Evaluation of the Appropriate Fairly Used (‘Tokunbo,) Vehicle For Nigeria Use

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Abstract
The confused state of Nigerian people on what type of brand and model of fairly used car normally called “Tokunbo” car to buy that will give them rest of mind in term of running cost has become worrisome issue. Therefore this study has focus on evaluation of most commonly used “tokubo” car in Nigeria using machine hour rate as a tools to determine the most appropriate tokubo cars for Nigeria used. This is very important at period of deregulation of down stream oil sector when the price of fuel keep on increasing every day. Factor such as availability of technical expert, availability of spare parts, confortability and adaptation to Nigeria road are also considered in evaluating appropriate “tokubo” car. Eleven types commonly used fairly use car with three models each which include 1980’s, 1990” and 2000 models were considered. It was glaring form all the factors considered that for 1980’s and 1990.s models Tokunbo vehicle, Volkswagen products are the most appropriate, followed by Toyota, Nissan, Mazda and Honda. For 2000 models, the appropriate Tokunbo vehicle is Nissan, it if followed by Mazda, Toyota, Volkswagen then Honda.

Keywords: selection, appropriate, ‘tokubo,’ vehicle, machine hour rate.

INTRODUCTION
Automobile is a very important means of transportation for almost every Nigeria today and as essential as the vehicles are to the society in creating mobility and job, only few Nigerians can afford to buy new car to serve these purposes (Oke,2005). Vehicle as a supposed to be bought new, but due to the economy situation of Nigeria combined with other factors like initial capital outlay of these vehicles most people could not afford to buy them new (Cliff, 1999 and CBN,2001). People go for fairly used cars popularly known as “Tokunbo cars” because these cars are sold at a cheaper price that is affordable to an average Nigerian. This is of excellent value, in providing quality transportation at a price that can be easily affordable. Tokubo cars are the most common type of car found on Nigeria roads and it takes about 80% of Nigerian vehicle when compare to brand new cars (Masha, 2001 and FRN,2000). These tokubo cars are mostly used for private and commercial purpose over the years, most people are faced with the problem of choice in buying these “tokunbo” vehicle. Moreover, it should be noted that, the dwindling in recycling of the end of life vehicle (ELV) in advance countries has lead to an apparent significant export flow ELV as second hand cars from the developed countries like Japan, Germany U.S.A. and Belgium to the developing countries like Africa most especially Benin Republic and Togo from where is imported or struggle to Nigeria to be of economy value (TBUC, 2003).

Despite the fact that the vehicle look new but their some factors like: Maintainability, fuel consumption, colour, model, stability etc that needs to be taken into consideration for ones to enjoy it with minimum cost (Obikwelu, 1999). Most Nigerian make wrong choice because people look at these factors in the area of their interest and select their vehicle base on either body, colour, structure, fuel consumption, maintainability or initial capital outlay. Although these factors are good but people does not take time to look at cumulative effect of all these factors in selecting their products. The effect most time is that, most people find it difficult to maintain the vehicle as time goes on because of some hiding factors which have not been considered at initial time.

The fairly used car are contributing in a greatly measure to the economy, the fact still remain that this vehicle are not new and they are band to have some minor fault that needs to be put in place for smooth running of the vehicle (NGP,2003 and Suraj, 2001) As essential as the fairly used cars are to the society with all it having associated benefit, people are facing with serious problem of making right selection of the brand of cars with model This always lead to serious frustration on the parts of the user because of high cost of running the wrongly selected car. It therefore becomes necessary to investigate which of this cars and models of the used car are the most appropriate for Nigeria use until the economy of the country is improved to an extend that almost all Nigeria will be able to avoid new car.
The appropriate vehicle for Nigeria used is determined in this research using machine hour rate. Machine hour rate is one of the economic criteria for selection of equipment when there is need to select machine from subset of alternative. The concept of machine hour rate is very important in the purchase and utilization of machines. Machine hour rate is the cost of using machine (vehicle) for one hour. It includes all important cost elements such as actual vehicle cost, maintenance cost and miscellaneous cost and depreciation cost. The other important factors in proper selection of used (tokunbo) vehicles are availability of spare parts and auto-technician are also considered in the study to arrive at reasonable conclusion. Appropriate vehicle selection is based on economic, technological and operational consideration. Then in selection of the best vehicle for Nigeria use, the following factors, the capital outlay of the vehicle, the expected usage of the vehicle and cost of repair and maintenance of the vehicle, availability of spare parts and auto-technician, and conformability are put into consideration.

