This requires that stakeholders are willing to financially commit to sustainable transport project. Lober (1997) asked a critical question whether the stakeholders involved are willing to commit the appropriate resources necessary for sustainable transport to be a major strategic initiative. Is government willing to form committees, draft legislation, and divert funds towards the encouragement of alternative fuels; are manufactures and collaborators willing to find out if market exists for sustainable transport; are activist groups allocating enough resources to the study of sustainable transport, at the expense of other projects and are consumers ready to open their wallet (Byrne and Polonsky, 2001)? These are questions that must be answered if the adoption of sustainable transport be successful.

However, the greatest impediment still lies with consumer demand which is the excuse that manufactures uses for slowing development of sustainable transport (Byrne and Polonsky, 2001). Ottman (1998) projects that consumers are willing to pay up to 10 percent premium for “green” products, this may be problematic given the relatively high purchase price of automobiles, where even a 5 percent premium may translate into a lot of money and result in sustainable transport not being competitively priced when compared to traditional fuel vehicles (Byrne and Polonsky, 2001). The solution is an effective communication of the fact that sustainable transport may have

lower life time cost (for instance, fuel or maintenance savings, government subsidies and tax breaks, even time saving preferential road way access) which may assist in overcoming initial price resistance

3. Infrastructure

For sustainable transport to work effectively, supporting infrastructures, which include, but not limited to availability of sustainable transport products, availability of alternative fuels, availability of fuel deliver outlets, availability of maintenance services, and appropriate transport easements, must be put in place (Byrne and Polonsky, 2001).

Sales infrastructure is important especially at the mass introduction phase, for consumers need to be educated as to the benefits and drawbacks of owning a sustainable transport vehicle. This necessitates significant corporate expenditures on sales force education, incentives, and consumer feedback.

In order to achieve widespread adoption of sustainable transport, the fuel itself must be readily available if for no other reason than to ease transition to sustainable transport by ensuring consumer convenience. The alternative fuel must be as readily available as gasoline is. Another thing to consider is the cost of the alternative fuel – the price of alternative fuel alone can act as an impediment to adoption of sustainable transport if it is relatively costly. Other running costs must be in line with traditional automobile like vehicle maintenance and refueling time or they may act as impediment to its adoption.

Another core issue to consider is the sustainability of the alternative fuel in question. “New” fuel are doomed to fail in the long run if they are derived from a non-renewable resource, or if the environmental impact from its production/use is similar to the traditional fuel (Byrne and Polonsky, 2001).

Another significant impediment to the adoption of sustainable transport is the lack of alternative fuel outlets. The development of nationwide outlet, even if these alternative fuels are supplied through existing gasoline outlet, would require a massive investment (Byrne and Polonsky, 2001), even for small changes like nozzle modification. It is noteworthy to mention that in the past, gasoline suppliers have been willing to diversify into unleaded fuel, diesel and auto gas because of increased demand and profitability of those fuels.

A lack of trained after-purchase maintenance and repair services will act as an impediment to sustainable transport adoption (Byrne and Polonsky, 2001). Sustainable transport producers should develop maintenance and repair program to facilitate its adoption.

4. Vehicle Characteristics

Cost/price of vehicles, performance, safety, socio-cultural considerations, refueling, maintenance and relative emissions are some of the characteristics of a sustainable transport vehicle and can pose a challenge to consumer adoption (Ewing and Sarigollu, 2000).

Performance characteristics such as speed, acceleration, and driving range before refueling remains concerns for consumers (Byrne and Polonsky, 2001). However, recent sustainable technology improvements have put serious dents into these perceived barriers. Perceived safety

of sustainable transport fuels and design is another impediment to purchase. In relation to design, this may be the most effectively overcome by conforming to existing styling designs, as the bulk of consumers would resist purchasing a sustainable transport vehicle if it looks radically “different” (Littman, 2000).

4.4 Quality Control

Harry and Schroeder (2005) explained that past definition of quality focused on “conformance to standard”, as companies strive to create products and services that fall within certain specific limits. These definition of quality assumed that if companies produced quality products and services, their performance standards were correct regardless of how those standards were met. Harry and Schroeder (2005) deepens the argument further explaining that quality often overlooked the fact that products and services rarely consist of a single element. Even a product/service consist of a few as few different elements that individual conform to a standard may not work together when put together. This is known as “interacting standard”. Harry and Schroeder (2005) define true quality as a state in which value entitlement is realized for the consumer and producer in every aspect of the business relationship. “Entitlement” in this context means that companies have a rightful level of expectation to produce quality products at the highest possible profit; for the consumer, “entitlement” means they have the rightful level of expectation to buy high quality products at the lowest possible cost. “Value” represents economic worth, practical utility, and availability for both the consumer and the company that

created the product/services. Economic worth refers to the fact that customers want to purchase products/services at the lowest possible cost, just as companies want to produce high-quality goods and services at the lowest possible cost.

