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The Viability of Plug-in Hybrid Electric Vehicles in the Kenyan Market: A Strategic Study

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Abstract
Numerous factors point toward the requirement of a change in the vehicle industry in the Kenyan market, and in the global environment in general. Environmental pollution, lack of efficiency, and high costs of petrol and traditional fuels, are just a few. Looking into options to bring this required change, we find that technology has brought us to a stand-off, whereby although the electric vehicles of today would prevent many of the flaws with traditional fuel driven vehicles, the standard requirements set by drivers; such as long distance travel and regular fuel station stops, would not be met by the electric vehicles. Therefore we need to look at a mix between the benefits of electric and traditional vehicles, and that is the PHEV. This paper covers various aspects in determining the viability of introducing Plugin Hybrid Electric Vehicles into the Kenyan market. The objectives have been categorized into four major aspects including the market viability, the technical viability, the economic viability and lastly a proposed business strategy which should enable quick adaptation into the market. The target of the study is the vehicle distribution agencies in Kenya, and both quantitative and qualitative data collection methods are employed. The data is analyzed using content analysis for the qualitative data and ANOVA for the quantitative data. The results of the data analysis show best practices when introducing PHEVs into the Kenyan market; such as the improvement of the electrical infrastructure, and the partnering with supermarkets to introduce charging stations in their parking lots. These best practices are then translated into a business strategy which is shown in detail. Analysis of various countries which have adapted the idea and brought in PHEVs into the market is then covered showing the feasibility and comparing it with the Kenyan market using the differences in fuel and electricity prices as well as the economy, living standards and environmental factors.
Keywords: Transport technology, Plug-in Hybrid electric vehicles

1.0 INTRODUCTION

The entire world, greedily, turns towards the natural resource found under our very feet; this resource is none other than that of black gold. But with the unlimited demand of desires and the very limited supply of this resource, it is inevitable that there will come a point when alternatives will look much more attractive to the consumer.

In the year 2008 the total amount of money spent by Kenya on Oil Imports was $3.05 billion, while each litre of fuel consumed by motorists reached a high of 110 kshs (the economic watch, 2011). The average consumption of petrol and diesel over the same year was 7.6 litres for every 100km (GFEI Kenyan Baseline, 2011).

There are fewer cars on the Kenyan roads during mid to end month when salaries have been depleted, this is because of the high prices of fuel, which forces consumers to look at the opportunity cost of fuel.

With these ever increasing figures, it becomes more and more attractive for consumers to look for alternative substitutes to fuel. One of the more dominant substitutes which has been adopted by various countries is that of plug-in hybrid electric vehicles (PHEV).

PHEVs are vehicles which run on electricity as well as fuel, allowing consumers to use electricity to charge their vehicles at home before travelling and at the same time leaving the possibility for them to use fuel to run the vehicles when it becomes necessary. This ultimately reduces the dependency on fuel.

The current technology of PHEVs allows approximately 196km of travel for a fully charged battery; which is good enough for most urban journeys, but for long distance travel, it would be necessary to add fuel as well.

In 1950 there were approximately 50 million cars across the globe, and in 1994 this number increased to 600 million cars, that's 1 car for every 10 people, if this trend continues by 2050 we would have over 3 billion cars in the face of the Earth (Sperling, 1995)

Kenya is no exception from this trend, having an annual average growth of cars in the country of approximately 20% (GFEI Kenya Baseline, 2011)

Over the years, the transport sector in Kenya generally consumed 70% of the total net domestic sales of petroleum products, with the overall amount of petroleum demanded by the transport sector projected to rise from 1.9 million tons in 2004 to 8.6 million tons, 5.3 million tons and 6.8 million tons (depending on Business

As Usual, Medium and Low scenarios) by 2030 (UNEP, 2006)

With this in mind, it is evident that there is need for a solution to the rising demand of petroleum products. Other countries have also noted this problem, and a number of solutions are being looked into. One of these solutions which has succeeded and is growing rapidly all over the globe is that of PHEVs.

1.2 Objectives of the Study

1.2.1 Broad Research Question

Plug-in hybrid electric verses fuel based vehicles: which is more viable in the Kenyan market?

1.2.2 Specific Research Objectives

1) To assess the market viability of PHEVs in Kenya
2) To evaluate the technical viability of PHEVs in the Kenyan environment
3) To determine the economic viability of the introduction of PHEVs in Kenya
4) To recommend an effective business strategy for the introduction of PHEVs in the Kenyan market

1.3 Research Questions

The specific research objectives are used as guidelines to ensure that the study concentrates on certain areas and is not side tracked. These objectives need to be phrased as questions so that by the end of the study it is clear whether the answers to these questions have been found and what exactly they are.

Therefore the research questions for this study are:

1) Is the Kenyan market ready for the introduction of PHEVs?
2) Taking into consideration the extent of technological development of PHEVs currently, is the Kenyan environment technically ready for PHEVs?
3) Will the economic status of Kenya allow consumers to purchase PHEVs?
4) What would the most effective business strategy be; for a vehicle distributor in Kenya, to successfully introduce PHEVs?

1.4 Significance of the Study

This research is meant to pave the way forward for development of new innovations in terms of environment friendly, electric and hybrid vehicles in the Kenyan Market.

1.4.1 Vehicle Distribution Agencies

The impact of the study to vehicle distribution agencies is that it is meant to direct them towards successfully introducing PHEVs into the market, and to show them using previous literature and current research what would be required to ensure their viability in the Kenyan environment.

It would be prudent to mention here that based on the outcome of the research, the impact could also be to prevent vehicle distribution agencies from venturing into PHEVs at the current time due to the lack of suitability in the Kenyan market. The study would also clearly indicate basic factors which would bring about the suitability of PHEVs and vehicle distribution agencies would know what to look for before venturing into this new product.

1.4.2 The Kenyan Government

The study is meant to bring to focus the various benefits of PHEVs, especially to a developing country such as Kenya. Benefits such as pollution reduction would cause the Kenyan government to encourage the importation and distribution of PHEVs in larger scales.

The various factors inhibiting the introduction of the PHEVs into the market, such as the lack of electrical infrastructure that would enable reliable charging of cars at home; among others, which can be corrected by the government, would be highlighted by the study and impact the decision of the government to act quickly to ensure these factors are mitigated.

1.4.3 The consumers and vehicle owners

Vehicle owners need to have a clear understanding of what to expect from a PHEV and exactly what benefits and costs would be involved with owning one.

If they are going to save in the long-term, and whether they will be willing to invest in a home charging station with the power fluctuations experienced in the country; these are all determining factors for the success of the adoption of PHEVs in the market.

This study is meant to improve the understanding of the consumers so that they can make better informed decisions.

2.0 LITERATURE REVIEW

2.1 Theoretical Literature Review

2.1.1 Market Viability

According to Sperling (1995) the first most important step to ensure market viability is to have a clear central vision and strict guiding principles. He argues that without this central vision, consumers would be bewildered by the large array of options in the fuel and vehicle industries.

On the other hand Eaton (1993) states clearly that vision is overrated due to the fact the car industry is mature. He states that a more important measure would be to have quantifiable short-term results.

From these arguments we can deduce that the viability of a market requires certain mind-sets which determine how well a particular product is taken up by the consumers in that environment; whether these mind-sets are in-terms of clear vision or short-term results.

Kenya does not have domestic vehicle production and relies on imports. The light duty vehicle stock saw an 85% increase between the years 1998-2008, with the majority (around 80%) of newly registered vehicles being second-hand imports from Japan (UNEP, 2010)

The established dealers face intense competition from imported second-hand vehicles, mainly from Japan and United Arab Emirates. These imports now account for about 70% of the market. The last decade witnessed a significant decline in the number of new vehicles sold in the country. There has been a steady recovery in the last four years, but the numbers achieved still fall far short of the numbers recorded a decade ago. In 2004, the leading motor vehicle companies recorded sales of 9,979 units. Although 27% better than the previous year, this is still well below the levels achieved in the early 1990's. The slump in the volume of new cars sold is attributable the increased competition from second hand vehicles and the depressed economic environment (PWC, 2013).

This reliance on imports will benefit the PHEV introduction as the consumers in the market are well acquainted with imported vehicles.

Because the adoption pathways of new technologies often follow S-shaped logistic growth curves (Geroski 2000), one of two cases apply to logistic growth curves of PHEV sales; the first models an aggressive 25 year transition to 100% market share for PHEVs, and the second models an extreme transition to 100% PHEV market share in 12 years. Both these models revolve around a changing world where pollution leads governments to ensure the uptake of PHEVs.

In the case of Kenya, certain infrastructure changes will be required to adapt the PHEV technology, such as, to allow charging from homes; Dowds et al. (2009) discusses some possible physical impacts on the transmission and distribution system. Transformers for instance could be subject to increased average operating temperatures under an additional load such as that required by PHEV charging stations. This could shorten their life, thus adding costs to the electricity grid.

Those concerns require the operators of the electricity grid to deploy new techniques to monitor, and remotely control the electricity demand. This is actually already one of the elements of the role of electricity grid operators in demand side energy management. (Nemry et al, 2009)

Many factors affect consumer choices about vehicles, and PHEVs may have desirable attributes other than fuel savings (Heffner et al., 2007), but promised fuel savings may be important in achieving large numbers of sales.

An interesting point to consider in the Kenyan market is the power outages. Sources of electricity in Kenya are hydro, thermal oil, geothermal and co-generation, with hydro being the highest contributor of electricity. KNBS data shows that all consumer categories recorded an increased demand in electricity with domestic, commercial and industrial, and rural electrification increasing by 10.8%, 7.6% and 3.5% respectively. Standby generation involves use of generators during times of high demand on utilities to avoid extra "peak-demand" charges or during periods of power shortage and outages in order to ensure continuous supply of power. From KIPPRA energy study, standby generation is estimated at about 22 percent in the manufacturing sector and 31 percent in the furniture related enterprises respectively. Other sectors such agro industry, construction related industries, machinery, metals and chemical plants have high standby generation levels. (KIPPRA, 2010)

Keeping this in mind, the ability of PHEVs to provide power to the grid would come in handy as a marketing factor to increase demand. In the more integrated system, the "Vehicle to grid" – V2G, the PHEV is capable to send power to the electric grid generally when it is parked. V2G concept was proposed by Amori Lovins in 1995 and afterwards several developments have been done especially by Willet Kempton. At present, an automobile capable of vehicle to grid (V2G) interaction is sometimes referred as 'mobile energy' or 'smart charging' (Williams and Kurani, 2006, 2007).

With the V2G technology, the unused electric car could supply electricity to the grid when required. It makes sense if most vehicles would remain parked at any point of time. (Nemry et al, 2009)

V2G technology is also envisioned as a solution to the intermittency of renewable energy sources of which role is expected to grow in the future. V2G would indeed provide both backup and storage that are the typical ways to cope with intermittency. It is suggested that the V2G technology could simultaneously accelerate the penetration of PHEVs and allow a reliable high penetration of renewable electricity (Kempton and Tomic, 2005).

However, three elements are required for V2G (Tomic and Kempton, 2007), the first being a power connection for electrical energy flow from the vehicle to the grid. The second is a control or communication device to enable the grid operator to determine available capacity, requested power from the vehicle, and meter the result. The final element required is precision certified metering on board the vehicle to track energy flows to measure exactly how much power a vehicle provided and at which times.

Also, potential challenges, relating to standards need to be resolved (smartgridnews, 2008); these include the communications standards and networks, the connection standards (Where does the intelligence reside: in the vehicle, at the utility, or at a third-party aggregator and how do they talk to each other?) and the integration of control methods.

Recently, the Michigan Public Service Commission (MPSC, 2008) established that the higher PHEV penetration depends on smart grid infrastructure research and developments. Thus, the US Department of Energy's (DOE) Office of Electricity Delivery and Energy Reliability has identified seven principal characteristics of a smart electric grid to allow PHEV penetration:

i. Self-Healing - a grid able to rapidly detect, analyze, respond, and restore from perturbations.
ii. Empower and Incorporate the Consumer - a grid able to incorporate consumer equipment and behavior.
iii. Tolerant of a Security Attack - a grid that mitigates and stands resilient to physical and cyber security attack.
iv. Provides Power Quality Needed by 21st Century Users - a grid that provides a quality of power consistent with consumer and industry needs.
v. Accommodates a Wide Variety of Generation Options - a grid that allows and takes advantage of a wide variety of local and regional generation technologies (including green power).
vi. Fully Enables Electricity Markets - a grid that fully enables maturing electricity markets.
vii. Optimizes Asset Utilization - a grid that employs IT and monitoring technologies to continually optimize its capital assets while minimizing operations and maintenance costs (O&M).

One of the possibilities to increase market viability for the small and medium size vehicle distributors in Kenya would be the formation of cooperatives. In general, cooperatives are formed because they allow members to do things they cannot do when acting independently. Members can work together to negotiate favorable terms of trade, combine capital resources to finance value-added enterprises, secure guaranteed markets for their commodities, and share the risks involved in growing and managing a business (Cropp 2001; Barton 1989; Schrader 1989).

Currently there is no cooperative which deals directly with vehicle distributers in Kenya. The numerous benefits of cooperatives have been highlighted by Schrader (1989); although with benefits come risks, the cooperative businesses clearly reduce risks to individuals by pooling resources and stabilizing returns. For example, profits from combined production, processing and marketing functions are likely to be more stable than any one component alone, especially in cyclical commodity systems.

The Automotive industry in Kenya is primarily involved in the retail and distribution of motor vehicles. There are a number of motor vehicle dealers operating in the country, with the most established being Toyota (East Africa), Cooper Motor Corporation, General Motors, Simba Colt and DT Dobie. There are also three vehicle assembly plants in the country, which concentrate on the assembly of pick-ups and heavy commercial vehicles (PWC, 2013).

The Kenya Motor Industry Association (KMI), the representative body of the corporate participants in the motor industry, has been lobbying hard to reverse this trend. Some of these measures have helped the industry recover from its lowest point in 2000, when only 5,869 units were sold. On their part, the companies themselves have become more innovative in responding to customer needs. Some of the measures that KMI has been advocating include:

i. Implementation of strict criteria on importation of second hand vehicles
ii. Incentives to promote local assembling of commercial vehicles
iii. Export incentives aimed at encouraging car manufacturers to expand operations in the region.

Data from the KMI show that while the total new vehicle market grew 10% year-on-year (y-o-y) in 2011, the Japanese earthquake and tsunami had the biggest impact on the country's larger dealers. As a result, those that the association groups as smaller dealers saw their market share increase from 6.5% in 2010 to 10%, while their sales rose 69% compared with 6.1% growth for the combined larger dealers. General Motors East Africa (GMEA) offset some of the negative impact of restricted supplies for its Isuzu truck brand, however, through its domestic production, which underlines the advantages to be gained in an increasingly competitive vehicle segment.

According to data from the KMI, growth in the agriculture, manufacturing and trade sectors is driving demand for pick-up trucks, which accounted for 35% of total vehicle sales in the nine-month period.

Sales of heavy commercial vehicles still account for 26.8% of the market, behind pick-ups. We also believe that construction projects in the region will fuel sales in the heavier segments over our forecast period. Further growth in Kenya's construction sector is forecast over the next two years by BMI's Infrastructure team, supporting the favourable conditions for the commercial vehicle segment. BMI expects growth in construction industry value to remain at roughly the same level as 2010 in 2011 and 2012, with industry value reaching KES159bn (US$2.1bn) by 2012. There could also be good news on the pricing front if the Central Bank of Kenya's monetary tightening measures result in the shilling's appreciation.