RESEARCH METHODOLOGY
To get a reasonable and reliable and data information, to achieve that objective, questionnaires was designed and administered to people in the state capitals of south west of Nigeria which include Lagos, Ibadan, Osogbo, Akure, Ado and Abeokuta. Personal interaction was made to ascertain the authenticity of the information gather through questionnaire. Four types of questionnaires were designed First type was administered to the car owner, the second type was made available to car dealer while the third type was distributed to vehicle parts seller and the fourth type to auto technical of different brand of vehicle.

Eleven brand of vehicles were considered in this research work with 1980, 1990 and 2000 models. Six hundred and sixty, copies of type (1) questionnaire were distributed to the car owners’ sixty copies for each brand of vehicle and 20 copies to each model. Three hundred and thirty (330) copies of type (2) were distributed to vehicle part dealers 10 copies to each vehicle brand of different models. Sixty(60) copies of type (iii) were distributed to car dealer. and Three hundred and thirty (330) copies of type (iv) were evenly distributed to auto – technician. About eighty per cent (80%) of the questionnaire were returned. Published Automobile bulletins on used cars maintenance were also used to substantiate the work. The information and the data were analysis using one of the economic criteria tools namely machine hour rate to arrive at the appropriate vehicles for Nigeria use. Machine hour rate encompasses all important cost elements such as actual vehicle cost, maintenance cost and miscellaneous cost and depreciation cost. The average vehicle cost for different brand of vehicles with their model was determined from the responses from the vehicle dealers. Depreciation cost is the amount or percentage by which equipment decreases in value after been used for period of time. Depreciation cost was determined in this case by find out the second hand values of these cars after been used for three years from car dealer through questionnaire and personal interview. Machine depreciation per hour is determined using reducing balancing method and is choosing because of it’s peculiarly of the reduction of value of asset with years. The maintenance cost was based on the recommendation from a standard vehicle manual of different vehicles which state that regular servicing must be carried out after every 5,000 km as partial overhaul after 60,000km Maintenance cost per was determined base on the cost of fuel per hour and kilometer moved by vehicle and it was established from the responds from questionnaire that, private vehicles in all these state capitals operate for an average of 4 hours per day and covered an average of 50.13 km per day.

The cost of fuel is determined from fuel consumption rate of different vehicle and fuel consumption is the measure of how much fuel an engine or vehicle uses per unit distance and this a way of measuring the level of economy of an engine or vehicle. To determine the amount of fuel consume by different vehicle, the following items were used during the course of the experiment; two Hoses of 1.7cm diameter and 147cm length each, two tightening rings, a measuring can, a vernier calliper, a stop watch and 25 litres of fuel. The hose from the tank of the vehicles was connected to the external measuring can with 1.7 cm diameter hose with two tighten ring clips. The external fuel tank is filled with 1 litre of fuel and the time used to exhaust was taken. The vehicles were stationary and the engines were allowed to operate in slow running mode at 1000 rpm to eliminate the effect of Speed, acceleration, drive pattern/style, cruise control and drafting e.t.c. The amount of fuel consumed by different vehicles in litres per hour was established from this experiment and the result was used to calculate the maintenance cost per hour and the cost of fuel consumed per hour as indicated in Fig., 4.2.

The miscellaneous costs include the cost of vehicles insurance and vehicles licensed the cost for the vehicles licensed and insurance which is affixed value was collected from board of internal revenue Akure, Ondo State, Nigeria and the cost for the selected vehicle are shown in Table 4.2. Important factors such as availability of spare parts, availability of expert automobile technicians, adaptation of these vehicles to Nigerian roads and comfortability were also considered and the result is as shown in the Table 4.1.
CALCULATIONS AND DATA ANALYSIS

Assumptions
In analysis the data, the following assumptions were made:
1. Total engine oil, SAF 40 (grade) is selected for servicing the vehicles
2. Miscellaneous cost is resisted to the cost of obtaining vehicle license and insurance (third part insurance).
3. Depreciation value of vehicle after 3 year was used

Determination of Machine Hour Rate (M_{hr})
Machine hour rate is determined using equation (1)

\[ \psi = \nu_r + \gamma + \eta + \mu \]  
Where,
\[ \psi = \text{Machine hour rate} \]
\[ \nu_r = \text{Machine depreciation per hour} \]
\[ \gamma = \text{Maintenance cost per hour} \]
\[ \eta = \text{Cost of fueling} \]
\[ \mu = \text{Miscellaneous cost} \]

Vehicle Depreciation Per Hour Determination
Machine depreciation per hour is determined using reducing balancing method and is choosing because of it’s peculiarly of the reduction of value of asset with years. Other methods include straight line method, and sum-of–the-year digit method.

