

**CUSTOMER PERCEPTION AND PURCHASE INTENTION IN  
HYBRID ELECTRIC VEHICLES (HEVs) IN THAILAND**



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entitled  
**CUSTOMER PERCEPTION AND PURCHASE INTENTION IN  
HYBRID ELECTRIC VEHICLES (HEVs) IN THAILAND**

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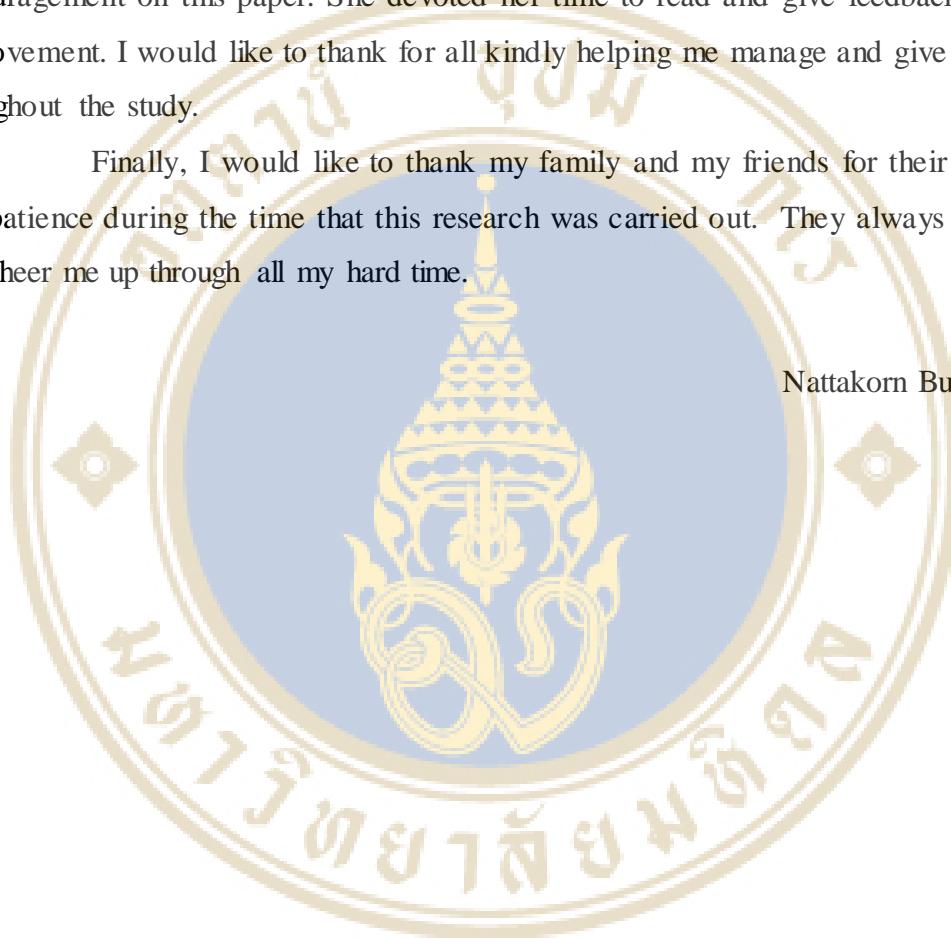
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**ABSTRACT**

A vehicle running on hybrid technology which is combined between Atison cylinder with pure petrol and electric motor is currently being discussed as a more energy efficient and climate-friendly. Unfortunately, the insights into consumer perceptions and acceptance of hybrid vehicle technology are still limited. This paper summarizes the insights into consumer acceptance of Hybrid Electric Vehicles (HEVs) obtained from a literature review. These findings are supplemented by twelve in-depth interviews. The interviews were conducted with vehicle users in Bangkok area. The studies showed that consumer come into contact with hybrid vehicle cars in various ways and then started to collect more information, mainly through direct experience user.

The qualitative method is used for this study by conducting the in-depth interview with 6 Thai men and 6 Thai women, aged 20-35 years old. All respondents live in Bangkok and never used hybrid car before. Result in this research identified four key factors for male and women perceive and intension to convert their car to hybrid car, which are economic advantage, Environment advantage, Referent group and performance & safety. Economic advantage and reference group have been indicated as central traits. This study has indicated that the most factor that influence their perception to convert to hybrid car is the referent group

**KEY WORDS:** Hybrid car / Customer Perception / Willing to Change

29 pages

## CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENTS</b>	<b>ii</b>
<b>ABSTRACT</b>	<b>iii</b>
<b>LIST OF TABLE</b>	<b>v</b>
<b>CHAPTER I INTRODUCTION</b>	<b>1</b>
<b>CHAPTER II LITERATURE REVIEW</b>	<b>4</b>
2.1 Economic Advantage	4
2.2 Environment Advantage	6
2.3 Reference Group (Expertise, Friends and others)	7
2.4 Performance and Safety	9
<b>CHAPTER III METHODOLOGY</b>	<b>13</b>
3.1 Data Collection	13
3.2 Discussion and Research Questions	13
3.3 Methodology Interviews	15
<b>CHAPTER IV FINDING AND DISCUSSION</b>	<b>16</b>
Research Question 1	17
Research Question 2	17
4.1 Research Factor: Economic Advantage	17
4.2 Research Factor: Environment Advantage	19
4.3 Research Factor: Reference Group	20
4.4 Research Factor: Performance and Safety	21
4.5 Limitations	23
<b>CHAPTER V CONCLUSION AND RECOMMENDATION</b>	<b>25</b>
<b>REFERENCES</b>	<b>27</b>
<b>BIOGRAPHY</b>	<b>29</b>

## LIST OF TABLES

Table	Page
2.1 List of tax credits given to hybrid consumers	7



## CHAPTER I

### INTRODUCTION

Growing consumer expectations, legislation pushing for lower emissions and higher fuel price, and the realization that petroleum is a finite resource are leading to groundbreaking changes in the automotive industry, such as drivetrain electrification and a push for fuel cell vehicle commercialization. Depending on the degree of electrification, the combination of the internal combustion engine (ICE) with an electric motor offers a wide range of benefits from reduced fuel consumption and emission reduction to enhanced performance and the supply of power-hungry hotel loads. In the USA, hybrid electric vehicles (HEVs) have already been accepted as a mainstream transportation option with close to a million hybrids on the road (Sanjaka G. Wirasingha, Nigel Schofield and Ali Emadi, 2008)

Hybrid-electric vehicles contain a unique power train that combines a gasoline engine with an electric motor and battery system. A hybrid-electric engine consumes less gasoline and emits less pollution per mile than a traditional internal combustion engine with similar performance. As such, hybrid-electric vehicles can have substantial public benefits for both the environment and for energy security.