BMI has previously commented on the effects of a weakening Kenyan shilling on the country's used car segment and new data show the extent of the problem, with figures not expected to improve in the short term. Data from the Kenya National Bureau of Statistics show that used car sales for the eight months to August 2011 were down 20% year-on-year (y-o-y) to 33,073 units, from 39,790 in the same period of 2010 previous year.

Dealers have reported a 30% increase since the start of 2011 in the charges associated with importing used cars, including the exchange rate against the yen and US dollar and higher freight costs. The shilling reached a record low of below KES100.0/US$ on September 26 2011, and the Central Bank of Kenya expects sustained currency volatility over the next six months. Inflation has exacerbated the situation and, according to Kwame Owino, chief executive of the Institute of Economic Affairs, this has particularly hit the middle class, which is the biggest customer base for used cars.

Domestic production is one solution to such issues and Kenya is attracting investment, particularly from Chinese companies. Commercial vehicle manufacturer Beiqi Foton Motor launched its first domestically produced trucks in June 2011, after establishing a local subsidiary in the country in late 2010. The Foton Slip Double Cab pick-up truck was assembled at the Kenya Vehicle Manufacturers facility, where it will be assembled until Foton's own plant comes onstream. As part of a growing focus on Africa by Chinese auto companies, the company is building its own vehicle assembly plant, which is scheduled to begin operations in May 2012. Chery Automobile will be the next Chinese carmaker to invest in Kenya. According to Justus Nguu, director of Chery's local franchise holder Stantech Motors, Chery is now in negotiations with the Chinese government to secure financing of US$50mn for the Kenyan plant, which the carmaker plans to open in 2013.

(reference: http://www.marketresearch.com/Business-Monitor-International-v304/Kenya-Autos-Q2-6844269/)

2.1.2 Technological Viability

Plug-in hybrid electric vehicles (PHEVs) have been proposed as a next step in the evolution of transportation technologies towards increased energy efficiency and less pollution (Romm and Frank, 2006 and Suppes, 2006). A key reason for exploring PHEV technology is its ability to achieve significant petroleum consumption reduction benefits. A PHEV has essentially two operating modes: a charge sustaining mode and a charge-depleting mode. The total consumption benefits of a PHEV are a combination of the charge-depleting and charge sustaining mode improvements. (Markel and Simpson, 2005)

New PHEVs will likely have a life of more than 15 years and the vehicle miles travelled (VMT) continues to grow. (Davis and Diegel, 2004)

The ability of PHEVs to drive independently (or not) from electrical and/or chemical energy make their fuel efficiency assessment a complex task. As underlined by (Silva et al., 2009)

PHEVs are differentiated according to their All-electric range (AER) i.e. the distance driven electrically up to the point at which the ICE engine first turns on. It can be also defined as the distance travelled before the vehicle switches from charge-depleting to charge-sustaining operation (Gonder and Simpson, 2007). This is measured for a reference driving cycle, usually on urban driving cycle.

The notation "PHEVx" is commonly used to specify the PHEVs AER. For instance a PHEV30 corresponds to a PHEV with a 30 miles electric range. Typical PHEVs AER are in the range 20-60 miles. The PHEVx notation is more indicative for the case where, in practice, a PHEV would operate on all-electric CD mode over the first x kilometres, and after in CS mode3. But this definition is less appropriate if a PHEV operating in CD blended mode for which both electricity and gasoline are used to power the vehicle. In this case, it would be more convenient to define the suffix x as the equivalent distance of petroleum-based fuel displaced by electricity from the battery (Gonder and Simpson, 2007).

Typically, the shortest the daily trips, the higher the utility factor will be since most of the distance will be driven on electric mode (depending of course on the AER capability of the PHEV). The typical utility factor in U.S. is estimated to be around 50% for a PHEV with a 50 km AER (see e.g. (MIT, 2008)). (EPRI/NRDC, 2007) assumes the utility factors to be 12%, 49% and 66% respectively for PHEV10, PHEV20 and PHEV40 (in miles). An example of UF curve is given in Figure 11 for the U.S. (Elgowainy et al., 2009).

A typical PHEV can reduce gasoline consumption by about 30–45% over that of a comparable conventional vehicle (Markel, 2007)

PHEVs will likely use more advanced batteries such as lithium-ion batteries, and these more advanced batteries need not use the lead-acid batteries' charging method and may not need to charge for as long (Linden and Reddy 2002).

The energy storage capacity (kWh) is of high importance since it will directly determine the distance the vehicle can drive on the CD mode, as well as the mass of the battery pack. For PHEVs, the energy storage requirement considered in the literature typically varies from ~6 kWh to 30 kWh depending on the CD range (compared to 1-2 kWh for conventional hybrids and 30-50 kWh for BEVs). The energy storage capacity represents the 'available' or 'total' energy capacity depending on whether the SOC window is taken into account or not (e.g. a 10 kWh of total energy capacity operating with a 65% charge swing would have only 6.5 kWh of available energy). Generally, the battery usable energy increases linearly with the CD range (Rousseau et al., 2007).

The peak battery power (W) required primarily depends on the CD range, the CD energy management mode and on the total vehicle weight. For instance, a PHEVx operating in CD blended mode would require less power than the one operating in CD all-electric mode. The peak power is generally assumed to remain constant as the AER increases (Rousseau et al., 2007).

Nickel Metal Hydride (NiMH) batteries are the current typical batteries used by car manufacturers in mass-produced HEVs (e.g. Toyota). However NiMH batteries are considered to have reached their maximum potential. For the future, experts do not expect significant new technical improvements and cost reductions (Anderman, 2008; Kalhammer et al., 2007; Kromer and Heywood, 2007).

One method to ensure efficiency of fuel and electric energy consumption when using PHEVs is that when the engine is on, it is used only to provide supplemental power beyond the capabilities of the energy storage system; substantial fuel displacement can still be achieved via a strategy where energy storage and engine operate in a blended manner. (Markel and Simpson, 2005)

A full energy performance assessment of PHEV implies to quantify both the fuel and the electricity consumptions over the considered distance driven. Compared to BEVs (that exclusively use electricity) and to HEVs (for which fuel is the sole source of energy), the final energy consumption equation for PHEV is more complex. As illustrated in figure 1.1 below, it will depend on the distance travelled on all-electric range, which will be influenced by both the charging pattern and the driving behavior. (Nemry et al, 2009)

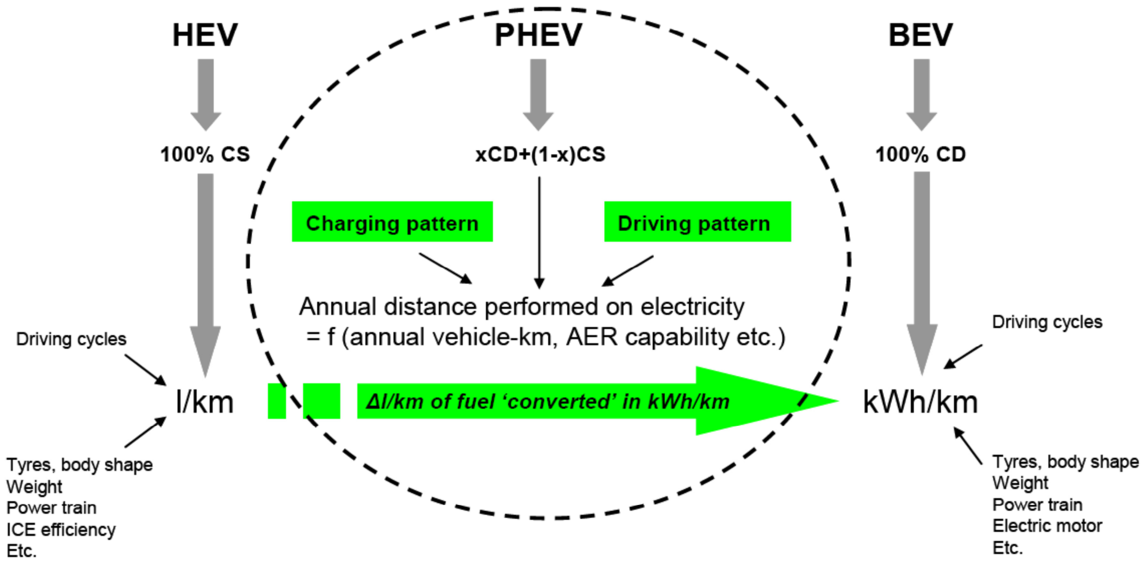


Figure 1.1: A full energy performance assessment of PHEV

2.1.3 Economic Viability

To analyze clearly the extent of economic viability for the introduction of PHEVs, one of the areas we need to understand is the consumers perspective, which is; how much does it really cost to own a car? Studies conducted prove that initial payment to buy a vehicle only amounts for around 25% of all the expenses involved with owning a vehicle. The rest of the expenses come from fuel, maintenance, parking fees and the like. (Sperling, 1995)

The basic cost projections for the implementation of this solution in the Kenyan market are those suggested by Electric Power Research Institute. (Duval, 2004)

Manufacturer costs result from engine and transmission, motor/inverter, controller, battery and charger as well as certain vehicle upgrades. In total, the additional manufacturer costs are reported in a range \$4000-10000 compared to conventional gasoline vehicles, and roughly 10-30% higher than for conventional HEVs (\$2000- 4000 for a sedan; greater than \$5000 for a SUV). Cost of batteries accounts for the higher contribution (~50%) and obviously increases with the battery storage capacity as determined by the AER (Pesaran and Markel, 2007).

Maintenance costs mainly depend on the battery replacement frequency: around 80000km for lead acid batteries and around 240000 km (150000 miles) for Ni-MH and Liion batteries. (Nemry et al, 2009)

Current battery prices for PHEV applications are difficult to determine reliably, but they are expected to be over \$600 per kWh for a 5.1 kWh battery even after substantial mass production (Kalhammer et al 2007)

The break-even battery costs for full-size SUV PHEVs with efficiencies as in EPRI (2002) are generally about 1.5 times the values for compact car PHEVs, suggesting that SUV PHEVs may become economical first.

Since buying the more expensive PHEV is a partially irreversible investment in efficiency technology and since fuel prices over the lifetime of a vehicle are uncertain, an option value premium would further lower the acceptable cost difference between a PHEV and other types of vehicles, also suggesting a need for still cheaper batteries (Dixit and Pindyck 1994).

Note that the electricity consumption (in Wh/km) increases linearly with the vehicle mass, around 6-7 Wh/km for every 100 kg in vehicle mass added (Rousseau et al., 2007).

A compact car PHEV with an all-electric range of 20 miles has gasoline-fueled efficiency of 52.7 miles/gallon and all-electric efficiency of 4.010 miles/kWh, compact car HEV efficiency is 49.4 miles/gallon, and compact car conventional vehicle (CV) efficiency is 37.7 miles/gallon. The all-electric efficiency includes losses from charging (EPRI 2001).

Compact car PHEVs charge at a rate of 1 kWh/h and require 4.1 kWh to recharge their batteries, and with Kenya Power and Lighting Co. LTD providing 1kWh for an average of 8 Kenya Shillings, this comes up to about 25 kshs per charge. This in-turn will give the user an average of 4.01 miles per kWh or about 6.5 kilometers per kWh; giving a grand total of approximately 27 kilometers of travel. (EPRI, 2002)

The Electricity tariff in Kenya in 2008 was US Cents 9.4 per kWh. This was higher than that of South Africa (US Cents 6.6 per KWh) and Egypt (US Cents 3 per KWh) who are her major competitor in trade and services in East and South Africa India which has one of the highest populations in the world and is currently experiencing growth rate of about 10% has very low and competitive tariffs (5.38US cents per kWh) and this is good for the households and industry. The UK and Singapore have some of the highest tariffs in the World at 21.9 and 18.4 US cents per kWh respectively compared to the USA and South Korea. Although power tariffs in South Africa

are lower than that of Kenya, there is a general trend for them increasing while those in Kenya between 2005-2008 have remained fairly stable. Table 4.1 shows the electricity tariffs in Kenya, according to the National Energy Survey 2009, the electricity tariffs Kshs/kWh are lowest for households (Kshs. 11.38/kWh) but highest in transport and communications (Kshs. 13.21/kWh) firms and manufacturing sector (Kshs. 13.01/kWh). These two sub sectors comprise the large commercial/industrial from the KPLC consumer category. (KIPPRA, 2010)

Table 1.1: Electricity Tariffs in Kenya

Sector	Kshs/kWh
Agriculture	12.16
Manufacturing including mining and quarrying	13.01
Electricity and water	11.95
Trade including tourism and insurance	11.80
Transport and communications	13.21
Community and social institutions including government	11.76
Households	11.38

Source: National Energy Survey, 2009

As compared to purely petroleum and gasoline fuelled vehicles, PHEVs allow the user to travel more than a kilometer per shilling, according to the calculations above. Whereas gasoline

The overall picture needs also to be looked at, considering all costs components, including maintenance and fuel costs. Such a comparison was made by (Karplus et al., 2009), considering a PHEV30, and using the long-term cost estimates and energy performance from (Simpson, 2006). He derived a 8 year payback period.

Based on assumed battery costs and assumed battery power, the extra costs for PHEVs are derived as

below:
Table 2.1: Basic PHEV Costing

		Conventional car	PHEV20	PHEV40	PHEV60
Battery cost	€		9 525	15 600	19 800
total manufacturing cost	€	11 706	20 106	26 181	30 381

By the rate at which the industry is growing as indicated earlier; with growth rates of up to 27% per annum, we find that this industry is very profitable and there is little barrier to entry for new players.

2.1.4 Effective Business Strategy

Based on certain key strengths such as the reduction in CO2 emissions, impact on the consumption of petroleum, fast moving innovation improving the various technologies used in the design and manufacturing of PHEVs, all add up when trying to create an effective business strategy.

CO2 released during fossil fuel combustion and deforestation is the single largest contributor to radioactive forcing of climate change (IPCC, 2007)

High concentrations of ground level ozone remain one of the most pervasive urban air quality problems worldwide, and vehicles are among the most significant sources of emissions leading to ozone formation (Cooper and Arbrandt 2004, Sawyer et al 2000).

Motorized transport is by far the most dominant transportation in Kenya and is a major source of pollution and GHG emission, especially in the urban areas. (UNFCCC, 2002)

If the predictions about sustainable development are accurate, neglecting the environment and social issues may be a barrier to long-term survival at both the micro or macro level. Consequently, those companies that can effectively manage their environment and the social will also help make themselves economically sustainable. (Doane and MacGillivray, 2001)

Plug-in hybrid electric vehicles (PHEVs) have attracted attention as promising approaches for reducing emissions from on-road mobile sources. Vehicles that commute less that 50 km day−1 represent about 60% of all commuting vehicles in the United States (US Department of Transportation, 2001), suggesting that many short trips could be accomplished purely on electrical power. PHEVs reduce on-road emissions

by using electricity from the power grid as their source of energy; however, the use of PHEVs has the potential to increase emissions from stationary electricity generation units, depending on the nature of the electricity generating units used to charge the PHEV batteries.