4.5 Environmental Implications of Tricycles

Vehicles are one of the dominant sources of urban pollution in the developing world that threatens both people's health and economic activity (ADB, 2005). Tricycles make up a sizeable number of vehicles in Nigeria and mostly have 2-stroke engines emitting fine particulate matter, which pose danger to public health. Epidemiological studies reveal that fine particles have serious health effects including premature mortality and such non-fatal effects as respiratory symptoms, exacerbation of asthma, and change in lung function (Kojima, 2000). Biona et al (2008) did a preliminary analysis on the fuel use and emission reduction potential of incorporating hybrid systems to two stroke powered tricycles in Metro Manila, Philippines; it was discovered that 4-stroke provided the highest global warming potential when compared to carbureted 2-stroke, carbureted-hybrid 2-stroke, and direct-hybrid 2-stroke. This could be traced to the high methane and CO₂ from these vehicles. 4-stroke tricycles also have the highest acidification potential (NO_x production) when compared to the rest. However, 4-stroke tricycle provides the lowest human health impact compared to their hybridized carbureted 2-stroke counterparts due to its lower nmVOC, PM and CO emissions.

Another source of environmental pollution to be discussed is the diesel engine; according to Lloyd (2002), the environmental impact include acidification potential (sources of NO_x production), soil and water pollution. Diesel engines generally release less carbon dioxide—the heat-trapping gas primarily responsible for global warming—from the tailpipe. So that's a check on the good side of the pollution chart. But when it comes to smog-forming pollutants and toxic particulate matter, also known as soot, today's diesels are still a lot dirtier than the average gasoline car (Monahan and Friedman, 2005). Soot is in three size category (large soot, coarse soot and Fine soot) particles and they harm the body causing chronic bronchitis, asthma, reduced ability of respiratory system to fight infections and remove foreign particles, and cancer (Monahan and Friedman, 2005).

ADB (2005) also reports Ozone as a secondary pollutant caused by tricycles; it is not directly emitted but it is produced by a reaction involving volatile organic compounds (VOCs) and NO_x, the ozone precursors in the presence of sunlight form ozone. Ozone is a highly reactive gas that affects the respiratory system by severely irritating the mucous membrane of the nose and the throat. Since 90% of the ozone breathed into the air is never exhaled, ozone molecules react with sensitive lung tissue to cause several health consequences..

Another often unpopular source of pollution from tricycle is noise (unwanted sound); the World Health Organization suggests that noise can affect the human health and well-being in a number of ways, including annoyance reaction, sleep disturbance, interference with communication, performance effects, effect on social behavior and hearing loss (ADB, 2005). Noise can cause annoyance and frustration as a result of interference, interruption and distraction. People experiencing high noise level differ from those with less noise exposure in terms of increased

number of headaches, greater susceptibility to minor accident, increased reliance on sedative and sleeping pills, and increased mental hospital admission rate. Exposure to noise is also associated with a range of possible physical effect including: cold; change in blood pressure, other cardiovascular changes, problems with digestive systems and general fatigue. Further, there is fairly consistent evidence that prolonged exposure to noise levels at or above 80 decibels (dB) can cause deafness (ADB, 2005).

5.0 EMPIRICAL SECTION AND ANALYSIS

One of the impediments to adopting sustainable transport is the collaboration of the stakeholder group that can affect it commercially (Byrne and Polonsky, 2001). The data revealed showed there is no collaboration between the various stakeholders to adopting sustainable tricycle in Nigeria. The brand manager of keke POeT was disappointed over the procurement of ten thousand pieces of carbureted 2-stroke tricycles by the Lagos State Government to alleviate poverty in her state. The brand manager's response was swift but bitter;

“we are definitely moving backward in this country; how can the government alleviate poverty by killing its people slowly using excuses that the carbureted 2-stroke is better than the carbureted 4-stroke because it has a higher power to weight ratio and cost lower. This move by the government will send a wrong signal to other tricycle dealers”.

However, the chairmen of the Tricycle Association in the two routes (Idewu and Liverpool) were in support of the government procurement; the chairman of the Liverpool axis said;

“We have no 4-stroke tricycle in our axis because all the spare parts are very difficult to get and when you get them, they are quite expensive. There is also the issue of getting technicians to repair them. The technicians that can repair them are very scarce and they charge exorbitantly unlike their 2-stroke counterparts that have numerous technicians even the operators can repair the two stroke counterpart themselves”.