Vehicle Depreciation per hour (\nu_r) is therefore given in equation (2) as

\[ \nu_r = \frac{r \times \sigma}{\tau} \]  
Constant rate (r) of loosing value is expressed in equation (3)

\[ r = 1 - \left( \frac{\phi}{\sigma} \right)^n \]  
where \[ \phi = \text{second hand value of the vehicle} \]
\[ \sigma = \text{initial capital outlay of the vehicle} \]
\[ n = \text{economic useful life (3 years)} \]
Where \[ \tau = \text{number of operating hour per year} \]
\[ (4 \times 360 = 1440) \]

Having known their initial capital outlay of all these vehicles and the second hand value after three year. The summary of the result is showing in Fig,.3.1

Maintenance Cost Per Hour, \gamma Determination
Maintenance cost per hour was determined using equation (4)

\[ \gamma = \delta + \zeta \]  
\[ \gamma = \text{Maintenance cost per hour} \]
\[ \delta = \text{Servicing cost per hour} \]
\[ \zeta = \text{Partial overhauling cost per hour} \]

Servicing cost per hour (\delta) and partial overhauling cost (\zeta) are expressed in equations (5) and (6)

\[ \delta = \frac{\beta}{\lambda} \]  
\[ \zeta = \frac{\sigma}{\phi} \]  
Where,
\[ \beta = \text{Total cost of servicing} \]
\[ \lambda = \text{Hour of usage before servicing in a year} \]
\[ \sigma = \text{Total cost of overhauling} \]
\[ \phi = \text{Hour of usage before partial overhauling in a year} \]

Total cost of servicing and total cost of partial overhauling are determined using equations (7) and (8).

\[ \beta = \text{number of time of servicing per year (Ns)} \times \text{cost per serving (Cs)} \]
\[ \beta = \text{Ns Cs} \]  
\[ \sigma = \text{Nh Ch} \]  
Where,
\[ \text{Ns} = \text{Number of time of servicing per year} \]
\[ \text{Nh} = \text{Number of time of Partial overhauling per year} \]
\[ \text{Ns} = \frac{k}{5000} \]
\[ \text{Nh} = \frac{k}{60,000} \]

If Nh < 1, then Hc = 0
Where k = No of kilometer move by the vehicle in a year
\[ k = \text{distance move per day} \times \text{Number days in year} \]

It was gather from information from the questionnaire that, a private vehicle in Akure moves an average distance of 50.km in 4 hours in day. That means it will move an average of 12.5 km per hour. Therefore, the hours of usage for every 5,000 km for servicing (\lambda) and 60,000 km for partial overhauling (\phi) are expressed in equations (9) and (10)

\[ \lambda = 5000/12.5 \]  
\[ = 400 \text{ hours} \]
\[ = 400/24 = 16 \text{days (2 weeks)} \]
\[ \phi = 60,000/125 \]  
\[ = 4,800 \text{ hours} \]
\[ = 4,800/24 = 200 \text{days (7 months)} \]

Fuel Cost Per Hour (\omega) Determination
Cost of fuel was determined using equation (11)

\[ \omega = (\omega + \gamma) \times \epsilon \]  
\[ \omega = \text{Cost per liter of fuel} \]
\[ \gamma = \text{Total fuel consume for a day} \]
\[ \epsilon = \text{working hour in a day} \]

Miscellaneous Cost (\delta) Determination
The miscellaneous costs is expressed in equation (12)
\[ \delta = \Psi + \Phi \]

Where,
\( \Psi \) = cost of vehicles insurance, \( \Phi \) = vehicles licensed

RESULTS AND DISCUSSIONS
As shown in Fig., 4.1 it was observed from the analyses of all the models of the entire vehicle that, Nissan has the lowest depreciation cost per hour followed by Mazda, next to it is Volvo, Toyota and Honda. This is an indication that these vehicles will have appreciable second hand value rate.