Since the Thai government will start taxing vehicles based on carbon dioxide (CO<sub>2</sub>) emissions rather than engine sizes from January 1, 2016. The new excise tax structure is divided into seven categories according to vehicle type. Currently, cars with engine sizes not exceeding 2,000 cubic centimeters (cc) and 3,000 cc are taxed at 30% to 50%, while hybrid-electric cars not exceeding 3,000 cc are taxed at 10%. A 30% excise tax will be applied to sedans and vehicles with no more than 10 seats, with a cylinder capacity of no more than 3,000 cc and CO<sub>2</sub> emissions of no more than 150 grams/kilometer (g/km). A 35% tax will be levied, if vehicular emissions are 150-200 g/km and 40%, if emissions are more than 200 g/km. A 25% tax will be levied on automobiles using E85 and natural gas, with a cylinder capacity of no more than 3,000 cc and CO<sub>2</sub> emissions of no more than 150 g/km. A 30% tax will be applied if the CO<sub>2</sub> emissions is between 150-200 g/km and 35% if more than 200 g/km. Hybrid

cars with a cylinder capacity of no more than 3,000 cc and emitting no more than 100 g/km of CO<sub>2</sub> will be taxed at 10%. The tax rate will rise to 20% if CO<sub>2</sub> emissions go up to 100-150 g/km, 25% if emissions go up to 150-200 g/km and 30% if emissions are more than 200 g/km. A 3% tax will be levied on pick-up trucks with no space behind the driver and with a cylinder capacity of no more than 3,250 cc, releasing no more than 200 g/km of CO<sub>2</sub>, and 5% if above 200 g/km. Pick-up trucks with space behind the driver and with no more than 3,250 cc cylinder capacity and less than 200 g/km CO<sub>2</sub> emissions will be taxed at 5%; above 200 g/km CO<sub>2</sub> emissions, the tax will be at 7%. Double cab pick-up trucks with no more than 3,250 cc cylinder capacity and less than 200 g/km CO<sub>2</sub> emissions will be taxed at 12%, while those emitting above 200 g/km will be taxed at 15%. Twenty-five percent will be levied on passenger pick-up trucks with a cylinder capacity of no more than 3,250 cc, releasing no more than 200 g/km CO<sub>2</sub>, and 30% if more than 200 g/km. (fuelsandlubes.com,2014)

And also, unexpected situation of rising oil prices and gas in recent period resulted in an upward trend of world inflation and the world economic slowdown due to rising oil prices would be plausible and thus adjusted downward of world economic growth forecasts in nationwide future and high oil price on output growth and inflation. Thailand's domestic oil prices have been raised continually which caused the fuel price increased respectively. Uncertain situation have caused domestic fuel price fluctuation together with political situations suit the Thailand's oil pricing structure become distorted. Early of last year, Thai government launched the first car buyer program to boost up the automotive industry for the Thai economy and with this first car buyer program had dramatically increased number of cars in Thailand significantly and the consumers who owning cars are becoming increasingly aware and highly concern of fuel price in the market that relatively affected to their cost of living.

Although, the issues about the maintenance cost for using the hybrid would be concerned about the battery replacement. "Some customer said that hybrid car batteries must be replaced every few years, costing thousands of dollars. Is this true? If so, why would anybody buy a hybrid?" Due to the problem as mentioned the Toyota Motor had claimed hybrid car batteries rarely need replacing. Hybrids now have a 12-year history in the United States, and most of the cars on the road are still on their



original packs — even many of the 300,000-mile Ford Escape Hybrids used as taxis in New York and San Francisco.

The San Francisco Municipal Transportation Authority says only two of its 182 hybrid taxis have needed new batteries. (<http://www.motherearthnews.com/green/hybrid-car-battery-replacement>)

Moreover, the Hybrid vehicle prices are taking an over of everyone's budget and the car manufacturer have pushed “Hybrid Synergy” technology into the market. To reduce the cost of fuel consumption, this new energy technology is being explored to Nationwide and the hybrid technology has not become popular in Thailand, because there are much more issues about the maintenance fees for the battery and lack of expertise educated people who know about the benefits of hybrid vehicle.

The problem with hybrid vehicle is most people have no idea how cars and hybrid vehicle system works. With the lack of knowledge, they had only one choice left which is to agree that pure fuel or alternative fuel need to go with the car for the best solution even though their budget is bleeding at every visits gasoline station.

To fulfill the aim and purpose of this study which is, to understand customer perception of hybrid cars and selecting criteria of customer to change their old car to hybrid car in Thailand. This research will be followed with developed research question as following:

- How is the customer perception toward the synergy hybrid system in Thailand?
- What are the factors that influence the customer persuasion to converting car in Thailand?

The researcher has chosen to study hybrid electric vehicle cars (HEVs) in Thailand mainly because, Thailand still facing the uncertainty of uncontrollable factor related to the fluctuation of oil prices, the car's tax increasing in 2016, and there are still an opportunity for market growth and potential market in hybrid electric vehicle cars (HEVs). And the future the plug-in hybrid will become the to be another choice of car in Thailand.