The chairman of the Idewu Route puts a different light to his support of the government procuring by saying;

“Government gets a lot of revenue from taxing the gasoline and diesel companies in its states so it would be difficult to get government to procure vehicles that have alternative fuel like Compressed Natural Gas (CNG). There is also the issue that CNG is not readily available; there are few stations that sell and mostly go out of stock because of domestic use like cooking. Most alternative fuel tricycles that we have are always parked-up for a long time waiting for gas supply before the tricycles are operated.”

The OAU transport committee member sees this particular move by the state government in a different light;

“In order to reduce the demand of carbureted 2-stroke tricycle, a scientific consensus should be forwarded to Federal Environmental Protection Agency (FEPA), who would use it as evidence in the House of Assembly and Senate to pass laws that will eradicate carbureted 2-stroke for our country.”

When the Marketing Manager of Kayemel Tricycle was asked about Lagos State Government procurement of carbureted 2-stroke powered tricycle, his response was very instructive;

“There is really no green tricycle; every tricycle emits one degree of pollution or the other depending on the risk dimension. Although the incomplete combustion causing CO emission is

quite high for 2-stroke tricycle, there are new technologies to reduce the level of CO like retrofitting to direct injection technologies which reduces CO to a considerable level lower than 4-stroke powered tricycle emission. However, its fuel efficiency is very low which may hinder consumer adoption but the Lagos State Government can easily procure it for its citizenry”

In the light of the above statement by the Marketing Manager of Kayemel Tricycle, the data also revealed the way the various stakeholder groups perceived the “publicized’ sustainable tricycles in Nigeria:

Table 1.0 – Guises of Green Marketing (Peattie and Crane, 2005)

Tricycles Guises of Green Marketing	CARB 2-STROKE TRICYCLES	CARB 4-STROKE TRICYCLES	HYBRID 4-STROKE TRICYCLES	DIESEL 4-STROKE TRICYCLES
	Green Spinning	NO	YES	YES
Green Selling	NO	YES	YES	NO
Green Harvesting	NO	YES	NO	NO
Enviropreneur Marketing	NO	NO	YES	NO

Compliance Marketing	NO	NO	NO	NO
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Table 1.0.above reveals the types of tricycles found in Nigeria and the different environmental guises (Peattie and Crane, 2005) that hinder their adoption by the tricycle stakeholders. Carbureted 2-stroke powered tricycle and Diesel 4-stroke powered tricycle are the only tricycles that do not spin themselves as green products and are not involved in any green selling. In terms of green harvesting, only carbureted 4-stroke tricycle tries to be as conservative in cost. The Hybrid 4-stroke tricycle is surely enviropreneur marketing because it is brought to the Nigerian Market without much research on the availability of the alternative fuel (in this case CNG). However, none of the 4 tricycles participated in compliance marketing because there is hardly any regulation in Nigeria concerning emission standards and noise level.

One of the executives of Beyond Company in China brought an interesting angle to the sustainable tricycle adoption in developing countries by saying;

“We have produced and sold 4-stroke powered tricycles to Pakistan and Egyptian market and even in our local market; one important difference in our offering is innovation. Unlike our competitors and 2-stroke powered tricycles, we emphasize on safety in our tricycles by producing protective doors on each of the sidecars and seat belt for the driver of the tricycle. This has stood us out and given passengers a feeling of safety when they board our brand of tricycles.”

The Marketing Manager of Kayemel Tricycle in India also emphasized on the importance of innovation to tricycle adoption;

“Ever since we have changed the engine of our 4-stroke powered tricycle from the rear to the front, we have experienced more sale than the 2-stroke powered tricycle and other 4-stroke powered tricycle brand in India, Egypt, Cuba and Honduras because front-engine tricycles have more pulling power, less chances of skidding of rear wheels due to presence of heavy differential and transmission of power by PP shaft ensures more load carrying capacity. We also have option of all power brakes unlike our competitors that have only hydraulic brakes which limit control on vehicle. The fuel tank of our 4-stroke tricycle is located under the chassis at the rear instead of the engine compartment which is safe and secure. Our tricycles also have fire extinguisher holder and safety belts at the rear.”

On the questionnaire that was given to the 15 drivers and 20 passengers; the question was asked if innovations like seat belts, doors, front engine have any influence to choosing the 4-stroke tricycle. There was a unanimous “NO” amongst the 15 drivers but for the passengers 18 of the passengers said the innovation was very crucial to them boarding the 4-stroke tricycle for safety while the other passengers are neither for nor against innovation. This opposite opinions between different class consumers questions who is a more influential consumer; the driver or the passenger?