The Electric Power Research Institute (EPRI) and the Natural Resources Defense Council (NRDC) performed an environmental assessment of PHEVs for the year 2030 (EPRI; Knipping and Duvall 2007). The study investigated the air quality impacts of PHEVs if 40% of US on-road vehicles were converted to battery power. The study used the Community Multiscale Air Quality (CMAQ) model to examine ozone mixing ratio, particulate matter concentrations, deposition of sulfate, total nitrogen and mercury concentrations. One of the important assumptions made in this study was that the new electricity generation capacity was met by increasing the load of current coal-fired generation units. The study did not account for additional emissions regulations or constraints in the future. The study showed that PHEVs would reduce exposure to ozone and PM, and reduce deposition rates for acids and mercury in most regions. However, some regions showed increases in ozone and PM exposure.

The incremental vehicle costs together with the availability and incurred costs from possible battery charging parameters will largely determine the large scale deployment of BEVs and PHEVs and, also, its effects on e.g. the electricity grid and sector. This will also determine the real environmental benefit stemming from the fuel displacement to electricity. Infrastructure geographical availability can for instance influence the required on-board energy storage energy capacity and vehicle performances. (Nemry et al, 2009)

PHEVs have been designed using conductive or inductive chargers. While inductive chargers have the advantage of intrinsic safety and pre-existing infrastructure, the conductive ones have efficiency advantages (87% charger efficiency (Pratt, 2007)), are generally lighter weight and more compact and can allow for bidirectional power flow (Bradley and Frank, 2009).

Three possible methods can be implemented to recharge the battery. In a charge infrastructure review, describes three charge "levels" defined by the US Electric Power Research Institute (EPRI):

The level 1 method uses the US standard 120 VAC, 15A or 20A branch circuit, used in the residential and commercial buildings. This delivers a 1.44 kW maximum power. This method would for the user, to install a new dedicated circuit to avoid overload. This is the most immediate solution.

The level 2 method is based on a 240VAC, single phase, branch circuit with up to 40A, requiring a dedicated circuit. Under 15A, the maximum charge power would be 3.3 kW. This method could be implemented for both residential and public charging.

The level 3 is the method suitable for fast charging through public facilities, based on 480 VAC, three-phase circuit, and enabling 60-150 kW charging power. This option implies a number of specific safety precautions. (Morrow *et al*., 2008)

The immediate expectation is that PHEVs would be charged overnight on a standard 220V outlet, in garages for instance. This would, in most cases, result in the optimal aggregated battery charging profile as it would be associated with low demand (off peak period). (Nemry *et al*., 2009)

However, the assumptions that recharging would occur after each trip and overnight are contradicted by surveys made on a sample of early PHEV in the U.S. which instead suggested that only 19% resulted in a charge event and the vehicles were predominantly charged during daytimes hours. (Morrow *et al*., 2008)

The availability of public charging would thus make PHEV driving more flexible but would also result in a reduced required onboard energy storage capacity, with also consequences on the energy performance and costs of the vehicle (Nemry *et al*, 2009).

2.2 Conceptual Framework

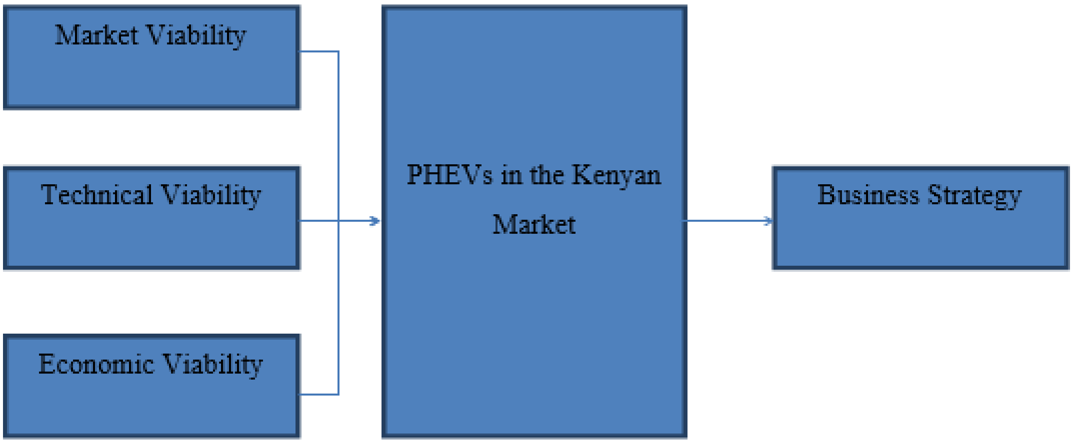


Figure 2.1 Conceptual Framework of the study

As the conceptual framework suggests, the desired output of the study is a clear and concise business strategy for vehicle distributers to introduce PHEVs in the Kenyan market. In-order to ensure that the business strategy will be successful it is necessary to understand the various factors which will influence its success.

These factors can be consolidated as the viability of PHEVs in terms of market acceptability, current technology, and economic environment in the target country. Thus the input of the study will be based on these three specific areas.

3.0 RESEARCH METHODOLOGY

3.1 Research Design

Using the concept of epistemology, the research for this study will be carried out with a descriptive survey design to ensure that data related to the viability of PHEVs in Kenya is gathered adequately. Although some people dismiss descriptive research as `mere description', good description is fundamental to the research enterprise and it has added immeasurably to our knowledge of the shape and nature of our society. (De Vaus, 2001)

The research philosophy used will blend between phenomenological and positivist paradigms so as to ensure that both facts and their meanings are focused upon. (Easterby-Smith, et al., 1991)

The survey will be conducted with the various car distributors in Kenya with a census of all distributors of international brands that have either developed PHEV models or have not yet ventured into that technology.

3.2 Target Population

Kenya Car Bazaar (2012) indicates a total of 153 registered used car distributors and 90 new car distributors in Kenya. Using this figure and the sample size table as appears in Saunders, et al., (2009), the ideal sample size would be a census sample. Using the sample size calculator on the Creative Research Systems Website (Appendix 1) with a confidence level of 95% and a confidence interval of 4 yields a sample size of 125.

3.3 Data Collection

Primary data collection will include both questionnaires and interviews. Secondary data will be gathered from results of previously implemented PHEVs in other countries. The questionnaire to be used can be found in Appendix 4 and the interview schedule in Appendix 5. During the data collection process, it will be ensured that all data will be ethically acquired by making sure participants are not be coerced into providing information, and by making sure that secondary data sources are not be obtained without required permissions. For the study to be replicable, you need to monitor and report your analytical procedures and processes as completely and truthfully as possible (Patton, 2002).

3.4 Data Analysis

Content analysis will be used for qualitative data analysis. Performed using both inductive and deductive analysis processes, so that content which has either been studied previously or has not, is analysed and patterns are identified and compared. (Elo and Kyngas, 2008). As Schamber (2000) pointed out, content analysis functions both as a secondary observational tool for identifying variables in text and an analytical tool for categorization.

Critical analysis of quantitative data will then follow to provide clear results and recommendations. These results will be tabulated and presented graphically in the form of Pie Charts and Bar Graphs, as recommended by Saunders, et al., (2009).

The Analysis of Variance test (ANOVA), will then be used on the responses to determine interaction of variables. Tharenou, et al., (2007) explains ANOVA as an instrument to compare the means of multiple independent groups. Blaxter, et al., (2006) also concurs with this explanation describing ANOVA as a measure of determining how independent variables interact with each other and impact the dependent variable.

4.0 DISCUSSION OF FINDINGS AND RESULTS

4.1 Feedback of the study

The study comprised of both interviews and questionnaires. The interviews were conducted with 5 vehicle distributors from various segments of the market, these 5 were asked questions as shown in the interview schedule (Appendix 5) and results were tabulated using the unit of analysis and a coding scheme.

An introduction letter (Appendix 6) was sent to all the 153 used vehicle distributors and 90 new vehicle distributors that were present in the sampling frame (Appendix 2) requesting for their participation in this study. All the 243 companies were then telephoned with a follow up of the same request.

Bearing in mind the constraints mentioned is the previous chapters, a cut-off date of 30th June and a minimum response of 100 usable questionnaires was set as a compromising balance between resources and credibility of the sample. A total of 125 usable responses were received by 30th June 2013, and these were used as a representative sample of vehicle distributors in Kenya.

4.3 Analysis of Results

4.3.1 Adopted Technique

In-order to analyze the results of the study, we need to employ various methods which should give us a clear understanding of what the results mean and how they affect the viability of PHEVs in the Kenyan Market.

We had both qualitative and quantitative data collection methods which require separate analysis techniques to gather accurate conclusions from the results, thus the techniques adopted include both content analysis and analysis of variance.

4.3.2 Content Analysis

As one of today's most extensively employed analytical tools, content analysis has been used fruitfully in a wide variety of research applications in information and library science (ILS) (Allen & Reser, 1990).

After gathering the various answers to the critical interview questions from the 5 interviews conducted, the unit of analysis was defined. The unit of analysis refers to the basic unit of text to be classified during content analysis. Messages have to be unitized before they can be coded, and differences in the unit definition can affect coding decisions as well as the comparability of outcomes with other similar studies (De Wever et al., 2006). In this case the unit of analysis was described as "a word or group of words that could be coded under one objective to determine viability of PHEVs in Kenya."

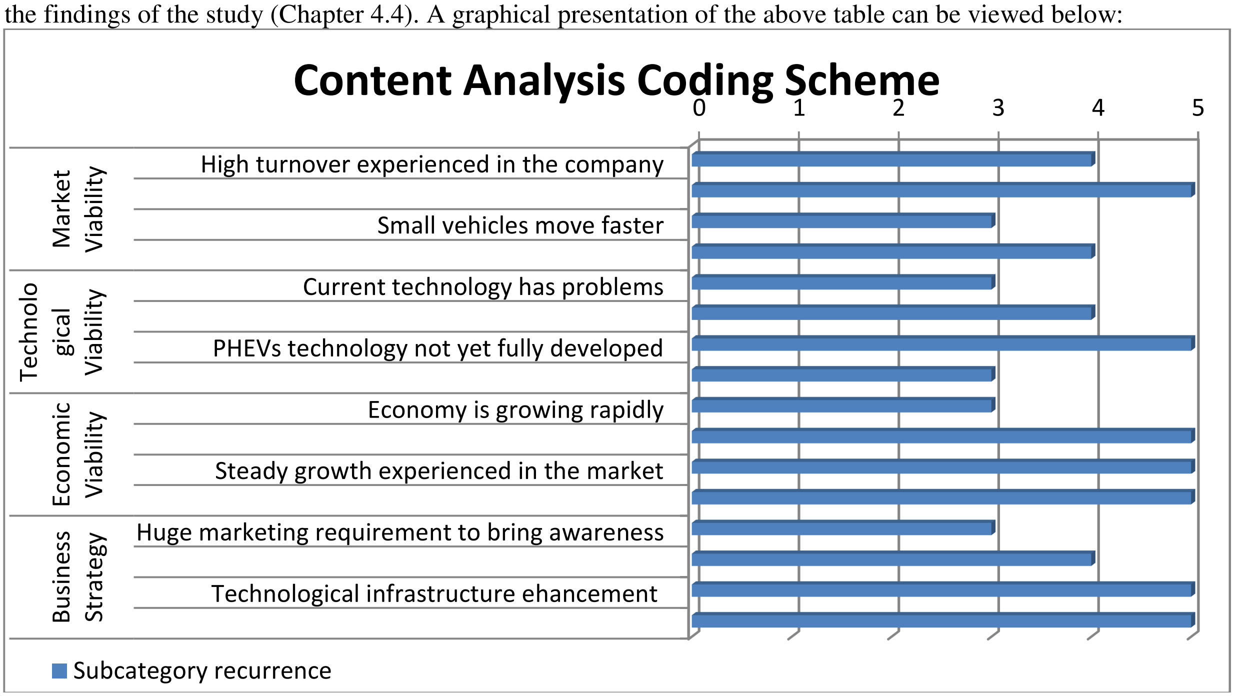
A category and coding scheme was then developed, using a preliminary model which was modified during the course of analysis to suit the content gathered, as Miles and Huberman, (1994) state, you can generate an initial list of coding categories from the model or theory, and you may modify the model or theory within the course of the analysis as new categories emerge inductively.

The coding scheme was then applied to a sample of the answers in the interviews, and whenever the percentage of agreement did not reach an acceptable level, the coding scheme was revised. When consistency was achieved, the modified coding scheme was adopted for all the content. The coding scheme which was derived with the results are below:

Table 3.1: Content Analysis Coding Scheme and Results

Theme	Subcategories	Subcategory recurrence	Comments
Market Viability	High turnover experienced in the company	4 out of 5	This shows that the market is active
	Fast movement of vehicles	5 out of 5	The rate at which vehicles are imported and sold is high
	Small vehicles move faster	3 out of 5	2 of the interviewees stated that larger vehicles moved faster
	Market readily accepts change	4 out of 5	Many changes have been adopted in the market before
Technological Viability	Current technology has problems	3 out of 5	Pollution and fuel prices were the major concerns
	Market not aware of PHEV technology	4 out of 5	Benefits of owning PHEVs would need to be highlighted
	PHEVs technology not yet fully developed	5 out of 5	News of the development of new features is a frequent occurrence
	Technological infrastructure not ready	3 out of 5	The requirement for reliable electricity and better infrastructure
Economic Viability	Economy is growing rapidly	3 out of 5	The new political regime was mentioned to bring growth
	Opportunity available to introduce new products	5 out of 5	Daily introduction of various new products in other industries
	Steady growth experienced in the market	5 out of 5	All interviewees agreed that they have seen growth
	Political factors will effect PHEV introduction	5 out of 5	Previous experience when dealing with nationwide projects
Business Strategy	Huge marketing requirement to bring awareness	3 out of 5	New product introduction will require collaborative effort
	Partnerships with both private and public sector	4 out of 5	Partnerships for charging stations and political motivation
	Technological infrastructure enhancement	5 out of 5	Infrastructure would be a key hindrance to PHEV introduction
	Slow introduction of PHEVs	5 out of 5	Parallel product selling of PHEVs and fuel driven vehicles

Certain conclusions can be drawn from the content analysis carried out above, these will be discussed in detail in the findings of the study (Chapter 4.4). A graphical presentation of the above table can be viewed below:



4.3.3 Analysis of Variance

In order to analyze the data collected using the quantitative approach, it was found that the ANOVA technique would allow the derivation of accurate finding which would allow us to determine certain answers to the research questions posed in the first chapter of the study.