## **CHAPTER II**

### **LITERATURE REVIEW**

The aim of this paper is to study Thai customer perception before deciding to convert to use Hybrid Vehicle Cars (HVCs) from the normal combustion engine. Based on the literature ' Hybrid car purchase intentions: a cross culture analysis to compare US and Korean consumers' intentions to purchase a high involvement, environmentally friendly product: the hybrid car. (Jason D. Oliver and Seung-Hee Lee, 2010) a research was developed to study the above questions.

#### **2.1 Environment Advantage: Low Emission**

Consumers today are more concerned about environmental degradation and negative impact of their uses of product and services on environment. The reason for this concern could be visible climatic changes, global warming and increasing air and water pollution. Various studies support the assertion that consumers today prefer environmentally safe products and have a positive disposition towards companies following such practices. A strong willingness is shown by consumers to favor environmentally conscious products and companies as per various opinion polls taken in US and elsewhere, however action to do so in reality are debatable (Mendleson N, Polonsky M J, 1995).

Hybrid electric vehicles (HEVs) are a new and fairly radical change in motor vehicle technology. HEVs could reduce oil consumption and greenhouse gas emissions through increased fuel economy. HEV models available in the US from 1998 to 2006 achieve fuel economy increases of 10 to 30 percent when compared to similar size vehicles, with commensurate reductions in emissions of the greenhouse gas carbon dioxide (Reid Heffner, Kenneth S. Kurani, Thomas S. Turrentine,1985)

The worldwide cumulative sales of the Toyota Prius had passed the two million mark as at September 2010. Toyota Motor Corporation (2008) believed that Prius vehicles worldwide had contributed to a reduction in CO2 emissions (considered

a cause of global warming) of 4.5 million tons when compared with ICE (internal combustion engine) vehicles in the same class and of similar size and driving performance based on sales figures collected as at 30 April 2008. The Prius is also one of the first vehicles to meet the new 2015 Japanese fuel efficiency standards set out under the Law Concerning the Rational Use of Energy (Mohammad Khaled Bhunoo, Vanisha Oogarah-Hanuman, and Rooma Roshnee Ramsaran-Fowdar, 2011)

Some research first conduct counterfactual simulations to evaluate the effect of rising gasoline prices and government support on the demand for hybrid vehicles in the 22 MSAs. Some research find that both factors are significant in explaining the increasing popularity of hybrid vehicles. However, due to the small market share of hybrid vehicles, the reduction in both gasoline consumption and CO<sub>2</sub> emission resulted from government support on hybrid vehicle purchases has been inconsequential. With the increasing number of hybrid models introduced into the market and increasing market share of hybrid vehicles, government support should be able to make more significant contribution toward achieving oil independence and environmental objectives (Arie Beresteanu and Shanjun Li, 2008)

CO<sub>2</sub> emission is direct proportional to the fuel burned in the internal combustion process. Modern combustion technologies such as high precision gasoline injection allow reducing fuel consumption and lower harmful emission such as CO, HC, and Nox. Hybrid Electric Vehicles (HEVs) technology can help to lower emission in different ways – by reducing a vehicle's fuel consumption through regenerative braking in stop-and-go traffic or by running the engine at highly efficient conditions. (J.J. Channaron and J.Teske, 2008)

It has always been believed that the actions of individuals can be predicted by their attitudes. A number of studies has been conducted towards improving the ability to predict an individual's actions. Following the research from Davidson et al. (1985) found that the consumers' attitude is associated with the knowledge and personal experience they possess. However inconsistencies were found among the relationship between consumers' attitude and their behavior when it comes to green consumerism. Mainieri et al. (1997) found low correlation between consumers' attitude and green behavior.

Antonio et al (2009) suggested that due to environmental consciousness that has evolved over time, studies on green consumerism will be the main focus point in the future leading to identifying the consumer attitudes, behaviors and intentions. Braimah and Tweneboah-Koduah (2011) studied Ghanaian consumers and have found low level of awareness towards green marketing issues which affected purchase decision of the consumers.

## **2.2 Economic Advantage: Lower Fuel Consumption**

The onboard electric motor(s) serves as a device to optimize the efficiency of the internal combustion engine (ICE), as well as recover the kinetic energy during braking or coasting of the vehicle. The ICE can be stopped if the vehicle is at a stop, or if vehicle speed is lower than a preset threshold, and the electric motor is used to drive the vehicle along. The ICE operation is optimized by adjusting the speed and torque of the engine. The electric motor uses the excess power of the engine to charge battery if the engine generates more power than the driver demands or to provide additional power to assist the driving if the engine cannot provide the power required by the driver. Due to the optimized operation of the ICE, the maintenance of the vehicle can be significantly reduced, such as oil changes, exhaust repairs, and brake replacement. In addition, the onboard electric motor provides more flexibility and controllability to the vehicle control, such as antilock braking (ABS) and vehicle stability control (VSC). (C. C. Chan, Fellow IEEE, 2007)

When HEVs and ICEVs are compared as a class, the model shows highly significant results for each of the three predictors (at the 99% confidence level). An HEV of the same weight and power uses approximately 3.21/100 km less fuel than its ICEV counterpart. Further, an increase in weight of 100 kg results in a fuel consumption increase of 0.56 l/100 km, and an increase in power of 10 kW results in a fuel consumption increase of 0.10 l/100 km. On an average 2007 HEVs are 136 kg heavier than equivalent ICEVs, resulting in a weight-related fuel consumption penalty of 0.75 l/100 km. Further, 2007 HEVs have 10 kW more average power than equivalent ICEVs, resulting in a fuel consumption penalty of 0.11 l/100 km. The total penalty amounts to a

reduction in the fuel consumption benefits of HEVs by 27%. (C Reynolds 1 and M Kandlikar, 2007)

### 2.3 Reference Group: (Experts, Friends and Relatives)

Tax credits are offered to those who purchase hybrid cars and are considered a significant incentive to consumers.