The above question of “who the more influential consumers are?” was also relevant when the question of which tricycle did they think was most sustainable? All of the drivers marked 2-stroke tricycles as the sustainable tricycles but the passengers were divided mostly based on the routes. Most of the passengers in the Idewu routes regarded the Diesel 4-Stroke powered tricycle as the sustainable tricycle while there were mixed answers in the Liverpool routes but none of

the passengers regarded the 2-stroke tricycle as sustainable. The OAU campus passengers unanimously agreed that the Hybrid 4-stroke tricycle was the sustainable tricycle. When the member of the Transport committee of OAU was asked about the unanimous decision of the passengers as oppose the drivers, he said;

“There has been a lot of green campaign by the POeT Solvers Team on campus in pushing their tricycles; these campaigns were targeted at students who are mostly the passengers of tricycles. However, the drivers view sustainable as easily maintained and cheaper spare parts which they translate to mean longer lasting.”

The chairman of the Liverpool route concurs with the above statement that the drivers see sustainability as cheaper after sale service and said;

“There is no driver that would take 4-stroke powered tricycle on hired purchase.”

The brand manager of keke POeT agreed on the drivers’ perspective and said;

“Our strategy to get 4-stroke tricycles adopted was passenger driven rather than driver-driven; we realized that this strategy could only work in campuses where we have formal literate minds but outside the campus, it is the drivers that determine the adoption. We also realize that it would be more expensive and ineffective to campaign to the drivers since their experiences of 4-sroke tricycles have not been a good one and they believe more in what they have experienced than what they are taught. The best way to get sustainable tricycles adopted is to get Government regulation to enforce emission standards and noise levels. As long as this regulation does not exist, adoption of sustainable tricycles by the drivers may not be possible.”

When the data of the passenger and drivers was presented to the executives of Beyond Company in China, she responded reflectively;

“We are not allowed to produce 2-stroke tricycles for the Chinese market but the government encourages us to build for export especially in Complete Knock Down (CKD) form which is as good as spare parts. This data is not surprising because we receive more requisition for 2-stroke spare parts than 4-stroke spare parts from Nigeria.”

However, the chairman of the Idewu route made an assertion about the adoption of 2-stroke tricycles;

“From the trend of things, it may take several years for 4-stroke powered tricycles to be accepted by the drivers because the environment does not support it except there is a government intervention. If the government bans 2-stroke powered tricycles, the drivers have no choice but to make it work out. This does not look possible as the government that is supposed to be placing a ban is procuring the 2-stroke tricycles in large quantities.”

From the data gathered, OAU Transport committee already adopted the 4-stroke tricycles exclusively to run on campus but later reverted in this decision. The transport team explains why;

“The mass media created by the POeT Solvers Team was effective in making us adopt the tricycles exclusively but when complains started coming from the drivers about difficulty in after sale service and incessant break down of this tricycle. This created a hole in the transport system of the campus which could not be filled by the buses. We allowed the two-stroke tricycles temporary until POeT Solvers can proof they can deliver durable 4-stroke tricycles and perform after sale service effectively. Although this is a long short since it would be difficult to convince the university senate that the company that was given exclusive rights to run the campus did not meet expectations, wants another chance to run the campus. Although, the POeT Solvers Team built a temporary LNG gas station to fuel its tricycles, it is not enough to compete with poor after sale service. ”

The Brand Manager of the POeT Solvers team concurs with the Transport committee member but blamed everything on their suppliers (Beyond Company in China) for bad products. However, he understood the challenge on getting the senate to give them the exclusive rights to their campus but they were looking into other strategies to make sure this is achievable. The executive of the Beyond Company agreed that the 1000 tricycles that the POeT Solvers team procured from them had some factory fault with the electric part of the tricycle which causes the battery to go dead after the tricycle runs for 50 Kilometers mileage. They claimed that the POeT Solvers team was so angry that they did not accept our offer to send a technical team to Nigeria to rectify the issue. They understood that it is the POeT Solvers brand that is suffering not theirs and they were ready to give them a hand to manage the crisis. However, the brand manager of POeT Solvers acknowledges the fact that they were ready to help but he claims;

“We have spent so much money on publicity, educating campus students and their lectures, lobbying Federal Environmental Protection Agency (FEPA) and the worse part of it all was we brought our technical team together with our consultants to Chongqing in China to manage the production process and make sure all things were in order before importing the tricycles but the management of Beyond Company rejected our technical team saying they have never made a mistake in production showing us the countless process that the tricycles go through before finally importing it; they kept on saying they operate on “zero defect” quality program. It was this assurance that made us go ahead with the promotions so you can imagine the impact of this set back on our brand. We believe in preventive management not after the crisis management”.

The Marketing Manager of Kayemel Tricycle criticizes Beyond Company for not putting up an effective quality management program like “Total Quality Management” or the “Six Sigma” in

place. He also mentioned the fact that the best way to judge quality is not by the mere words or assertion by the management but by standard quality metric system.