Based on the result obtained from the calculation of the Machine Hour Rate (MHR), shown in Fig.4.3, the vehicle with the lowest machine hour rate is considered the appropriate vehicle for each model because all other factors has been taken into consideration in machine hour rate. The vehicles are listed according to the increase in machine hour rate with Volkswagen having the lowest in 1980 model, followed by Toyota, next to it is Nissan and after that are Mazda and Honda. In 1990’S models, Volkswagen still takes the lead followed by ‘Toyota, Nissan, Mazda and Honda respectively. In 2000’S model there is serious rearrangement base on improvement on some products which follows this order Nissan, Mazda, Toyota, Volkswagen, Honda.

There is all indication in Fig., 4.2 that 2000 models of these cars have better fuel economy followed by 1990’s and then 1980’s models. This shows that there is serious improvement in the technology of how these vehicles consume fuel by each manufacturer. It is deduced from the Cumulative analysis for all the models of each brand of vehicle that, Volkswagen is the best in term of fuel economy, followed by Toyota and next to it are Nissan, Mazda and Honda.

As shown Table 4.1, the auto technician Experts in Toyota, Nissan, Honda and Peugeot are more available than that of any other vehicle in Nigeria. Peugeot Mercedes Benz, BMW and Volvo are more adaptable to Nigerian roads. BMW, Mercedes Benz, Nissan, Honda and Toyota provide better comfortability. It is also shown in the table that Toyota, Nissan, Honda and Peugeot spare parts are more readily available than any other vehicles.

Table 4.1: Other Factors for Appropriate Vehicle Selection

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>OPEL</th>
<th>VOLVO</th>
<th>MITSUBISHI</th>
<th>TOYOTA</th>
<th>HONDA</th>
<th>NISSAN</th>
<th>VOLKSWAGEN</th>
<th>MERCEDES BENZ</th>
<th>BMW</th>
<th>MHR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spare parts availability</td>
<td>75%</td>
<td>70%</td>
<td>85%</td>
<td>90%</td>
<td>90%</td>
<td>87%</td>
<td>95%</td>
<td>74%</td>
<td>80%</td>
<td>87%</td>
</tr>
<tr>
<td>Auto-technicians experts</td>
<td>68%</td>
<td>60%</td>
<td>65%</td>
<td>85%</td>
<td>90%</td>
<td>85%</td>
<td>85%</td>
<td>75%</td>
<td>80%</td>
<td>87%</td>
</tr>
<tr>
<td>Nigeriang roads adaptation</td>
<td>60%</td>
<td>75%</td>
<td>87%</td>
<td>80%</td>
<td>90%</td>
<td>90%</td>
<td>87%</td>
<td>90%</td>
<td>87%</td>
<td>87%</td>
</tr>
<tr>
<td>Percentage of Comfort</td>
<td>57%</td>
<td>60%</td>
<td>75%</td>
<td>82%</td>
<td>90%</td>
<td>82%</td>
<td>73%</td>
<td>50%</td>
<td>84%</td>
<td>80%</td>
</tr>
</tbody>
</table>

Fig. 4.1: Depreciation Cost Per Hour for Brands of Vehicle

Fig. 4.2: Fuel Cost per Hour for Brands of Vehicle

Fig. 4.3: Machine Hour Rate for Brands of Vehicle
CONCLUSIONS AND RECOMMENDATIONS

Having considered all these factors, it is glaring from all the factors considered that for 1980’s and 1990’s models Tokunbo vehicle, Volkswagen product is the most appropriate, followed by Toyota, Nissan, Mazda and Honda. For 2000 models, the appropriate Tokunbo vehicle is Nissan, it is followed by Mazda, Toyota, Volkswagen then Honda. Despite the fact that the cost of fuel consumption of some vehicles per hour are smaller, the availability of spare parts of all the Tokunbo vehicle differs, people are recommended to use vehicles in terms of their machine hour rate (the total cost of using a vehicle per hour) which has taken in to consideration all this factors. The ‘Tokunbo’ vehicles that falls in this category includes: Volkswagen, Toyota, Nissan, Mazda and Honda. This research work will beneficial to the fairly used car dealers to import appropriate vehicle that will be economical for customers. Moreover, the car buyers should not be carried away with colours, brands, types and imitations but rather go in depth in search for a car that have cumulative running cost advantage.

REFERENCES