**Table 2.1 List of Tax Credits given to Hybrid Consumers**

TABLE I  
LIST OF TAX CREDITS GIVEN TO HYBRID CONSUMERS [11]

	Tax Credit Amount (US\$)
Ford Escape Hybrid	3,000
Toyota Prius	3,125
Chevrolet Silverado	250
Nissan Altima	1,300

A number of consumer incentives for purchasing hybrids have been put in place to address these market barriers and to overcome the incremental initial purchase costs of hybrids compared to their gasoline equivalents. Until 2005, the US Federal Government provided a \$2000 tax deduction for all qualifying hybrids, regardless of make and model. Starting in January 2006, however, the Energy Policy Act of 2005 replaced this tax deduction with a tax credit based on an individual model's emissions profile and fuel efficiency compared to equivalent gasoline vehicles. Credits vary from several hundred to several thousand dollars, and phase out over time after the manufacturer sells a total of 60,000 hybrid and lean-burn vehicles (New Energy Tax Credits for Hybrids, 2007).

The Bridgers, who brought hybrid car, do agree that buying an HEV was not about saving money: “for us it was not an economic decision” Mr. Bridger explains. They have heard others (including a close friend of Mr. Bridger’s) argue that it is not worth it to pay “several thousand” dollars more for hybrid technology, but they

feel that these people do not quite understand what HEVs are all about. While the idea of saving money was not a primary motivation for their purchase, the Bridgers are not oblivious to finances. For example, they accelerated the purchase of their HEV in order to maximize their federal income tax deduction. Interestingly, the federal tax benefit also reinforced the HEV's environmental meaning. In a moment of post-purchase validation, Mr. Bridger was preparing his taxes using a popular tax software product. As the software guided him through the deductions, Mr. Bridger remembers happily affirming that he had purchased a "green vehicle." While he was unsure exactly how much his HEV reduced air pollution, the software confirmed that the vehicle was considered "green" by the U.S. government. Though offered light-heartedly by Mr. Bridger, this story illustrates how symbols come to be reproduced and exchanged in myriad ways. (Reid Heffner, Kenneth S. Kurani, Thomas S. Turrentine, 1985)

Like other automobiles, HEVs have symbolic benefits, and these benefits have importance to consumers. Research shows that at least some HEV owners purchase their vehicles because the cars have a "green image," are perceived as "socially responsible," and represent "environmental stewardship"; the same study also confirms that some HEV buyers recognize and embrace the communicative ability of their vehicles. It is unclear, however, just how important the symbolic benefits of HEVs were to these consumers, and whether these benefits had a major impact on their purchase decisions. Another study indicates that HEV owners are motivated more by "a commitment to be pioneers" and by their perception of the gasoline hybrid as "the right vehicle for society" than by economic benefits such as fuel cost savings. While this suggests the strong importance of symbolic benefits, further investigation is necessary to confirm the existence of these symbolic benefits and the extent of their influence on HEV purchases. (Reid R. Heffner, Kenneth S. Kurani and Thomas S. Turrentine, 2005)

Consumers are often influenced by the consumption patterns of neighbors, co-workers, opinion leaders and other peers. According to Deffuant et al. (2005), individuals assign a social value to products, which evolves during their interactions with others and with information. So, individuals who feel a product has a high social value will look for information that helps them evaluate the benefits of purchasing the product. Especially for high involvement products, which often times are symbols of

status, luxury, and personal identity, the way others perceive consumer use of products is likely to be an important factor in purchase considerations (Hickie et al., 2005). Therefore, understanding the role of social value in the decision-making process the consumer goes through is really important.

Each of the households interviewed recognized that their HEV had meaning apart from its functional benefits, although there was considerable variation in their views. All participants recognized some symbolic benefits rooted in their HEVs' reputation as "green" environmental vehicles, an image which is reinforced by automakers, the media, and a growing list of vocal celebrity owners. This image is distinct from the vehicles' function, but related to it. In other words, HEV owners saw their vehicles as having functionality that reduced their impact on the environment, and they also believed the vehicles projected an image of their owners as people who cared about conserving precious natural resources and preserving the natural ecosystem. The communicative ability of HEVs was recognized by most participants; as one household explained, hybrids are a "way to put forth feelings about the environment," a clear reference to sending a message to others. It is important to note that several participants were aware of this "green image," even though they believed it did not apply to them or had not influenced their purchase. Two households even saw the "green image" as a potential liability, believing others could perceive their cars as "too progressive" or representative of radical political views. In these cases, the meaning participants saw in their HEVs was different from the images they had of themselves, potential evidence of self-image incongruity in certain households. (Reid R. Heffner, Kenneth S. Kurani and Thomas S. Turrentine, 2005)

## **2.4 Performance and Safety**

Richard and Diane Hall are professionals in their 40s who have three school-aged children. At the time they purchased their Toyota Prius in 2001. Richard and Diane explained that their Prius was different in two ways: the hybrid powertrain made it more efficient and more advanced. These ideas were represented by the silent, all-electric acceleration from a stop (a feature they nicknamed "stealth mode"). Each time their Prius operated in electric mode, it affirmed the ideas of higher efficiency and

technological superiority. High efficiency was not important for its own sake; higher efficiency resulted in less waste and more frugal use of fuel, which led to lower emissions and therefore reduced environmental impact (Reid Heffner, Kenneth S. Kurani, Thomas S. Turrentine, 1985)

In a parallel hybrid, microprocessor controls switch between drawing power from the engine and drawing power from the battery. During low power driving, when the gasoline engine is least efficient, the electric motor switches on and draws supplemental power from the battery. During high power episodes, when the gasoline engine is most efficient, the vehicle draws power only from it. Parallel hybrids can use smaller, less powerful engines compared to conventional internal combustion engine vehicles (ICEVs), because the battery system supplements the engine. Some hybrid designs also use the battery and electric motor to supplement power from the ICE during high-power driving to further reduce the size requirements of the engine. The engine for a parallel hybrid is often downsized by perhaps two-thirds, compared to the size used in a conventional vehicle. ( Kathryn G. Clay, 2004)