The feedback of the questionnaire was fragmented into relevant areas including two variables each. This data was then fed into a statistical calculator which allowed the formulation of graphs which analyzed the variance between these variables. Each of these sets of variables and their results are shown below:

Table 4.1: Turnover against Size of Vehicle Distribution Agent

Turnover for the past year	1-10 staff	11-50 staff	50-100 staff	above 100 staff	Total
below $100,000	10	2	0	0	12
$100,000-$500,000	49	7	2	0	58
$500,000-$1m	25	5	2	0	32
$1m-$5m	4	6	9	1	20
Above $5m	0	1	0	2	3
Total	88	21	13	3	125

With the above data, using the code *plot.design(data1)* a general graphical presentation of turnover and the size of the company is shown below:

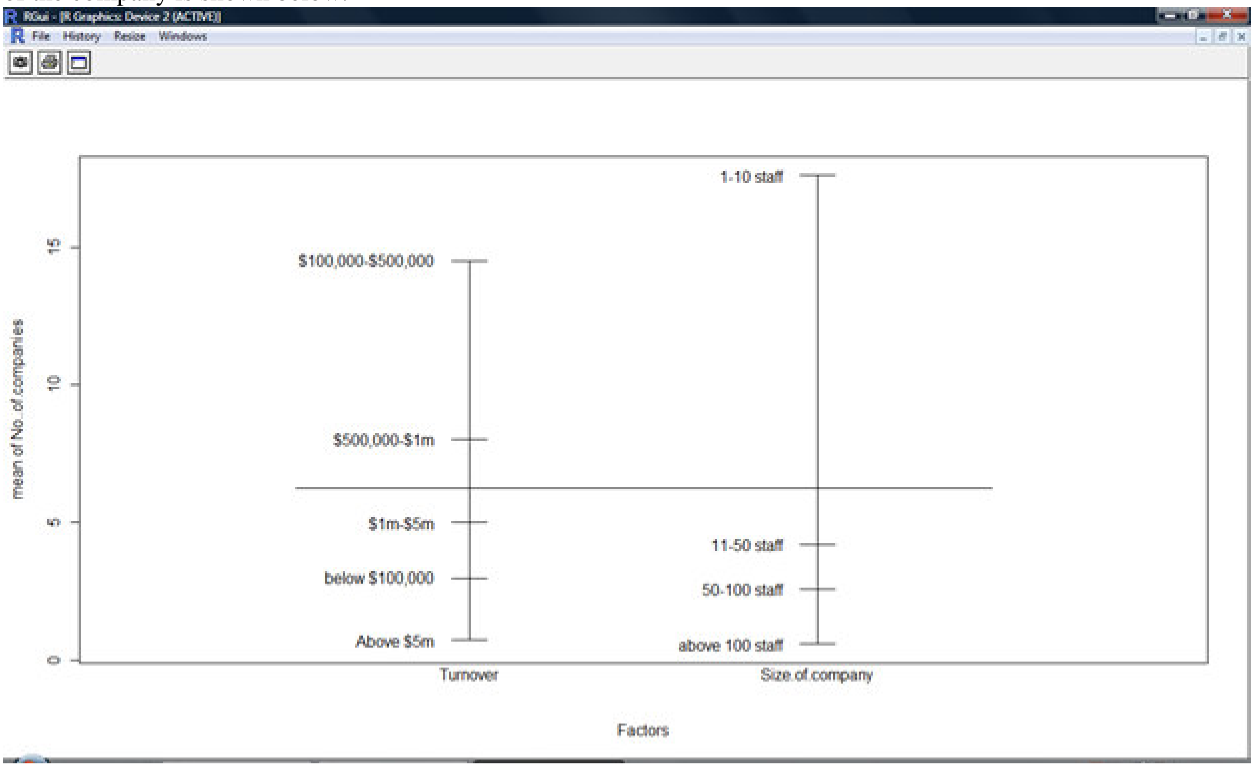


Figure 4.1.2: Graph showing the distribution of number of companies for 2 variables

Then one way ANOVA is performed to check if the means of the number of companies vary with Size of the company. Our null hypothesis is that size of the company has no influence. If the F value is greater than the 95% F Tabulated value then we reject the null hypothesis and say with 95% confidence that there is a difference between in the means and size has an effect on the number of companies.

Two ways ANOVA is also performed to ensure that the size has an effect on the turnover and vice versa. A 95% family-wise confidence level graph is then plotted so that we can see exactly which size of company influenced the data most and which amount of turnover. We use the following code:

```
> tk1=TukeyHSD(anova2, "Size.of.company")
>plot(tk1)
> tk2=TukeyHSD(anova2, "Turnover")
>plot(tk2)
```

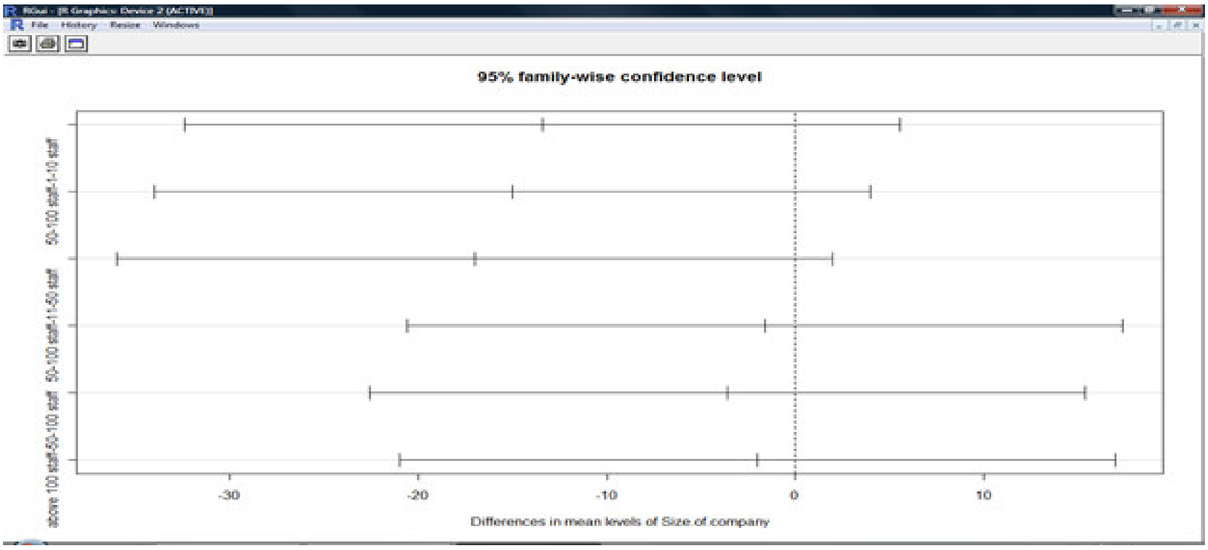


Figure 4.1.3: Graph showing the 95% family-wise confidence level for company size

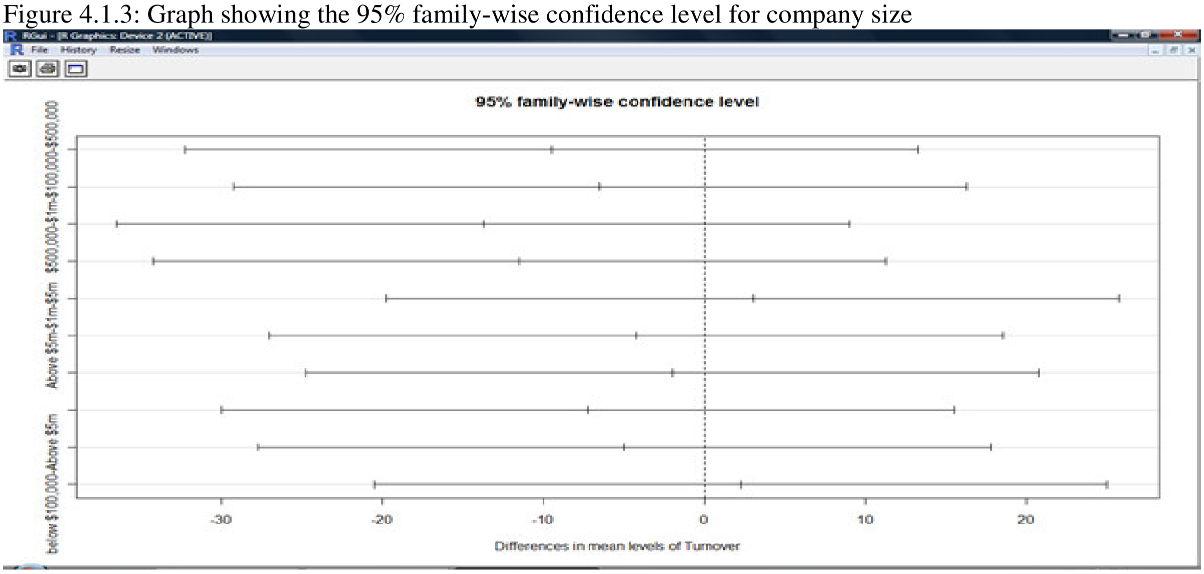


Figure 4.1.4: Graph showing the 95% family-wise confidence level for turnover

Conclusion: From the results of the Anova tests above it is clear to see that the calculated F Values are greater than the tabulated F Values at the 95% confidence interval. Thus we conclude that there is a definite effect of the size of the business on the turnover for that year.

Table 4.2: Willingness against Location of Vehicle Distribution Agent

Willingness to venture into PHEVs	**Nairobi**	**Mombasa**	**Nakuru**	**Eldoret**	**Kisumu**	**Other**	**Total**
None	0	0	0	0	0	0	**0**
little	14	6	1	1	1	0	**23**
average	22	3	3	1	1	0	**30**
enthusiastic	40	15	3	2	1	1	**62**
very enthusiastic	9	1	0	0	0	0	**10**
Total	**85**	**25**	**7**	**4**	**3**	**1**	**125**

With the above data, using the code *plot.design(data1)* a general graphical presentation of willingness and the location of the company is shown below:

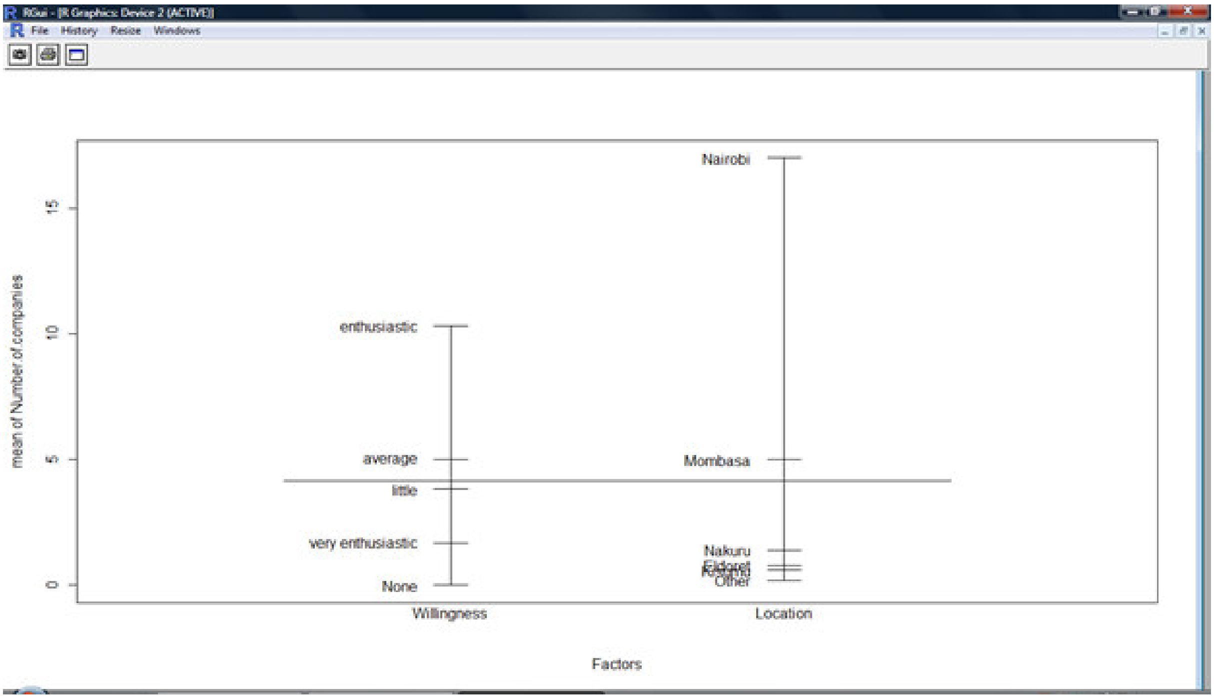


Figure 4.2.2: Graph showing the distribution of number of companies for 2 variables

Then one way ANOVA is performed to check if the means of the number of companies vary with location of the company. Our null hypothesis is that location of the company has no influence. If the F value is greater than the 95% F Tabulated value then we reject the null hypothesis and say with 95% confidence that there is a difference between in the means and location has an effect on the number of companies.

Two ways ANOVA is also performed to ensure that the location has an effect on the willingness of a company to venture into PHEVs and vice versa. A 95% family-wise confidence level graph is then plotted so that we can see exactly which location of company influenced the data most and which level of willingness. We use the following code:

> tk1=TukeyHSD(anova2, "Location")
>plot(tk1)
> tk2=TukeyHSD(anova2, "Willingness")
>plot(tk2)

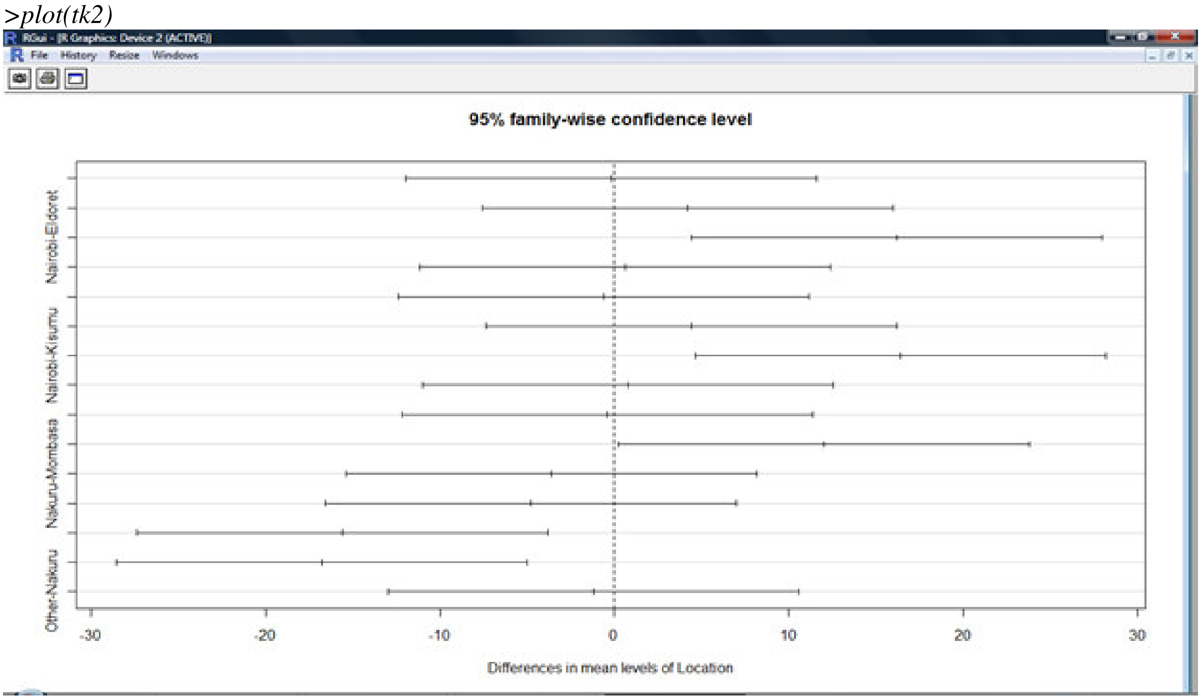


Figure 4.2.3: Graph showing the 95% family-wise confidence level for company location

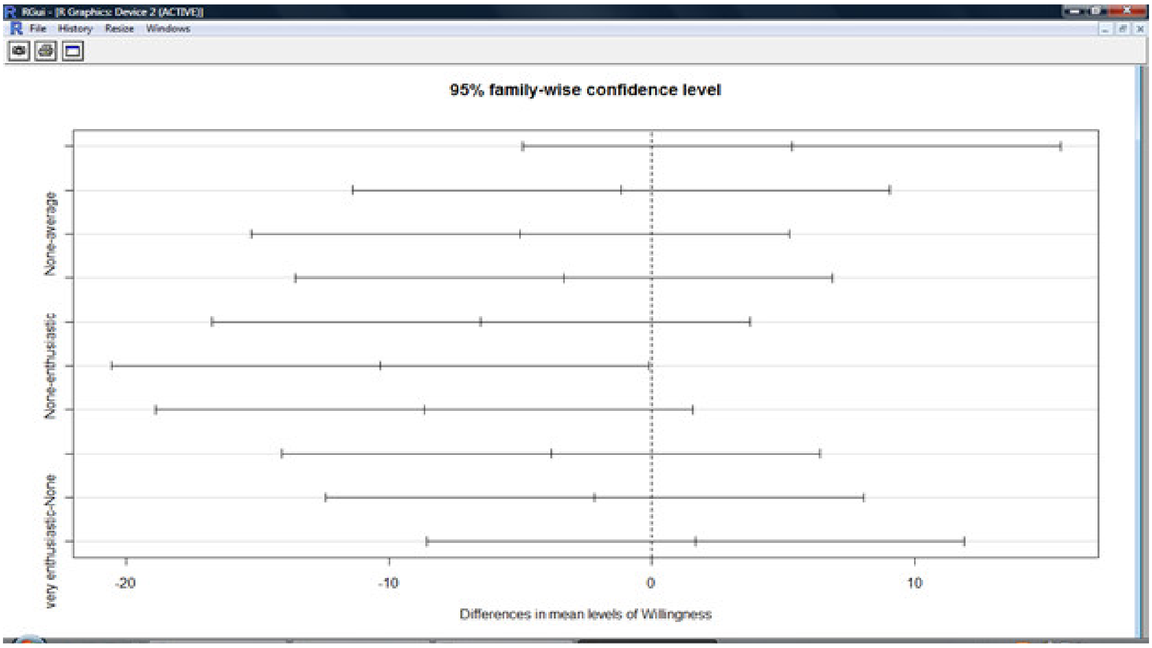


Figure 4.2.4: Graph showing the 95% family-wise confidence level for willingness

Conclusion: From the results of the Anova tests above it is clear to see that the calculated F Values are greater than the tabulated F Values at the 95% confidence interval. Thus we conclude that there is a definite effect of the location of the distributor on the level of willingness to venture into PHEVs.