6.0 INTERPRETING THE EMPIRICAL SECTION

The dialogue that ensued in the empirical section above could be interpreted as follows;

1. There is no single story regarding the sustainable tricycle system in Nigeria: We realize that various actors have diverse perspective on how they view the concept of sustainable tricycle. From the dialogues above, it seems that the efforts of POeT Solvers Limited in diffusing sustainable tricycle to the Nigerian economy is being stifled by the Lagos State Government and the Route chairmen also seem to support the government. Other actors like customs and the Federal Environmental Protection Agency are also not helping matters by keeping mute; they seem not view the proliferation of the 2-stroke tricycle as a present and clear danger.
2. Government action and policies are crucial to sustainable tricycle adoption in Nigeria: It is also clear that without a law in place as regards emission standards, noise reduction, etc, the operators would continue rejecting sustainable tricycles.
3. Innovation and innovative features are not important drivers of sustainable tricycle adoption in Nigeria: We would realize that despite the efforts of the vehicular design for the sustainable tricycle, it had no impact whatsoever in its adoption.

4. Sensitization workshop on sustainable tricycle should be emphasized for a successful adoption in Nigeria: We also realize that the rejections of the sustainable tricycle stems from lack of knowledge on the part of the operators and the route chairman. If proper sensitization is done as regards the sustainable tricycle, the barrier regarding its adoption may reduce.
5. The Chinese factory is not transparent in its dealings to eliminate any future quality issues: despite their willingness to solve the pending issue; the factory is not transparent in its production process.

7.0 DISCUSSIONS

The non-collaborative stands by the commercial stakeholders of sustainable tricycle are imminent in Nigeria and the assertion made by some literary works (Byrne and Polonsky, 2001; Yosie and Herbst, 1998) is evident in the data analyzed above: The government is not interested in procuring 4-stroke powered tricycles; the producers and the channel distributors are not in tune with each other; the collaborators are not interested in investing in alternative fuel like the LNG; the 2-stroke competitors would be glad to get rid of any trace of 4-stroke tricycles and the question of who really is the consumer is evident in the data above. There are three levels of consumers; the supplier like POeT Solvers Team that sources the tricycles from China, the drivers/operators that procure the tricycles from companies like the POeT Solvers and the passengers that take the tricycles from one point to another. Which particular consumer group

determines the adoption of sustainable tricycles? The data analyzed above points to two consumer group with pulling power – the passengers (the end consumer) and the drivers (the intermediate consumer). In the campus, the passengers have the power to determine which particular tricycles to be adopted like the adoption of sustainable tricycle in OAU was driven by the passengers but outside campus, the drivers have the power to impede sustainable tricycles. This is quite important in determining who to appeal to when sinking sustainable tricycles.

Another important point is how consumers perceive green tricycles; this perception is important to its adoption. The Marketing Manager of Kayemel Tricycles raised an important point on the sustainability of 4-stroke tricycles. According to Biona's et al (2008) preliminary analysis on the fuel use and emission reduction potential of incorporating hybrid systems to two stroke powered tricycles in Metro Manila, Philippines; it was discovered that 4-stroke provided the highest global warming potential when compared to carbureted 2-stroke, carbureted-hybrid 2-stroke, and direct-hybrid 2-stroke which could be traced to the high methane and CO₂ from these vehicles. 4-stroke tricycles also have the highest acidification potential (NO_x production) when compared to the rest. However, 4-stroke tricycle provides the lowest human health impact compared to their hybridized carbureted 2-stroke counterparts due to its lower nmVOC, PM and CO emissions. Biona et al (2008) could challenge the notion that 4-stroke powered tricycle could be regarded as green and thus not be regarded with the seriousness it deserves. The general ban of 2-stroke tricycles in China as observed by one of the executives in the Beyond Company in China could also assert that 4-stroke powered tricycle is a lesser evil than 2-stroke tricycles. Despite these findings, it is important to observe Peattie and Crane's (2005) guises of green marketing in the tricycle market in Nigeria; according to table 1.0, carbureted 2-stroke powered tricycles and diesel 4-stroke powered tricycles do not disguise themselves as green products in Nigeria so the

various commercial stakeholders are not bothered perceiving them as green products. The issue lies with the 4-stroke tricycles (both carbureted and hybrid); they participate in the green spinning and green selling while they differ both in green harvesting and enviropreneur marketing. Since green harvesting symbolizes deep cultural fixation on cost reduction, short-term profitability, and shareholder value, it was simply exemplified in the carbureted 4-stroke tricycle market unlike hybridized 4-stroke tricycle that leans towards enviropreneur marketing which supports studies that suggest that consumers were ready, willing and able to buy green alternatives but consumers wanting greener products is not the same as knowing exactly which products consumers are going to buy, what kind of price-performance trade-offs they may be willing to accept and what kind of marketing approach they will respond to (Peattie and Crane, 2005). Companies that brought in the hybridized 4-stroke underestimated the tricycle drivers as a change agent. The high cost of maintaining hybridized 4-stroke tricycles ruled them out of the green harvesting scenario. However, Shelton (1994) proposes a solution for green harvesting saying that if companies were to move into a green position, they had to embrace more radical change and invest more management time and money to achieve it.