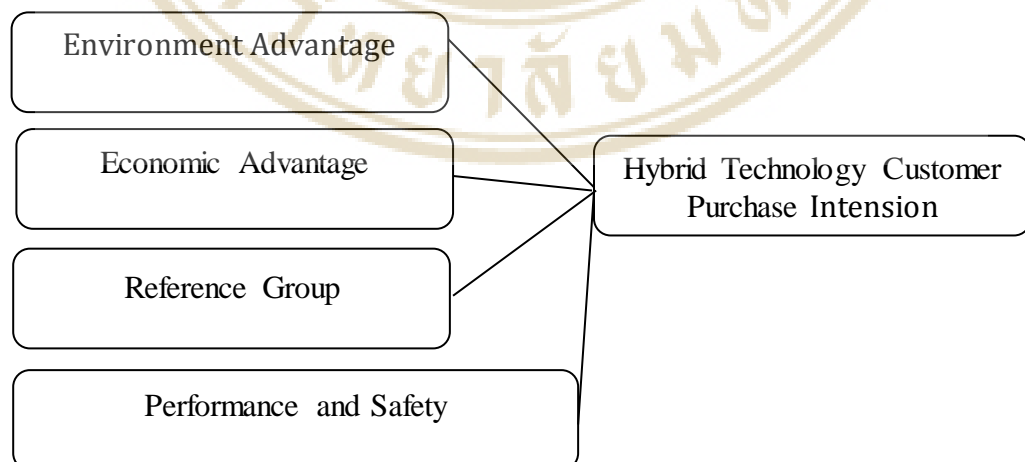
Cherian and Jacob (2012) found that consumers with low awareness and still not focusing towards development of fuel-efficient vehicles products because consumers are lack knowledge. Again, there are several issues and challenges identified by various researchers with respect to fuel-efficient vehicles, (Welling and Chavan, 2010) noted that practicing green marketing initially may prove to be a costly affair as it encourages green products/services, green technology (procuring new technology or modification of existing technology), green power/energy which requires a lot of money to be spent on R&D programs. High investment is required in marketing promotions to create awareness and their uses. It also requires the manufactures to extensively communicate the presence and benefits of fuel-efficient vehicles to the customers by means of various tools available for integrated marketing communication. It could be a good way to convince the customers if they see additional benefit (such as quality, environmentally safe product, fuel-efficient vehicles, and non-hazardous products) attached with the product. It can help organizations to gain a competitive advantage and a strong consumer base. (Renfro L A, 2010).



According to Christine & Scott Gable (2008), possibly hybrids cost more to maintain, but not necessarily in most cases. The cost of maintaining a hybrid car is really quite similar to the expenses of maintaining an ICE car. Other than their sophisticated electric drive motor assemblies and the large battery pack, all other hybrid vehicle systems are really quite similar to traditional cars. They can cost the same, even potentially less to maintain. With regenerative braking, less wear and tear is imposed on the regular friction brakes resulting in much longer pad life. In addition, full hybrids have the ability to shut the engine down, allowing the electric motor to take over, resulting in less wear on all the engine components allowing for fewer maintenance needs (Mohummud Khaled Bhunnoo, Vanisha Oogarah-Hanuman, and Rooma RoshneeRamsaran-Fowdar, 2012)

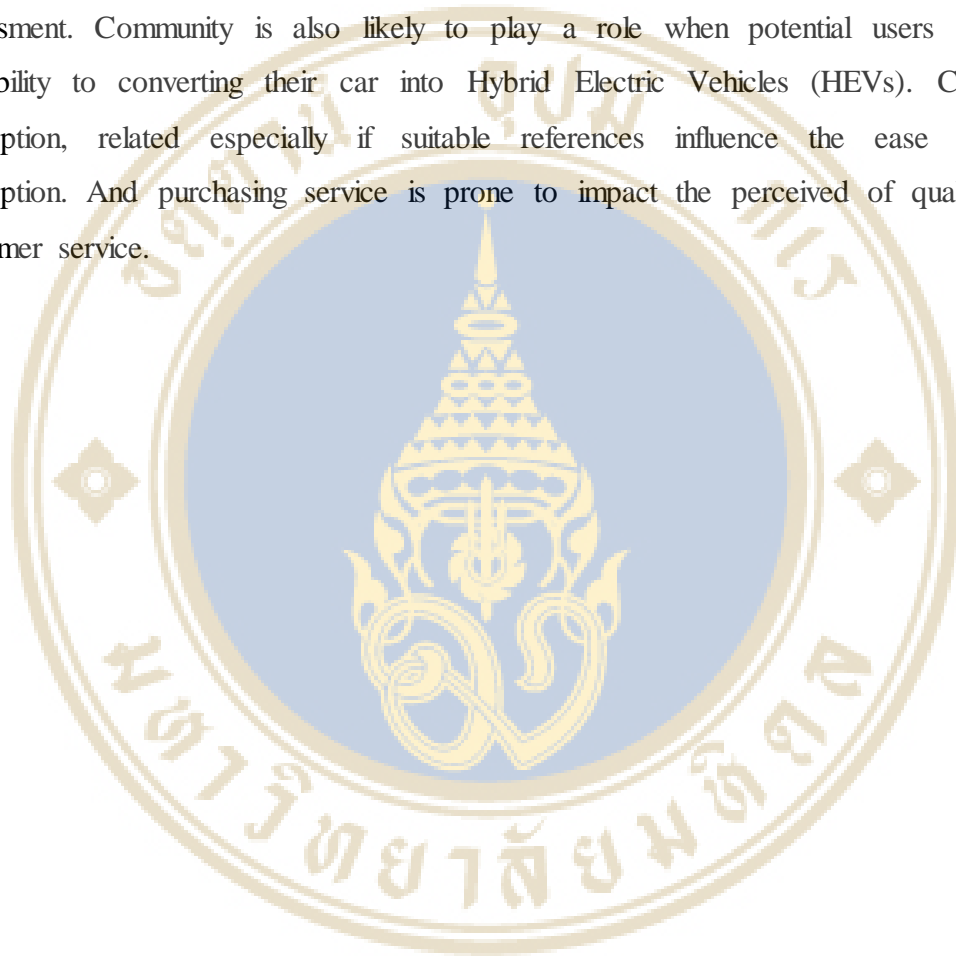
The one area where maintenance costs of hybrids could easily exceed those of conventional vehicles is the electric drive battery packs (Hybridcars.com, 2006). Yet with developments in battery technology (NiMH and Li-ion) and reliability, most hybrid manufacturers warrant the battery packs for 80,000 to 100,000 miles. As more and more hybrids hit the roads, real world experience is showing that few battery failures occur and there have been instances in which the batteries have lasted 150,000 miles and longer (Toyota, 2006)