Table 4.3: Age against Knowledge of PHEVs

Age of company	None	word of mouth	average	Clear knowledge	Deep knowledge	Total
0-1 year	4	14	1	3	0	**22**
1-2 years	1	12	5	1	0	**19**
2-4 years	0	13	2	13	0	**28**
4-6 years	0	24	6	2	0	**32**
6-8 years	0	9	3	4	0	**16**
Above 8 years	0	2	5	1	0	**8**
Total	**5**	**74**	**22**	**24**	**0**	**125**

With the above data, using the code *plot.design(data1)* a general graphical presentation of age and the knowledge of PHEVs is shown below:

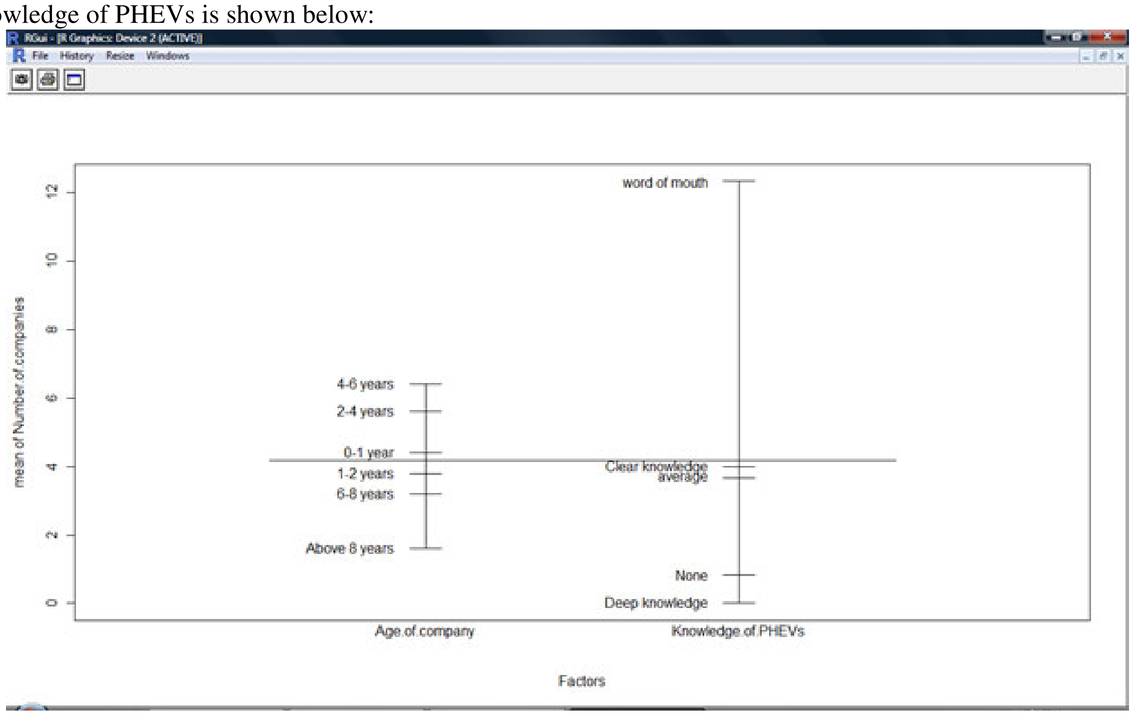


Figure 4.3.2: Graph showing the distribution of number of companies for 2 variables

Then one way ANOVA is performed to check if the means of the number of companies vary with knowledge of PHEVs. Our null hypothesis is that knowledge of PHEVs has no influence. If the F value is greater than the 95% F Tabulated value then we reject the null hypothesis and say with 95% confidence that there is a difference between in the means and knowledge has an effect on the number of companies.
Two ways ANOVA is also performed to ensure that the knowledge has an effect on the age and vice versa. A 95% family-wise confidence level graph is then plotted so that we can see exactly which level of knowledge of PHEVs influenced the data most and which age. We use the following code:

```
> tk1=TukeyHSD(anova2, "knowledge.of.PHEVs")
>plot(tk1)
> tk2=TukeyHSD(anova2, "Age")
>plot(tk2)
```

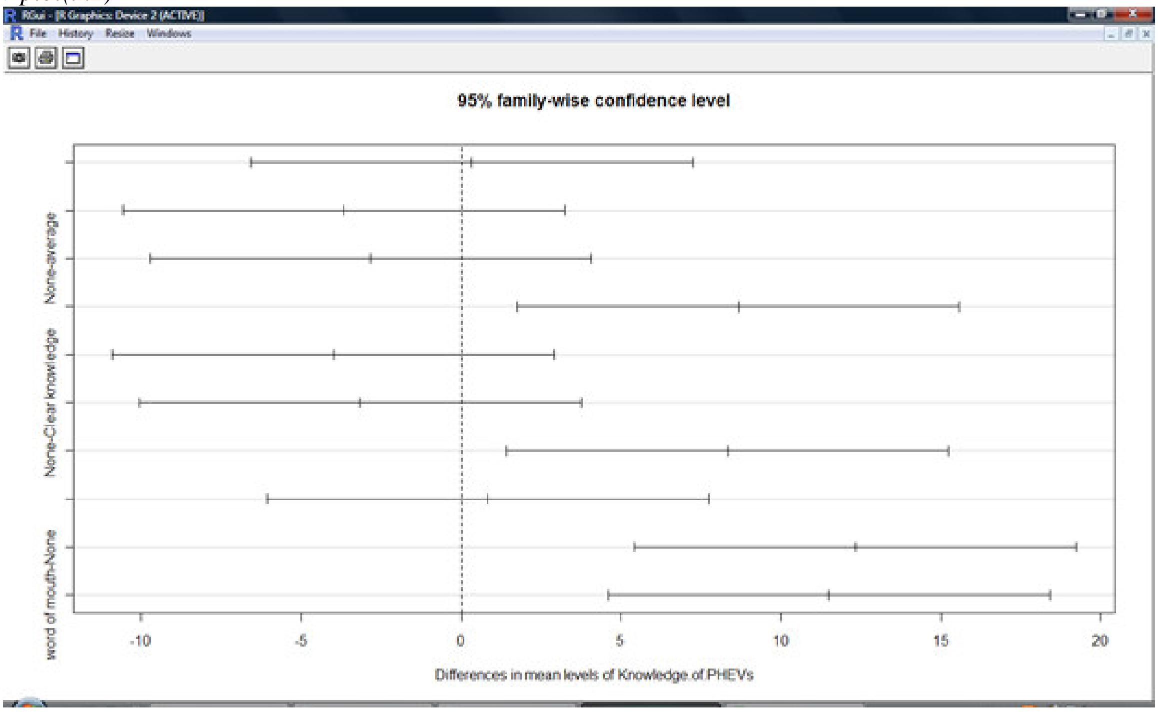


Figure 4.3.3: Graph showing the 95% family-wise confidence level for knowledge of PHEVs

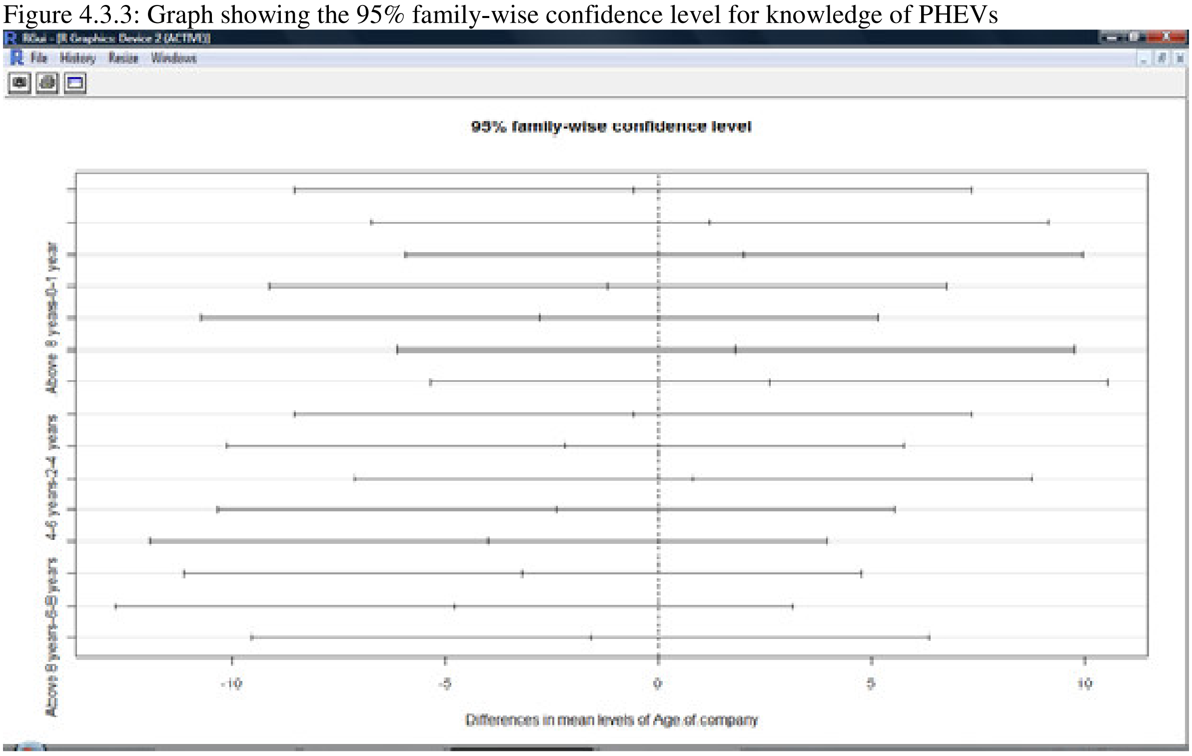


Figure 4.3.4: Graph showing the 95% family-wise confidence level for age of company

Conclusion: From the results of the Anova tests above it is clear to see that the calculated F Values are greater than the tabulated F Values at the 95% confidence interval. Thus we conclude that there is a definite effect of the age of the company on the level of knowledge it has about PHEVs.

Table 4.4: Vehicle Type against Market Acceptability to Change

Type of vehicles which are fast moving	very bad	bad	average	good	very good	Total
Sports	0	0	0	0	0	**0**
Luxury	0	0	1	2	3	**6**
Large	2	2	12	2	4	**22**
Mid-sized	3	15	5	3	2	**28**
Small	2	5	29	26	7	**69**
Total	**7**	**22**	**47**	**33**	**16**	**125**

With the above data, using the code *plot.design(data1)* a general graphical presentation of type and the market acceptability to change is shown below:

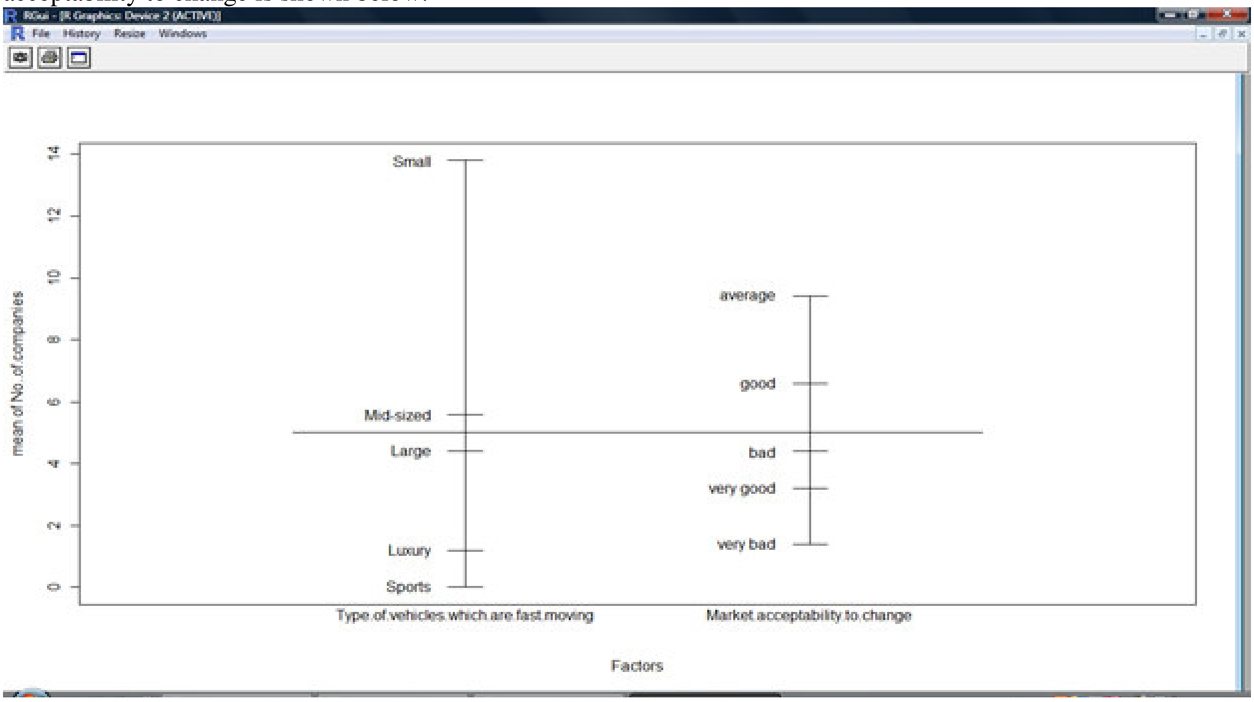


Figure 4.4.2: Graph showing the distribution of number of companies for 2 variables

Then one way ANOVA is performed to check if the means of the number of companies vary with Type of vehicle which are fast moving. Our null hypothesis is that type of vehicle has no influence. If the F value is greater than the 95% F Tabulated value then we reject the null hypothesis and say with 95% confidence that there is a difference between in the means and type has an effect on the number of companies.