The 4 impediments to sustainable transportation (Byrne and Polonsky, 2001) was also highlighted by the two chairmen of both the Idewu route and Liverpool route in their defense of the Lagos State Government's procurement of 2-stroke tricycles – Regulatory Barriers (Ewing and Sarigollu, 2000), Resources (Lober, 1997), Infrastructure (Byrne and Polonsky, 2001) and Vehicle Characteristics (Littman, 2000). The chairmen opined that the drivers reluctance to adopt the sustainable tricycles may be due to lack of infrastructures like the alternative fuel and after sale services, misplaced resource allocation like procuring 2-stroke instead of 4-stroke tricycles, inability to promulgate laws because the same government that is suppose to place a barrier

against 2-stroke tricycles is adopting it and innovative vehicle characterization like the inclusion of doors at the sidecars and seat belts. Innovation which seems to be the leverage for sustainable tricycle adoption for countries like Pakistan and Egypt is an impediment to its adoption in Nigeria. The drivers of the township routes remove the doors attached to the sidecar and cut off the seat belt to enable them get passengers as fast as possible unlike the campus routes where passengers queue in order to get into the tricycles. There is huge competition between tricycles in township routes; the easier for passengers to get into your tricycles, the faster your tricycle gets filled, the more income you earn, There is hardly any competition for the campus routes because tricycles queue up to take passengers who also queue up.

The data reveals that sustainable tricycle adoption is easier in formal educated communities like the campuses than township routes. Although the POeT Solvers Team picked their battles favorably by focusing on campus adoption rather than township, their Achilles heel was too strong to downplay their only victory in OAU campus. Despite the team's efforts to put in place infrastructures like sustainable transport products, alternative fuels, fuel deliver outlets, maintenance services, and appropriate transport easements, it could not foresee a factory fault that only the tricycle manufacturers can fix. This is one impediment that Byrne and Polonsky (2001) did not address – Quality Control Program of Manufacturers.

Taking a deeper look at the manufacturers (Beyond Company) definition of quality, we would realize that it falls under the Harry and Schroeder's (2005) definition of "conformance to standard" where companies strive to create products and services that fall within certain specific limits. The two executives of Beyond Company overlooked the fact that products and services rarely consist of a single element; they were not bothered about fixing the processes that encourages the rework of the product but are justifying their action by fixing an already bad

situation. The statement made by the management of Beyond Company on their perfect quality records without allowing external body (POeT Solvers Engineers and Consultants) to review their process shows their inability to grasp the concept of value entitlement for both the producer and consumer. POeT Solver team accessing this process would have exposed the hidden factory and early detection of the faulty electric problem would have been solved.

The brand manager of keke POeT rejected the offer of the Beyond Company to rectify the issue because every defect takes additional space, time, material, manpower and money for detection, inspection, analysis and defect repair. As defect rate increase, hidden factories in a company or process tend to proliferate and costs escalate (Harry and Schroeder, 2005). The Marketing Manager also raised an important point on the best way to judge quality products without actually witnessing the process of manufacturing the product – The metric system gives a good indication on how the quality is measured and the quality of the products can be inferred from it.

Answers to Research Questions

From the discussion above, the following research questions has been fully answered:

Can sustainable tricycles market be developed in Nigeria considering cost implications and green marketing guises? Yes, especially if they start the distribution at university campuses in order to build momentum and use the success of the university as a model for future markets.

What is/are the most effective strategy for developing sustainable tricycles market in Nigeria?

The concept of dominant demand plays a huge role in diffusing sustainable tricycles in Nigeria.

Other concept like stakeholder's cooperation is also very important. An innovation like vehicular characteristics does not induce sustainable tricycle adoption because in the campus route where

the doors are not removed, innovation was not an important driver to its adoption. It is also important to realize that geographical location play a role in consumer adoption of sustainable transportation as discussed above. Location inhabited with majorly populated formal educated citizens like the university campuses have a better chance of getting the sustainable tricycles adopted as oppose to locations with minor populated formal educated citizens.

How does quality control program influence consumer adoption of sustainable tricycles? Overall, Lack of proper quality control (e.g. Harry and Schroeder, 2005) may affect the sustainable tricycle adoption negatively. The brand of the sustainable tricycle would also be eroded and it may become a “hard sell” for any of the distributive channel.