## Research Framework



Adapted, SYMBOLISM IN EARLY MARKETS FOR HYBRID ELECTRIC VEHICLES (Reid Heffner, Kenneth S. Kurani, Thomas S. Turrentine, 1985)

In order to structure finding from the literature. Based on the above literatures review, there are four factors have been identified representing customer purchase intention and consumers' attitude towards Hybrid Electric Vehicles (HEVs) which are: Economic Advantage, Environment Advantage, Community and Performance and Safety. The next step is item generation to measure these dimensions and item validation. These four factors provided further customer's insights of Hybrid Electric Vehicles (HEVs) which Economic and fuel price may play a role in their assessment. Community is also likely to play a role when potential users evaluate possibility to converting their car into Hybrid Electric Vehicles (HEVs). Customer perception, related especially if suitable references influence the ease of use perception. And purchasing service is prone to impact the perceived of quality and customer service.



## **CHAPTER III**

### **RESEARCH METHODOLOGY**

#### **3.1 Data Collection**

To understand consumer purchasing behaviors and influential buying factors, this study gathered primary data from semi-structured interviews with standard respondents. This study discovered that interview method seems to be the effective tool for analyzing consumer behavior. (Gothenburg, 2010) Interview helps the researcher to investigate and understand opinions and reactions of respondents regarding to a particular issue which is slightly deeper than a survey. Furthermore, this method could be modified as a comprehensive way of formative assessment. Because of the flexible process of qualitative interview, when interviewer establishes initial set of questions base on the framework. Interviewees' answers will shape the leading and relevant initial questions. Role of interviewer is to listen, analyze, and discuss almost extensively. (Sociology, 2012)

By investigating the research questions, conducting in-depth interview with a group of respondents has a significant advantage comparing to survey. The major benefit of in-depth interview is it provides more critical and detailed information regarding a person's thoughts and behaviors as well as enables to explore new issues in depth. It becomes effective because it offers a more complete picture of what experience and opinion towards a particular issue. (Boy et la, 2006).

#### **3.2 Interview Questions**

To sum up, several factors that are likely to play a role with regard to choosing Hybrid Electric Vehicles (HEVs) have been identified from the literature. However, it turned out that contextual factors - which are often contingent on the conditions within a specific country - also play an important role. Moreover, the decision-making process has hardly been analyzed at all. In order to contribute to

enhancing the knowledge on this issue, the researcher therefore conducted our own empirical work, focusing on the questioning factors as follows:

- What is your opinion toward the hybrid electric vehicles (HEVS)?
- How does the retail oil price increasing effect to your motivate to converting car to hybrid car?
- How does the increasing tax policy in year 2014 affect your motivate to changing car to hybrid car? (Community : Benefits)
- In your opinion, what is the difference between a hybrid car and a normal car in term of safety and performance? (Performance , Customer perception)
- What is your main concern of converting to use a hybrid electric vehicles (HEVS)? (Customer perception)
- How does your relatives converted experiences affect to your encourage hybrid electric vehicles (HEVS)? (Community: Benefits)
- How do you see hybrid electric vehicles (HEVS) vehicle as an eco-friendly product for environment? (Environment Advantage)
- In your opinion, what are the most important sources of information accessed prior to the purchasing decision hybrid electric vehicles (HEVS)?
- What are the relevant motivates for you to purchasing a hybrid electric vehicles (HEVS)?

Open-ended questions are used because they enable respondent to think analytically and critically. They can encourage discussion and debate from interviewee, representing. Furthermore, they provides the opportunity for respondents to express themselves more openly as well as encouraging respondents to provide information including their ideas, concerns , feelings and sharing their own experience. Besides, these questions are able to lead interviewees flow with their thoughts and feelings. (Open research, 2008). A listed of opened- end questions is developed not only developing creativity, self-expression, and richness of detail but also creating two-way communication in a professional relationship from respondent and interviewer.

### 3.3 Methodology Interviews

Semi-structured interviews were conducted on this study. The main advantage of this approach is that the interview resembles a normal conversation; however, a guideline structures the conversation ensuring that all topics of interest are covered. This format was chosen to allow a certain degree of comparability between the individual interviews and to be able to explore new aspects that interviewees might raise due to the openness of the conversation. An interview guideline was prepared covering the topics mentioned in the research questions as well as background questions (e.g. demographics, data on the Hybrid vehicle).

Different characteristics of interviewees in order to obtain a heterogeneous sample. Individuals were conducted with the sample questions to investigate the interviewee with a clear understanding opinion and reaction of a respondent regarding to particular factors of consumer intention purchase on the a hybrid electric vehicles (HEVS). Additionally – and mainly to recruit the personal car owner interviewee who are underrepresented in the sample – personal contacts were used as well. Twelve individuals aged between 25 and 35 from various professionals finally took part. All of the interviewees had never had experience with a hybrid electric vehicles (HEVS), or had purchased a hybrid electric vehicles (HEVS) vehicle before.