Two ways ANOVA is also performed to ensure that the type has an effect on the acceptability to change and vice versa. A 95% family-wise confidence level graph is then plotted so that we can see exactly which types influenced the data most and which level of acceptability. We use the following code:

```
> tk1=TukeyHSD(anova2, "type.of.vehicles")
>plot(tk1)
> tk2=TukeyHSD(anova2, "Market.acceptability.to.change")
>plot(tk2)
```

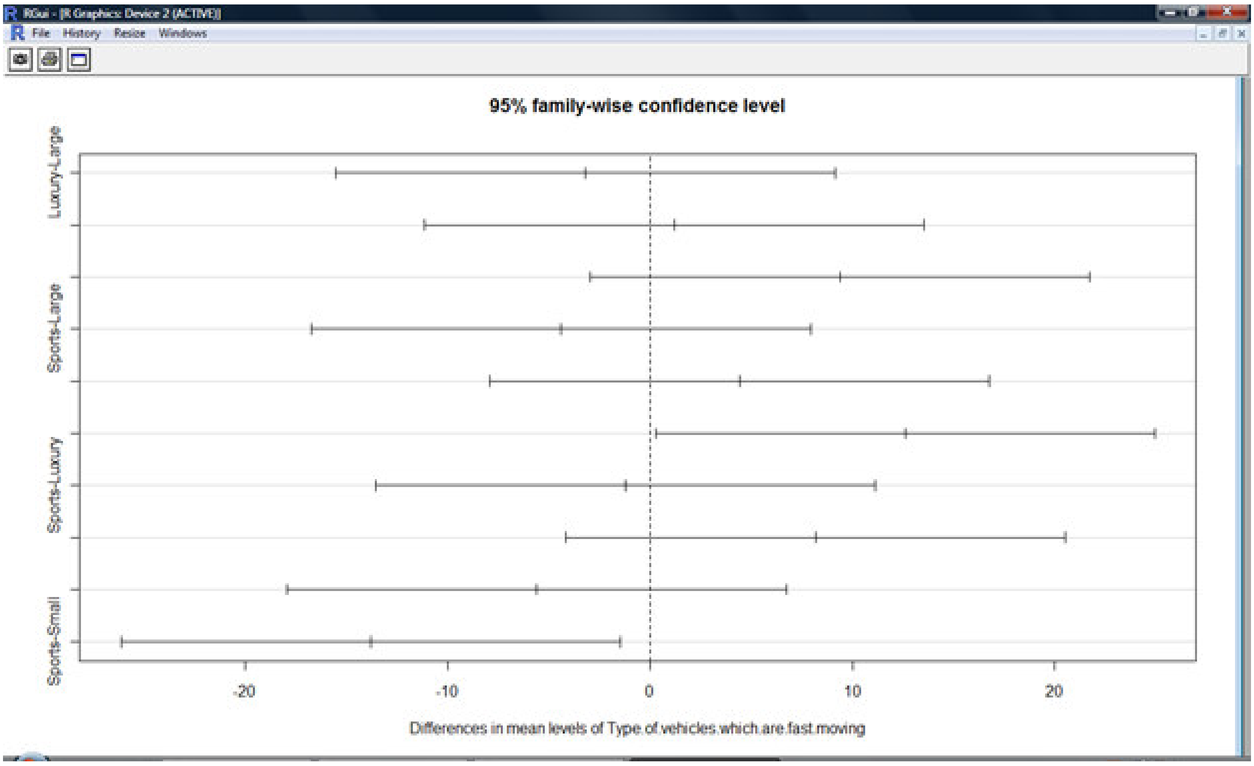



Figure 4.4.3: Graph showing the 95% family-wise confidence level for type of Vehicles

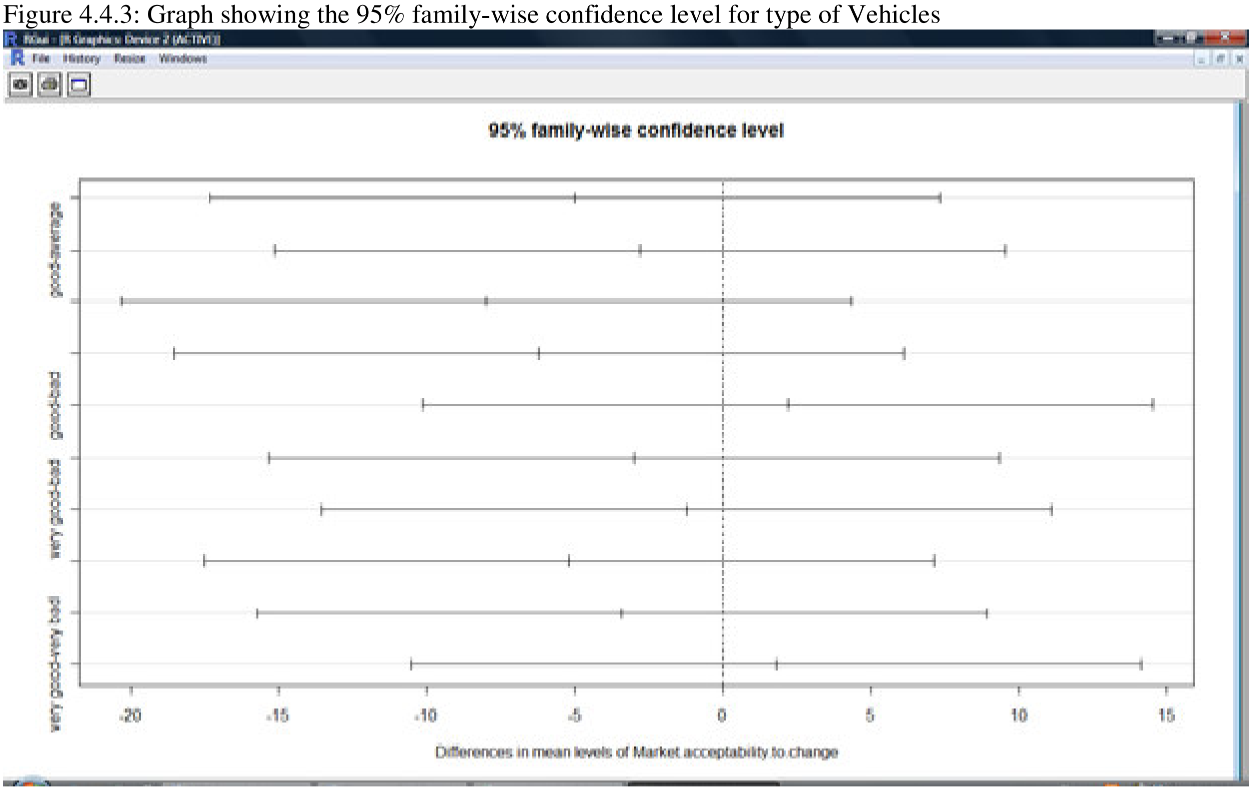


Figure 4.4.4: Graph showing the 95% family-wise confidence level for market acceptability

Conclusion: From the results of the Anova tests above it is clear to see that the calculated F Values are greater than the tabulated F Values at the 95% confidence interval. Thus we conclude that; although market acceptability to change does not really influence the data as much as type of vehicle does, there is an effect of the type of vehicle on the level of market acceptability to change.

Table 4.5: Vehicles Imported against Market readiness for PHEVs

Number of vehicles imported in average per month	very bad	bad	average	good	very good	Total
less than 5	20	26	28	2	0	**76**
5-10	5	3	14	11	2	**35**
10-15	0	0	1	2	0	**3**
15-20	0	0	4	0	0	**4**
20-25	0	1	0	4	0	**5**
above 25	0	0	0	2	0	**2**
Total	**25**	**30**	**47**	**21**	**2**	**125**

With the above data, using the code *plot.design(data1)* a general graphical presentation of average number of vehicles imported per month and market readiness for PHEVs is shown below:

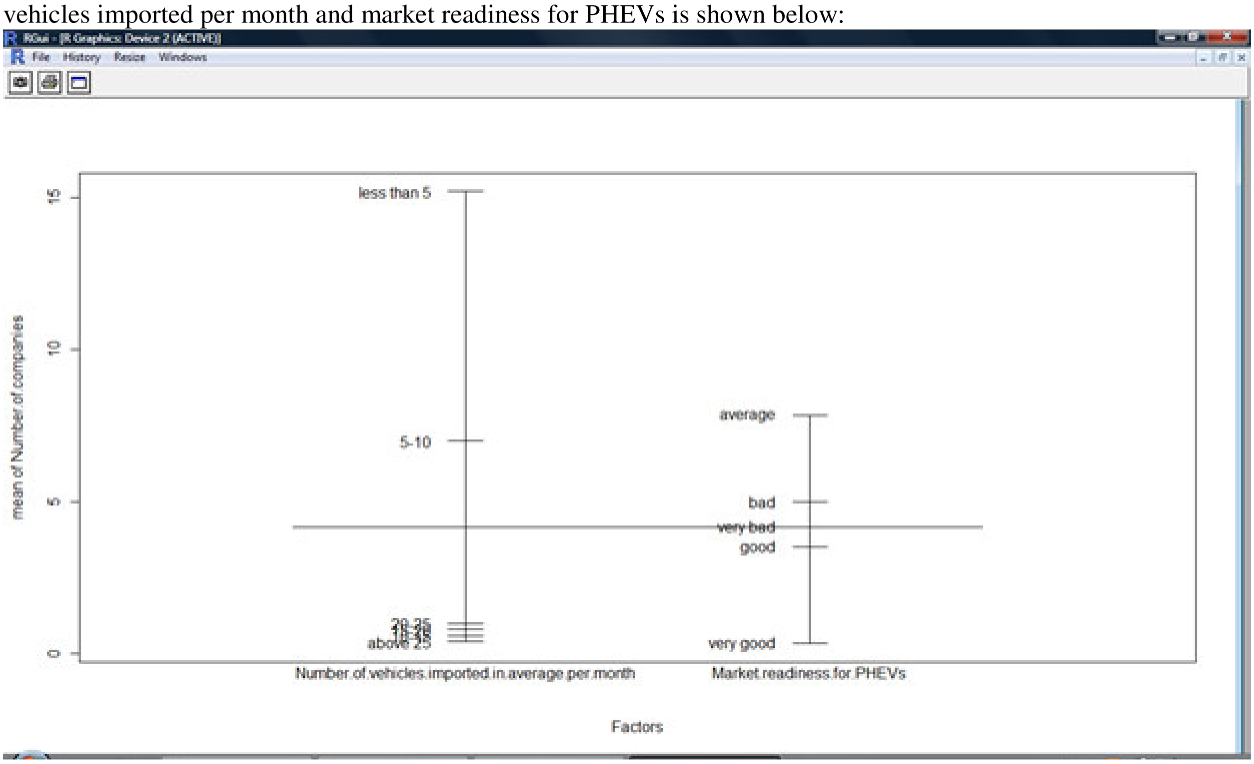


Figure 4.5.2: Graph showing the distribution of number of companies for 2 variables

Then one way ANOVA is performed to check if the means of the number of companies vary with market readiness for PHEVs. Our null hypothesis is that market readiness has no influence. If the F value is greater than the 95% F Tabulated value then we reject the null hypothesis and say with 95% confidence that there is a difference between in the means and market readiness has an effect on the number of companies.

Two ways ANOVA is also performed to ensure that the market readiness has an effect on the number of vehicles imported and vice versa. A 95% family-wise confidence level graph is then plotted so that we can see exactly which types influenced the data most and which level of acceptability. We use the following code:

```
> tk1=TukeyHSD(anova2, "market.readiness")
>plot(tk1)
> tk2=TukeyHSD(anova2, "vehicles.imported")
>plot(tk2)
```

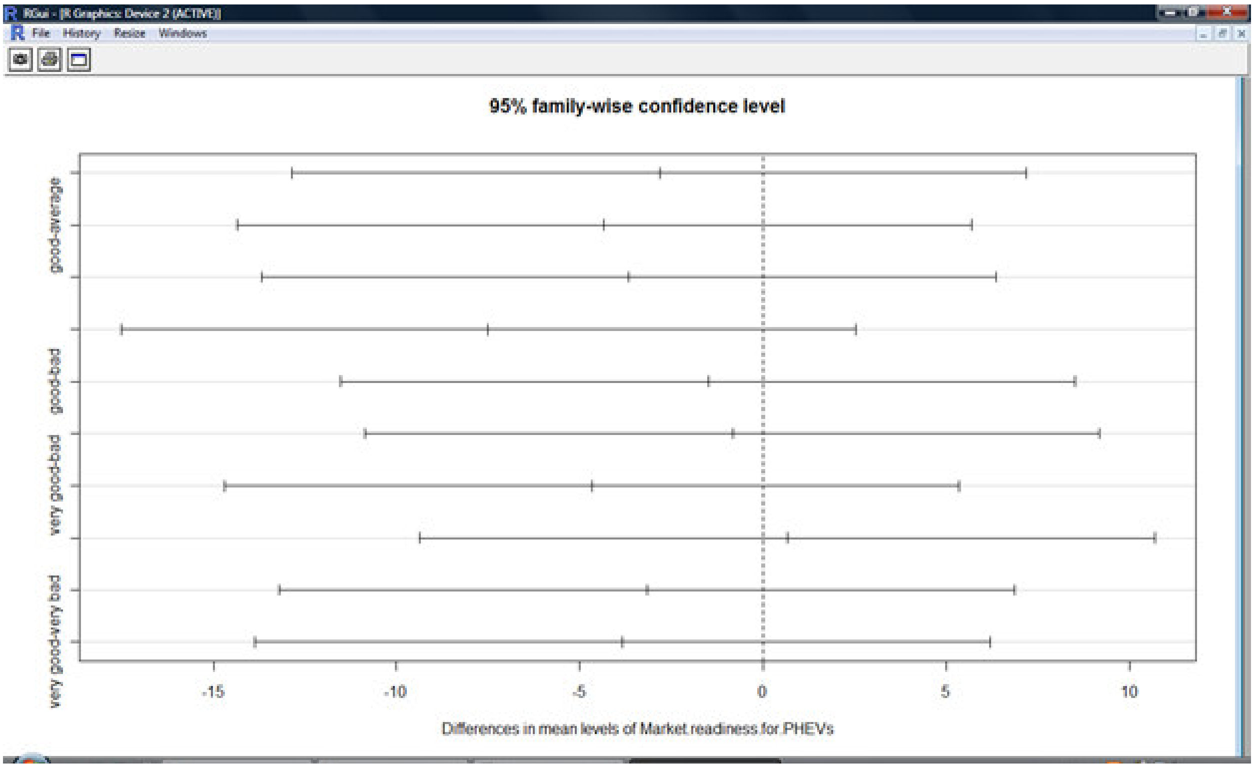



Figure 4.5.3: Graph showing the 95% family-wise confidence level for market readiness