8.0 CONCLUSION

The purpose of this paper is to discover the impediments to consumer adoption of sustainable transportation in developing countries using tricycles in Nigeria as a case study. This paper has expanded on elements impeding sustainable adoption found in literatures (e.g. Byrne and Polonsky, 2001; Ewing and Sarigollu, 2000) like the kind of quality program employed by the companies that supplies the sustainable transportation. However, more could have been done by interviewing the government officials especially those in the transport secretariat in charge of procuring the carbureted 2-stroke powered tricycle. The points of view from this stakeholder would have made this report very accurate but the government officials refused to comment on green tricycle adoption. Another important stakeholder worth interviewing could have been any

of the officials from Federal Environmental Protection Agency (FEPA) explaining their roles in ensuring proper environment for the Nigerian citizens; this interview was also declined by the FEPA officials.

Despite the fact that we cannot get the data from all the stakeholders, this paper was able to ascertain that sustainable tricycles market has the potential to be developed in Nigeria despite cost implications and green marketing guises. This paper was also able to confirm that Hollander's (2003) Dominant Demand, Byrne and Polonsky's (2001) stakeholders cooperation and Harry and Schroeder's (2005) Quality Control program are effective strategy for developing sustainable tricycles market in Nigeria. This paper opposes the notion that innovation plays a huge role in sustainable tricycle adoption – it shows clearly that innovation in vehicular characterization hinders adoption in Nigerian township routes but is favorable in other developing countries like Egypt, Pakistan and Nigerian campuses. In the light of the above, this paper explores the question; “which of the consumers (either the intermediary consumers or the end users) ultimately influences the adoption of sustainable tricycle?” The township routes depict the drivers (the intermediary consumers) of the tricycles as the ultimate influencers while in the campus routes, the passengers (the end users) become the ultimate influencers. Other questions answered include how geographical location plays a role in consumer adoption of sustainable transportation? This paper shows that the campus routes readily adopt the 4-stroke tricycles as oppose the township routes. It is also important to note that Quality Program may not necessary affect the early adoption of sustainable tricycle (as in the case of OAU) but is necessary for the sustenance of the sustainable tricycle adoption. Please, kindly note that the events concerning POeTSolvers vs. OAU campus is an ongoing event.

It is also worth mentioning the issue concerning the POeTSolvers Team and the offer of the Beyond Company to solve the electric issues in the 4-stroke powered tricycles; instead of sourcing for other tricycle suppliers (e.g. Kayemel Tricycle). A new supplier may present another issue all together which may not be foreseen. Having gained success in the OAU Campus in terms of exclusivity with the 4-stroke tricycles, it would be a total calamity trying a new brand in a new campus and developing a new unforeseen issue. The issue with the 4-stroke powered tricycle has been zeroed down to electrical parts; if this could be resolved effectively, the 4-stroke tricycle could be introduced to other campuses.

In order to truly appreciate this paper, further research should be done on quality programs and how they affect adoption of green transportation in developing countries.

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APPENDIX 1.0

Table 2.0 Simulated in-use fuel and emission factors of tricycles (Biona et al, 2008)

Vehicle technology	Fuel(km/l)	HC(g/km)	CO(g/km)	CO2(g/km)	Nox(g/km)	VOC(g/km)	Methane(g/km)	nmVOC(g/km)	PM(g/km)
Carbureted two stroke	20.40	11.77	9.22	43.34	0.07	12.17	0.11	12.06	0.38
Four stroke	24.48	3.11	9.50	58.57	0.23	2.90	0.31	2.59	0.18
Carb-hybrid two stroke	29.63	8.58	6.36	32.61	0.05	8.88	0.08	8.80	0.28
DI - hybrid two stroke	38.52	1.72	2.23	32.61	0.05	1.78	0.02	1.76	0.06

Four strokes provide the highest global warming potential. This could be traced to the higher methane and CO emissions from these vehicles. The higher NO_{x2} emissions during the in-use phase caused the higher acidification potential in four strokes systems. It could be noted also that these vehicles would provide lower human health impact compared to their hybridized carbureted two stroke counterparts due to its lower nmVOC, PM and CO emissions. In all aspects, the hybridized direct injection retrofitted two stroke tricycles is the most environmentally benign and economical. This is confirmed by its lower data in the entire parameter factor compared to the others. Though the hybridized carbureted two stroke

technology provides lower environment impact than the four stroke system as indicated above, it is not expected to be easily adopted by the market due to its minimal fuel economy differences compared to the latter.