The interviews were conducted by phone, recorded and later transcribed. The average duration was 8 to 12 minutes. The transcripts were then coded; the topics from the interview guideline were used to produce a preliminary list of codes, which was extended if necessary.

The study focused on a limited geographical area has limited generalizability but provides good insights regarding behavior of consumers towards a hybrid electric vehicles (HEVS) product. Future research could focus on psychographic segmentation of consumers in terms of assessing their alternative fuel values and preferences. The study can be replicated at a larger scale to get more insights into the behavior of consumers and understand more about a hybrid electric vehicles (HEVS) and other alternative fuel vehicle car.

## CHAPTER IV

### FINDINGS AND DISCUSSION

It was the aim of the empirical studies to complement the findings from the literature and to fulfill the answer of understands consumer perception to change car to hybrid electric vehicle car and selecting criteria of prospect customer to intentionally convert into to hybrid electric vehicle in Thailand with regard to four factors on framework.

#### Interviewee's Profile

Name	Occupation	Gender	Age
Interviewee 1	Sales Engineer	Male	28
Interviewee 2	Business owner	Male	29
Interviewee 3	Business owner	Male	29
Interviewee 4	Marketing officer	Female	26
Interviewee 5	Marketing officer	Female	28
Interviewee 6	Accountant	Female	27
Interviewee 7	IT developer	Male	27
Interviewee 8	Business Owner	Male	30
Interviewee 9	Business Owner	Male	28
Interviewee 10	Safety officer	Female	29
Interviewee 11	Police officer	Female	29
Interviewee 12	Sales Engineer	Female	27

**Research Question #1:** How is the customer perception toward hybrid electric vehicle cars in Thailand?

Thai customer perception toward hybrid electric vehicle in majority still not yet accepted as the hybrid car is not worth for purchasing because, they were concerned about its maintenance cost and the starting price of hybrid car. However, there were few interviews that interesting and would change their own car from pure benzene petrol to hybrid car. However, the perception of Thai customers from interviewees show they are not familiar with the new technology of hybrid vehicle car. The main reason was because they lack of knowledge and correct information about hybrid car in terms of efficiency and performance which created a bias factor in customer perception. Therefore, the majority of the interviewees still did not yet accept and are curious about hybrid car system in terms of performance and benefits. In contrast, the few interviewees accepted to use hybrid car. These interviewees were the ones who have more understanding of hybrid car.

**Research Question #2:** What are the factors that influence the customer persuasion to converting hybrid car in Thailand?

From the discussion with interviewees, it could be identify that there are four important factors that could possibly encourage the non-user hybrid car to convert their car in Thai market which are: Economic advantage due to the benzene seem to be raised in daily. Reference group also play important role of trustworthiness and confident in terms of image and quality which is one of four factors that play a role for those prospect customers who were willing to convert their car into hybrid car in Thailand market in the future.

#### **4.1 Economic Advantage**

Economic advantage was mentioned around 25% or 3 interviewees of this research. The reason that economic advantage were expected because the interviewees have relatively short commuting distance in their home to their workplace especially during the rush hours with the traffic jam in their city. The hybrid system will support the engine when they got stuck in the traffic, the engine will be turned into motor so,

and it will help to reduce the fuel consumption rate. And the increasing of retail oil price in weekly or monthly caused the interviewees to suffer from their high cost of living. When their salary is fixed month by month but the liquid fuel price still fluctuated.

A visit to a gas station itself became a moment of stressful for several of the interviewee as one of the interviewees mentioned that:

“I felt annoyed every time my tank went down and the rate of retail oil price went up in daily that I have to fill up my tank.”

The interviewees mention that there are so many times that they decided to stay home rather than hang out outside just only to save their liquid fuel in the tank.

The hybrid car leads a more sensible decision for people who drive a car in the city with traffic more than occasional drivers who uses the car for long distance in everyday; with petrol prices continuing to increase, a few interviewees whom owners of existing petrol vehicles are looking at changing their vehicles to run on other alternate fuels like CNG or LPG.

These results from most of interviewees can ensure that increase of petrol price plays an important factor supporting with the literature on economic advantage which could possibly encourage the consumer to switch from using petrol to hybrid car; They will consider again on hybrid or LPG/CNG in the future coming because increasing the petrol price has been affect their cost of living.

In contrast, there were 75% of interviewees' mention that increasing the price of petrol does not play role on their decision to convert their car into hybrid car and one interviewee said, he is willing to pay for petrol in any price because, they believe that hybrid car will lower the car performance and will caused future problem especially in car maintenance. However, the results of discussion from the majoring of interviewees have confirmed and support the literature from (C Reynolds 1 and M Kandlikar, 2007) that hybrid car can save the fuel consumption up to 27% and discussed their motivates for purchasing such a vehicle which turned out that economic advantage were the main driver using hybrid car as new way to use the new car.



## 4.2 Environment Advantage

The environment advantage does not play an important role of consumer purchasing for Thai consumer, there are only 1 person from 12 interviewees agreed on this factor which is contrast from the literature stated environmental friendly was the important reasons to convince the consumer to convert from petrol to hybrid car. Most of interviewees perceived that there is no effect and different between using petrol and hybrid vehicle. Therefore, literature of (Mohummud Khaled Bhunnoo, Vanisha Oogarah-Hanuman, and Rooma Roshnee Ramsaran-Fowdar, 2011) cannot be used with Thai consumer. To confirm this contrast of literature, one of interviewees mentions that:

“I don’t think that hybrid car can reduce emission problem in Thailand’s. Using petrol or hybrid vehicle is both creating air pollution to the environment anyway or a little bit helped, so why I have to care about it”

The results of this study also shows that the majority of Thai interviewees do not concerned about environment friendly and saving the environment does not played any important role. From the discussion with majority interviewees, they provided more insights into the matter of understanding the overall attitude of the Thai consumers towards hybrid car. The majority of interviewees’ shows that the Thai consumers are indecisive or not understand whether hybrid vehicle is an environment friendly product or not. And several interviewees also did not care about the environment, so this factor does not main effected to motivate on this research.