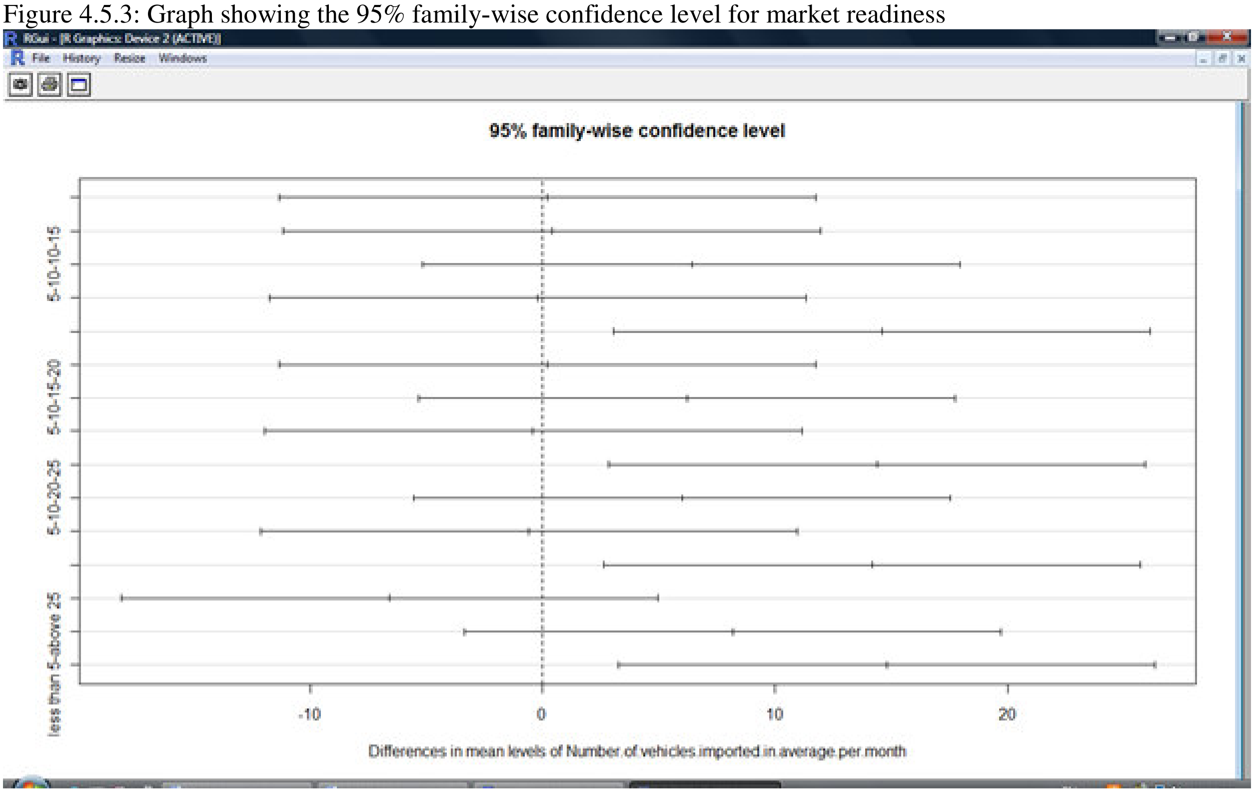


Figure 4.5.4: Graph showing the 95% family-wise confidence level for vehicles imported

Conclusion: From the results of the Anova tests above we can see that the calculated F Values are greater than the tabulated F Values at the 95% confidence interval. Thus we conclude that the market readiness effects the number of vehicles imported per month and vice versa. However, the market readiness only meets the quota slightly, i.e. if we use a greater confidence interval e.g. 99% the market readiness would not influence the number of vehicles imported per month.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Various conclusions can be drawn from the study and these can be used to either support or contradict previous literature discussed in the second chapter of this research document. As we will see in the four areas below, some results of the data analysis have gone against views discussed in the literature review. A lot of this chapter is dependent on the business strategy (Appendix 1) and other than a brief summary, the conclusions and recommendations have been explained in more detail in the various sub-sections of the business strategy.

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Appendix 1

Business Strategy

1. Introduction

Having found the results of the study and analyzed the various areas of viability, the next stage is to formulate a strategy of implementation so as to guide vehicle distribution agencies in Kenya; who are willing to take this path, towards success.

New products are an obvious way to grow sales, but their issuance often is poorly executed (D. Richards, http://entrepreneurs.about.com/od/businessplan/a/growthstrategy.htm). It is important to have a clear plan when venturing into something new, so that certain eventualities are predicted and catered for. In the case of PHEVs we find from the literature review as well as the research conducted, that if certain key factors are taken into consideration, the introduction of PHEVs into the Kenyan market would be extremely successful and a lucrative business venture for the vehicle distribution agencies.

2. Benefits and Costs

As highlighted in the literature review, PHEVs come with their own advantages and disadvantages, and thus venturing into the business of introducing them into the Kenyan market will have both benefits and costs, and here we will discuss how a good business strategy will ensure that the benefits outweigh the costs.

Just to summarize briefly, benefits of PHEVs are three fold, to the government, it would benefit the country as a whole by reducing pollution and if technology permits, it would improve the electricity grid reliability and supply using the V2G technology. Secondly it would benefit end users by reducing fuel costs and providing better technology. Even end-users would benefit from the V2G technology for their homes. And lastly the PHEVs would benefit the vehicle distributors by giving them a new product to differentiate them from their competitors and would allow them diversify into charging stations.

Disadvantages of the PHEV technology also include a few main areas; the first being the initial cost of the vehicles is slightly higher than that of fuel driven vehicles; although this is rapidly changing. Also, the limited choices when it comes to types of vehicles that are PHEV; again because more and more vehicle manufacturers are producing PHEVs, this should also be changed.

Then there is the issue of charging stations, training of end-users to use home charging stations, and a requirement to have charging stations across the country through various partnerships so as to allow end-users to charge their vehicles when they are far from home as they do with fuel. The electrical infrastructure for the introduction of charging stations may be another hurdle; but the implementation of a higher standard of electricity reliability in Kenya would benefit the population in many ways other than the use of charging stations, and this should encourage the government to invest in this project.

The maintenance of PHEVs is slightly different from that of fuel driven vehicles due to the batteries and this will require skills which have not been developed locally. Also the power output for the PHEVs is known to be less than that of fuel driven cars; although this is being improved in newer electric vehicles.

3. Financial Implications

One of the considerations in this proposal is the financial resources required to successfully rollout PHEVs in Kenya. These resources will include the actual cash outlay for purchase of both second hand and brand new PHEVs from various overseas suppliers, in addition to the human resource and physical resources, as elaborated in the product development plan above.

The cash flow required for this project will necessitate that any vehicle distribution agency should have some form of financial backing. This will be in addition to a cash inflow of Kenya Shillings 5 million in the form of a bank overdraft to cover the fixed costs and running expenses for the first two years from the launch date. It is projected that this overdraft will be repaid by the end of the fifth year. The cash flows will have substantial positive inflows from the increase of consumer awareness about PHEVs, and this has been taken into consideration.

The projected cash movement, balance sheet and profit and loss statement should be based on the following key assumptions.

i. Revenue for the first year is estimated at 8 PHEV sales of an average value of Kshs 1,500,000.00 each, totaling Kshs 12,000,000.00. Certain sales will include home charging stations. These transactions will yield additional revenue of Kshs 180,000.00 and it is expected that within the first year all consumers will purchase these home charging units totaling the revenue to Kshs 13,440,000.00.
ii. Revenue for the subsequent years is increased at a steady rate to show the uptake of PHEVs in the market and the adoption of various partnerships to enable recharging at shopping malls and petrol stations.
iii. A base lending rate of 15% per annum is assumed for the financial backing required for the initial capital as well as the operational costs involved.
iv. A Loan Amortization schedule for Ksh. 8,000,000.00 over two years at 15% would be required. This schedule would have a monthly repayment of Ksh. 387,893.00 amounting to Ksh. 4,654,716.00 annually. The schedule also calculates the total amount of Interest payable being Ksh. 1,309,463.00 of which Ksh. 952,308.00 is payable in the first year and the balance in the second year. These values represent the estimated cost of equipment for the first year, and should be used as a yardstick for subsequent years' revenue and costs.
v. Partnerships with various private sector firms would add to the cash flow and profitability and reduce some expenses such as marketing; which would be shared among both parties of the partnership.
vi. Overhead costs are estimated based on a portion of the average current operations costs of vehicle distributors. Insurance is estimated at 1% of expected revenue.
vii. A provision for Bad Debts is estimated at 3% of expected Income. This provides better protection in case of default.

5. Strategy

Risk assessment, marketing strategy

Appendix 2

Used Car Dealers in Kenya

A-Plus Motors Ltd.
Phone Contacts: +254 20 3861384 , +254 20 3746119
Location: Nairobi

AUTO LEHMANN
Phone Contacts: 0049 162 15 64 007, 0049 40 329 699 524
Location: Other

Bae Auto
Phone Contacts: +254 753 300 300, +254 753 300 300
Location: Nairobi

JasAuto Solutions Ltd
Phone Contacts: 0725160228, 0725160228
Location: Nairobi

Matuto Mwalimu Motors
Phone Contacts: 0722 515239, 020 2015699
Location: Nairobi

MAYGUY MOTORS
Phone Contacts: +254715234342, 0715234342
Location: Nairobi

Mombasa Car Ltd.
Phone Contacts: 0722404937, 041231400

Location: Mombasa

Mulkan Motors Ltd.
Phone Contacts: 0722 626 600, 0722 626 600
Location: Mombasa

1st for 4x4 exports. ROBIN WARD 4X4
Phone Contacts: 00447787503891, 00441530224053
Location: Other

AAA tycooncars.com
Phone Contacts: +447865147860, +441444390786
Location: Other

Ace Motors Ltd
Phone Contacts: , 053 2030010
Location: Eldoret

ADVANCE TRADE CO., LTD.
Phone Contacts: 81-9093293126, 81-45777-3399
Location: Other

Africpak Motors Ltd
Phone Contacts: 0722 783777,
Location: Mombasa

Aichi Trading Company (K) Ltd
Phone Contacts: , 020 556700
Location: Nairobi

Ali Global General Trading LLC , UAE
Phone Contacts: +971552631747, +971552631747
Location: Other

ALI GLOBAL TRADING
Phone Contacts: 81-80-4548-1986, 81-80-4548-1986
Location: Other

ALUMNAS AGENCIES
Phone Contacts: 0710506008, 0710506008
Location: Nairobi

Anything Express
Phone Contacts: +447939943886, +447812686503
Location: Other

AUTO EQUATOR
Phone Contacts: 65 94375002, 65 64754484
Location: Other

AWAN INTERNATION .K.K
Phone Contacts: +996709445446, +819030913914
Location: Other

Cameroon Corporation
Phone Contacts: 818043731366, 81257281366
Location: Other

Car Master
Phone Contacts: 0729026999, 0729026999
Location: Nairobi

CarMAx East Africa Limited
Phone Contacts: 0720392386, 0787392386
Location: Nairobi

CarVectoR International Co., LTD
Phone Contacts: +81 345 2093 42, +81 345 2093 42
Location: Other

CCM Intertrade Co., Ltd
Phone Contacts: +81-029-274-0027, +81-029-274-0027
Location: Other

Classic Marques Overseas Ltd
Phone Contacts: 00441423563044, 00441423563044
Location: Nairobi

COAST COMMERCIAL TRUCKS LTD
Phone Contacts: 00254787330622, 000254412221128
Location: Mombasa

Crown Trading
Phone Contacts: +81-90-6628-4790, +81-44-200-0985
Location: Other

Derrickson systems
Phone Contacts: 0722478121, 0722478121
Location: Mombasa

Dimex Autos
Phone Contacts: 0728600530, 0728600530
Location: Nairobi

etwelve cars
Phone Contacts: +447749125592, +447749125592
Location: Other

Exclusive Autos Kenya
Phone Contacts: +447438862464, +447438862464
Location: Other

Export UK Motors Ltd
Phone Contacts: 447876485615, 442089861254
Location: Other

HENGTONG INTERNATIONAL DEVELOPMENT CO.,LTD.
Phone Contacts: +81-4-7136-7986, +81-4-2266-0822
Location: Other

Imran's Auto Selection
Phone Contacts: 0723980353, 0720469193
Location: Mombasa

Isaac Auto Spares & Hardware
Phone Contacts: , 020 2219883
Location: Nairobi

Italian Engineering Works Ltd
Phone Contacts: , 041 2490446
Location: Mombasa

Jam City Motors Ltd
Phone Contacts: , 020 601546
Location: Nairobi

Jasena Auto Spares
Phone Contacts: , 066 248530
Location: Nairobi

Jayden Motor Ltd
Phone Contacts: , 020 2211421
Location: Nairobi

Jime Agencies Ltd
Phone Contacts: , 020 333912
Location: Nairobi

Jiwaji Enterprises
Phone Contacts: , 041 2493885
Location: Mombasa

Joyker Agencies
Phone Contacts: 0723 993157, 020 2089336
Location: Nairobi

JPC TRADE
Phone Contacts: +81-80-6426-6215, +81-3-5245-7731
Location: Other

Kalenburg Motors
Phone Contacts: , 020 786571
Location: Nairobi

Kalis Motors (Kenya) Ltd
Phone Contacts: , 020 556215
Location: Nairobi

Kamwana Auto Spares
Phone Contacts: , 020 312948
Location: Nairobi

Kangwana Motor Dealers
Phone Contacts: , 051 44627
Location: Nakuru

Kansai Trading Ltd
Phone Contacts: 0724 710610, 020 2736900
Location: Nairobi

Karen Auto Mart Ltd
Phone Contacts: 0720 791992, 020 3884603
Location: Nairobi
Kasarini Auto work
Phone Contacts: , 020 512666
Location: Nairobi

Kaswa Enterprise
Phone Contacts: 0722 416924, 041 2318468
Location: Mombasa

Katco Investment Ltd
Phone Contacts: 0722 766226,
Location: Mombasa

Katiba Executive Motor Autodrome
Phone Contacts: 0722 270708, 020 8560685
Location: Nairobi

Kenmuch Motor Limited
Phone Contacts: 0722 847121,
Location: Nairobi

kenscope shipping company
Phone Contacts: +254750697822, +2547250697822
Location: Nairobi

Keyman Motor Ltd
Phone Contacts: , 061 55039
Location: Nyeri

Kheng Keng Auto (K) Ltd
Phone Contacts: , 020 2733591
Location: Nairobi

Lumheroagencies car importer
Phone Contacts: 0721101890, 0729598324
Location: Eldoret

Malugei Agencies Ltd
Phone Contacts: , 051 40915
Location: Nakuru

Mascot Metal Africa Ltd
Phone Contacts: +254733983344, +254733983344
Location: Mombasa

mc evoys
Phone Contacts: 00447720404091, 0044284065026
Location: Other

Micma Investment
Phone Contacts: 0722 312486,
Location: Nairobi

Mid Africa Investment Company
Phone Contacts: , 020 533294
Location: Nairobi

Migingo Motor Dealers
Phone Contacts: , 058 21207
Location: Kisii

Milestone Cars
Phone Contacts: 0722 522477, 041 2314796
Location: Mombasa

Million Access
Phone Contacts: +81-90-5306-6050, +81-42-499-6663
Location: Other

Minase Auto Car Sales (K) Ltd
Phone Contacts: 0721 792181, 020 2243915
Location: Nairobi

Minase Auto Car Sales (K) Ltd
Phone Contacts: , 020 252315
Location: Nairobi

Monarch Motor Ltd
Phone Contacts: , 041 2491539
Location: Mombasa

Motherland Motors Ltd
Phone Contacts: 0722 376556, 020 6006706
Location: Nairobi

Motor Bank services Ltd
Phone Contacts: 0722 712174, 020 252041
Location: Nairobi