This table by Biona et al (2008) should also be considered in the Nigerian situation; instead of marketing carbureted 4-stroke tricycles, hybridized direct injection retrofitted 2-stroke tricycle which is regarded as the most environmentally benign tricycle when compared with carbureted 2-stroke, carbureted 4-stroke tricycle and hybridized carbureted 2-stroke tricycle should be placed in high pedestal in the marketing strategy of sustainable tricycle. It would be easier to convince the government and the township routes to adopt a benign 2-stroke tricycle than a 4-stroke tricycle. The winning formula concept (2-stroke powered tricycle) should be modified rather than destroyed. There is also the issue of Schumpeterian competitors (Foster and Kaplan, 2001) arising and lobbying FEPA into raising standards for green tricycles since carbureted 4-stroke tricycles and hybridized 4-stroke tricycles are what Hollander (2003) calls false summit.

APPENDIX 2.0

Mechanically Comparing 2 Different Types and Brands of Tricycles in Nigeria: 2-Stroke (Bajaj) vs. 4-Stroke (POeT)



Above – Picture 2.0: Different views of a 2-Stroke Tricycle brand called Bajaj



Above – Picture 3.0: Different views of a 4-Stroke Tricycle brand called POeT

Table 3.0: Mechanical Difference between POeT and Bajaj

S.No	Features	POeT	Bajaj	Implication
1.	Engine	175CC 4-Stroke Petrol Engine and CNG	150CC 2-Stroke Petrol Engine	Higher metric shows ability to withstand rough and mountain-type terrain
2.	Displacement	173cc	150cc	More Volume Displacement leads to better cooling of engine

3.	Power	12hp@7000rpm	6.4hp@5000rpm	More Strength with higher power
4	Location	Middle Engine	Rear Engine	More puling power for middle engine Less chances of skidding of the rear wheel due to the presence of heavy differential.
5	Brakes	Dual Circuit self adjusting hydraulic brakes on all 3 wheels	Hydraulic expanding friction shoe type	The Dual Circuit gives better control and no need for frequent brake adjustment.
6	Gear	5 forward+1 reverse	4 forward+1 reverse	The more the forward gear, the more the speed
7	Doors	Present in all side	Not Present	Safety on Highway
8	Fuel Tank Location	At the rear under the chassis	In the Engine Compartment	The safer the vehicle is if fuel

				tank is separate from the engine.
9	Safety Features	Fuel Tank Lock, Seat Belt, Tool Kit Lock	No Seat Belt Present	Safety
10	Extra Tyre	At the rear	At the bottom of the front seat.	Passenger Comfort
11	Starting	Kick and Electric	Mechanical	The more the choices, the better
12	Gear Shift Way	Foot Control	Hand Control	Depends on the Driver
13.	Lubrication Method	Pressure Splash	Mixed with Petrol	The pressure splash is better

APPENDIX 3.0

ASSEMBLING KEKE POeT IN CHINA FACTORY



Above - Picture 4.0: Welding the keke POeT body on the Assembly Line



Above - Picture 5.0: Fixing the engine in the Middle of the Vehicle



Above – Picture 6.0: Parking keke POeT for Exportation to Nigeria

APPENDIX 4.0

Sample: Questionnaires for Tricycle Operators

Name _____ Date _____

Address _____

City/State _____

Telephone _____ Date of Birth _____

1. Which brand of keke do you operate? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**
2. Which brand of keke do you prefer to operate? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**
3. Which brand of keke attracts most passengers? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**
4. Which brand of keke is the most beautiful? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**
5. Which brand of keke is the most sustainable? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**
6. Which brand of keke is the easiest to maintain? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**
7. Which brand of keke is the noisiest? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**

8. Which brand of keke is the fastest? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**

9. Which brand of keke can withstand the longest distance? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**

10. Which brand of keke has the most ability to withstand weight? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**

11. Which brand of keke provides the most comfortable experience when driving? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**

12. Would innovations like seat belts, doors, front engine have any influence to choosing POeT? **A)YES B) NO**

13. Would reduction in cost of spare parts and maintenance influence choosing POeT? **A)YES B) NO**

14. Would the availability of infrastructure like alternative fuel stations influence choosing POeT? **A)YES B) NO**

15. Would readily available technicians for POeT influence their choosing POeT? **A)YES B) NO**

Sample: Questionnaires for Tricycle Passengers

Name _____ Date _____

Address _____

City/State _____

Telephone _____ Date of Birth _____

1. Which brand of keke do you prefer to board? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**
2. Which brand of keke attracts you? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**
3. Which brand of keke is the most beautiful? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**
4. Which brand of keke appears most sustainable? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**
5. Which brand of keke is the noisiest? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**
6. Which brand of keke has the most ability to withstand weight? **A) BAJAJ B) NAPEP C) POeT D) OTHERS**

7. Which brand of keke provides the most comfortable experience when driving? **A) BAJAJ**
B) NAPEP **C) POeT** **D) OTHERS**

8. Would innovations like seat belts, doors, front engine have any influence to boarding a tricycle **A)YES** **B) NO**