Motor Boutique Ltd
Phone Contacts: , 020 3006333
Location: Nairobi

Motor Care Ltd
Phone Contacts: , 020 6002482
Location: Nairobi

Motor Mania Ltd
Phone Contacts: 0721 875211, 020 557742
Location: Nairobi

Motor Mart Group Ltd
Phone Contacts: , 042 2131485
Location: Malindi

Motor Options
Phone Contacts: 0722 514601, 020 3875002
Location: Nairobi

Motorlink Ltd
Phone Contacts: 0720 582289, 020 3875317
Location: Nairobi

Motormax
Phone Contacts: 0722 791173,
Location: Nairobi

Mutindwa Enterprise Ltd
Phone Contacts: , 064 20346
Location: Meru

Naif centre (HON's)
Phone Contacts: 0722 591931,
Location: mombasa

Nathu Khan & Company Ltd
Phone Contacts: , 020 3868724
Location: Nairobi

Nathu Khan & Company Ltd
Phone Contacts: , 051 2211174
Location: Nakuru
Ndemi Motors Company
Phone Contacts: , 020 6008948
Location: Nairobi

Nebima Motors Ltd
Phone Contacts: , 053 2033061
Location: Eldoret

New Rafiki Machinery & Motor Sale
Phone Contacts: , 067 2020960
Location: Ruiru

Ngeeru Enterprise
Phone Contacts: , 020 6761057
Location: Nairobi

Nichibo Kenya Ltd
Phone Contacts: 0726 339329, 020 2215109
Location: Nairobi

Njilux Motor Ltd
Phone Contacts: , 020 3748830
Location: Nairobi

Njima Investment Ltd
Phone Contacts: 0722 517698, 020 3748830
Location: Nairobi

NK Investment (K) Ltd
Phone Contacts: 0722 411718, 041 2317756
Location: Mombasa

Norway Spare Parts Kenya Ltd
Phone Contacts: , 020 531834
Location: Nairobi

Nyandarua Motors Ltd
Phone Contacts: , 020 542228
Location: Nairobi

Nyandarua Motors Ltd
Phone Contacts: , 065 2032375
Location: Nyahururu

Nyanduko Motors
Phone Contacts: , 020 6763680
Location: Nairobi

Ombimahs Motors Dealers Ltd
Phone Contacts: , 051 2211185
Location: Nakuru

Overseas Cars Import Trading Ltd
Phone Contacts: 0721 290684, 020 341439
Location: Nairobi

Patience Motors
Phone Contacts: 0722 388422, 020 604674
Location: Nairobi

Peacock Motors Ltd
Phone Contacts: , 051 2211929
Location: Nakuru

Prestige Vehicle Importers services
Phone Contacts: 0722 920928, 020 2248585
Location: Nairobi

Principle Investment
Phone Contacts: , 020 785618
Location: Nairobi

Puma Cars Ltd
Phone Contacts: 0720 266134, 020 2076328
Location: Nairobi

R B Shaw (Africa) Ltd
Phone Contacts: , 020 530605
Location: Nairobi

Rainbow Vehicle Dealers Ltd
Phone Contacts: , 051 2214487
Location: Nakuru

Real Cars Ltd
Phone Contacts: 0722 144726, 020 6750160
Location: Nairobi

Real Motors Ltd
Phone Contacts: , 020 350200
Location: Nairobi

Real Time & Mada Motors
Phone Contacts: 0722 603870,
Location: Mombasa

Rehal Services Ltd
Phone Contacts: , 020 553031
Location: Nairobi
Renroc Motors Ltd
Phone Contacts: , 041 2228049
Location: Mombasa

Resma Motors
Phone Contacts: , 051 2212593
Location: Nakuru

Revenup Inc. Ltd. UK
Phone Contacts: +447773730758, +441273221421
Location: Other

Rising Motors
Phone Contacts: , 020 780990
Location: Nairobi

Riverland Motors Ltd
Phone Contacts: , 064 30331
Location: Meru

Rocate Automobiles Ltd
Phone Contacts: 0720 568486, 020 2216582
Location: Nairobi

Rossyn Export & Imports Company
Phone Contacts: , 020 2227246
Location: Nairobi

Royal Motors Ltd
Phone Contacts: , 020 3744307
Location: Nairobi

RUIFA INVESTMENTS
Phone Contacts: 0724805255, 0724805255
Location: Nairobi

Saba Star Cars
Phone Contacts: 0722 852115, 041 2229265
Location: Mombasa

Sakai Trading
Phone Contacts: 0722 272829, 020 2067440
Location: Nairobi

Salama Motor Ltd
Phone Contacts: , 020 558817
Location: Nairobi

Sapodilla
Phone Contacts: , 020 2211158
Location: Nairobi

Saratonic Enterprise
Phone Contacts: 0722 524779,
Location: Nairobi

SBT Kenya Ltd
Phone Contacts: 0723 382525,
Location: Mombasa

SBTJapan
Phone Contacts: +81-45-290-9485 ext#9568, +81-45-290-9485 ext#9568
Location: Other

Seaways Kenya Ltd
Phone Contacts: 0722 513493, 020 3872660
Location: Nairobi

Shabana Motors Ltd
Phone Contacts: , 058 31922
Location: Kisii

Shahid Automobiles Ltd
Phone Contacts: , 020 6762654
Location: Nairobi

Shahzad Motors Ltd
Phone Contacts: 0733 333468, 041 2220764
Location: Mombasa

Shamir's Automobiles
Phone Contacts: , 020 553985
Location: Nairobi

Shapla Motors Ltd
Phone Contacts: 0715 777800, 020 2426440
Location: Nairobi

Shecamo Hub
Phone Contacts: 0714 817779, 020 2713779
Location: Nairobi

Shiotsu Autotrade
Phone Contacts: +81-90-3266-8113, +81-72-967-1495
Location: Other

Sidra Motors Ltd
Phone Contacts: 0722 370050, 041 2220303
Location: Mombasa

Simbili Motors
Phone Contacts: 0722 802786, 020 2249025
Location: Nairobi
Sira motors
Phone Contacts: , 020 3449657
Location: Nairobi

Skyways Motor Works
Phone Contacts: 0721 805723, 020 6531440
Location: Nairobi

SOUTHERN QUALITY GROUP
Phone Contacts: 0723970231, 0716344382
Location: Nairobi

Specialised Motor Ltd
Phone Contacts: 0722 914024, 020 8561827
Location: Nairobi

Sports Cars Ltd
Phone Contacts: , 020 2223349
Location: Nairobi

Sports Cars Ltd
Phone Contacts: , 020 534366
Location: Nairobi

Ssi-Zyder (africa-N-America) Ltd
Phone Contacts: , 020 820462
Location: Nairobi

Tokyo Auto Company
Phone Contacts: +81-90-8582-2229, +81-4-7711-3342
Location: Other

Tradebuy Autos
Phone Contacts: 007850821888, 00441375482783
Location: Other

uk-exports
Phone Contacts: 00447738048042, 00447738048042
Location: Other

Warwick Motors
Phone Contacts: 0721 541050, 020 7125804
Location: Nairobi

Western Auto Dealers
Phone Contacts: , 020 2228251
Location: Nairobi

Western Automobile Company Ltd
Phone Contacts: 020 2215925
Location: Nairobi

Western Automobile Company Ltd
Phone Contacts: , 020 2222220
Location: Nairobi

Westfield Motors Ltd
Phone Contacts: , 054 20985
Location: Kitale

Wheatland Motors & General Agencies
Phone Contacts: , 053 2062770
Location: Eldoret

YAMAKATSU CO., LTD.
Phone Contacts: 81524330010, 81524330010
Location: Other

YUASA MOTORS LTD
Phone Contacts: 0715222222, 0206006145
Location: Nairobi

Zest Motors
Phone Contacts: +254723488400, +254-532062100
Location: Eldoret

New Car Dealers in Kenya
DT Dobie
Phone Contacts: 0711 057 000 , 020 6977000
Location: Nairobi

DT Dobie
Phone Contacts: 0722 203314, 041 2316701
Location: Mombasa
A Jiwa Shamji
Phone Contacts: , 058 30090
Location: Kisii

Associated Auto Centre Ltd
Phone Contacts: , 051 221 2340
Location: Nakuru

Associated Auto Centre Ltd
Phone Contacts: 0733 500 100, 057 202 1312
Location: Kisumu

Central Farmers Garage
Phone Contacts: , 020 352 2435
Location: Nairobi

Central Farmers Garage
Phone Contacts:
Location: Kitale

Kenya Coach Industries
Phone Contacts: , 020 653 6795
Location: Nairobi

Ryce East Africa Ltd
Phone Contacts: 0724 256665, 020 6531786
Location: Nairobi

Ryce East Africa Ltd
Phone Contacts: , 041 222 6365
Location: Mombasa

Thika Motor Dealers
Phone Contacts: , 067 22262
Location: Thika

Crater
Phone Contacts: 0736 212055, 051 2212055
Location: Nakuru

Crater
Phone Contacts: 020 2363915, 020 559814
Location: Nairobi

Crater
Phone Contacts: , 057 2024087
Location: Kisumu

Crater
Phone Contacts: , 053 2060531
Location: Eldoret

One Autospare
Phone Contacts: 0722 767363, 020 554997
Location: Nairobi

Alfa Motors Ltd
Phone Contacts: , 020 653 6071
Location: Nairobi

Al-lkhlas Motors
Phone Contacts: , 020 600 1104
Location: Nairobi

Amazon Motors Ltd
Phone Contacts: , 020 653 2304
Location: Nairobi

Amazon Motors Ltd
Phone Contacts: , 020 222 4392
Location:

Atsushi&Brothers investment Ltd
Phone Contacts: 020 2215705
Location: Nairobi

B T Automobile Ltd
Phone Contacts: 0720 619688, 020 2212151
Location: Nairobi

Balco International Ltd
Phone Contacts: 0722 525395, 020 2212410
Location: Nairobi

Bavaria Auto Ltd
Phone Contacts: 0716 555524, 020 2308823
Location: Nairobi

Bhatia Auto (Kenya) Ltd
Phone Contacts: 0734 348888, 020 3001093
Location: Nairobi

Bhavin Motors Ltd
Phone Contacts: , 041 2315040
Location: Mombasa

Bhinder Trading Co Ltd
Phone Contacts: 0722 415044, 041 2226441
Location: Mombasa

Bhogal's Motors Mart Ltd
Phone Contacts: 0722 512774,
Location: Nairobi

Bravia Auto Kenya Ltd
Phone Contacts: , 020 230 8823
Location: Nairobi

C M C Motors Group Ltd
Phone Contacts:
Location: Nairobi

C M C Motors Group Ltd
Phone Contacts: , 041 2230490
Location: Mombasa

C M C Motors Group Ltd
Phone Contacts: , 053 2020061
Location: Eldoret

C M C Motors Group Ltd
Phone Contacts: , 064 309847
Location: Meru

C M C Motors Group Ltd
Phone Contacts: , 054 30382
Location: Kitale

Car & General(Trading) Ltd
Phone Contacts: 0721 395397,
Location: Nairobi

Chery Motors EA Ltd
Phone Contacts: 0728 736 736, 020 807 0402
Location: Nairobi

Country Motors Ltd
Phone Contacts: , 057 2020457
Location: Kisumu

Coverpoint Automobiles Ltd
Phone Contacts: 0721 290684, 020 2211910
Location: Nairobi

Crystal Kenya Co Ltd
Phone Contacts: 0722 789635, 020 2245076
Location: Nairobi

Crystal Net Auction
Phone Contacts: , 020 2241291
Location: Nairobi

Daewoo Corporation
Phone Contacts: , 020 2228686
Location: Nairobi

Daewoo International Corp
Phone Contacts: 0714 714505, 020 2050229
Location: Nairobi

Dynacorp Motors Ltd
Phone Contacts: , 020 651 471
Location:

Gachewa Motors Ltd
Phone Contacts: 0722 200532, 020 3755033
Location: Nairobi

Heavy Vehicle & Plant suppliers Ltd
Phone Contacts: , 020 497 0000
Location: Nairobi

Jas Auto Solution Ltd
Phone Contacts: 0721 873533, 020 3002152
Location: Nairobi

Kenya Car Bazaar
Phone Contacts: 0722 400920, 020 2018181
Location: Nairobi

Kenya Grange Vehicle Industries Ltd
Phone Contacts: 0722 203813, 020 554 018/4
Location: Nairobi

Kenya Grange Vehicle Industries Ltd
Phone Contacts: 0728 651 078, 041 2492713
Location: Mombasa

Kinza Motors Ltd
Phone Contacts: 0722 374399, 020 828788
Location: Nairobi

Krue Investment Company Ltd
Phone Contacts: 0722 559044,
Location: Mombasa

Lian Motors Ltd
Phone Contacts: , 020 344 094/8
Location: Nairobi

Marshalls East Africa Ltd
Phone Contacts: 0722 205 776, 020 222 9547/8/9
Location: Nairobi

Marshalls East Africa Ltd
Phone Contacts: 0722 208819, 020 559163
Location: Nairobi

Marshalls East Africa Ltd
Phone Contacts: 0722 208823, 020 535035
Location: Nairobi

Mashariki Motors Ltd
Phone Contacts: , 020 531288
Location: Nairobi

Mashariki Motors Ltd
Phone Contacts: , 041 2313504
Location: Mombasa

Panij Automobiles Kenya Ltd
Phone Contacts: 0722 816364, 041 2317606
Location: Mombasa

Panjatani Auto Spares
Phone Contacts: , 041 2224619
Location: Mombasa

Safari M Park Motors
Phone Contacts: , 020 8562311
Location: Nairobi

Signature Cars Ltd
Phone Contacts: 0722 338071, 020 3860562
Location: Nairobi

Simba Colt Motors Ltd
Phone Contacts: , 020 6534800
Location: Nairobi

Simba Colt Motors Ltd
Phone Contacts: , 020 6531230
Location: Nairobi

Simba Colt Motors Ltd
Phone Contacts: , 041 2493051/2/3
Location: Mombasa

Singapore Motors Ltd
Phone Contacts: 0722 116116, 020 2228037
Location: Nairobi

World Wide Automobiles Ltd
Phone Contacts: 0721 216443, 020 2013624
Location: Nairobi

Worldlink Holding Ltd
Phone Contacts: 0720 671717, 020 3050184
Location: Nairobi

Yatal Automobiles
Phone Contacts: 0722 329344,
Location: Mombasa

Yaya Motors
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Yuasa Motors
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Location: Nairobi

Sam-Con Ltd
Phone Contacts: , 020 821 252
Location: Nairobi

Subaru Kenya
Phone Contacts: 0722 203 782, 020 65 2266/7/8
Location: Nairobi

Symc Motors (K) Ltd
Phone Contacts: , 020 273 2008
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Tata Africa Holdings
Phone Contacts: ,
Location:

Toyota east Africa Ltd
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Location: Nairobi

Toyota east Africa Ltd
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Phone Contacts: , 020 201 9868
Location: Kisumu

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Location: Nyeri

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Phone Contacts: , 062 203 2088
Location: Nanyuki

Toyota east Africa Ltd
Phone Contacts: , 052 31172
Location: Kericho

Toyota east Africa Ltd
Phone Contacts: , 057 251 2874
Location: Eldoret

Transafrica Motors Ltd
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Transallied Ltd
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