The obvious result shows that the Thai consumers are highly suspicious about environment friendly with hybrid car. Therefore, an environment advantage does not play an important factor for Thai consumers enough to influence them before changing their car.

One interviewee expressing his idea about this factor that:

“Thai consumers paid little attention to the pollution caused to the environment from their actual usage of any products because they are concentrated on profit taking for their own to get the most value for the money paid by them”

From the researchers and literature conducted mainly in the developed countries, it is observed that there are various factors which have considerable influence on consumers’ perception and attitude towards hybrid car. In Thailand, the

concept of environment friendly is relatively new and the consumer buying behavior is also different from that of the developed nations. Many cultures and traditions are prevalent in Thailand.

### **4.3 Community Group (Expertise, Friends and Others)**

Community group was mentioned repeatedly to motivate the interviewees and this was also the most important motivate for 6 interviewees from 12 interviewees. Some of interviewees who were interested in technology knowledge of hybrid vehicles both direct and indirect experiences were interested and will react in a positive way of changing hybrid vehicle car followed by their friends' experiences or their relatives' direct experience of using hybrid car.

The interviewee also stated that direct experiences from their colleagues, family members or friends could persuade them if expressing strong positive point into hybrid car could gain their intention to converting their car.

The relevant with the literature from reference group stated above that a vast majority of respondents indicated that family and friends were their main sources of information on these issues; this research analyses found that experience as communicated by other users seem to be one of the most important factors to boost the perceived reliability and safety of a technology, enhancing its perceived usefulness and ease of use.

An interesting statement found from one interviewee mentioned that the internet or web board is also an important source of information, especially social online networks like specialized platforms. Although the interviewees regard some of the information provided there as being biased, it is still seen as a valid data source during the decision-making process. Talking directly to other users was also regarded as helpful; however, not everybody had this opportunity which is relevant to the literature generally found in reference group. Furthermore, the interview results confirm the assumption that knowing other users' supports the decision in favor of hybrid vehicle and that these contacts are also actively sought out by those who are already interested in the technology. Anyhow, other sources of information, e.g. car dealers, advertisement were seen as less helpful for forming an opinion.

In this discussion, it seem to indicate that the information provided by persons who are trusted and regarded as reliable contributes to increase the perceived ease of use as well as the usefulness (e.g. in realizing economic advantages), as well as supporting the statement from the reference group literature.

#### **4.4 Performance and Safety**

The interviewees stated the reason of not changing their car, because they were afraid that the power or acceleration of hybrid car is lower than the normal car. And they said there might be an issue about battery in the long run. And also the accident might be caused while they were driving the hybrid motor could be stopped as their perceived from the news before. One of the interviewees mentioned that they had much concern about the engine stopping.

Another interviewee mention about the dangers in hybrid car in the raining season or into the flooding situation. The hybrid engine might be affected since the motor was not designed to use in this condition.

Several interviewees recounted having various concerns about safety, reliability, availability of filling stations, performance losses, and the process of refilling, all of which affect the usefulness and the ease of use of hybrid vehicles. Overall, these concerns resemble those found in the literature. However, the lacked of infrastructure was also mentioned by these non-users interviewees in surveys – and seem to play another important role of consumer concern of changing to hybrid car. To support the statement from literature, safety continues to be one of the top considerations for consumers. Even though the hybrid car in Thailand have been making improvement and tested by car manufacturer through TV advertisement or internet about preventing structure to be used in the rain season and safety systems over time, there is no guarantee that all hybrid cars provide comparable protection in terms of the level of hybrid car can be driven in. Also, about the battery problem issue. It is important for consumers to look beyond a list of features to see how their cars perform along with the safety when they used hybrid car instead of use petrol – one of interviewees express their concern.

However, one interviewee stated if the consumer perceived the benefit of using hybrid car; for example, tax reduction on who purchased on hybrid car, government policy about emission control, the marketing campaign for the starting price of hybrid car, good after sale service and extended battery warrantee. These will encourage consumer to interesting on using hybrid vehicle car which is relevant with the literature; (New Energy Tax Credits for Hybrids, 2007) stated that consumer had concerns about the tax reduce and about the benefits for using hybrid car instead general car. One of the interviewees also mentioned that sales person in the dealer plays an important role trust person of convincing to tell about the new information and the updated benefits from using hybrid car.

Before the transferability of the results of this paper to change to hybrid car in Thailand can be discussed, it is necessary to point out the limitations of this empirical data. The generalizability is limited due to the fact that both the qualitative study have relatively small sample sizes and are neither representative for the Thai population in general, nor Thai car-users in general (e.g. men being strongly overrepresented in the sample).

Since the reference group and oil price increase in Thailand play a crucial role in consumer perception of changing to hybrid car, the results of this study cannot be applied to other countries. Further limitations result from the fact that the interview was conducted after the decision making process and the interviewees personal perceptions might affect the results.

The number of studies researching these issues on a detailed level is very low and as we asked non-users of hybrid car vehicles on their perception without their direct experiences and are thus building on reports of real practices and behaviors, the researcher assume some validity for these results. This is underlined by the finding that the overall results are congruent with the findings from the literature; however, they also add further details to several of these findings.

With regard to future research, further analyses of information search strategies may be important in order to inform industry about effective strategies for supporting the market entrance of new technologies. Additionally, in this context, it might be useful to survey individuals who started to gather information about hybrid

car in Thailand and then decided to purchase and convert their own car. This would also contribute to overcoming the possible self-selection effects of researcher's study.

Marketers should come up with new way of communicating the benefits to the consumers of changing to hybrid car in term of low fuel consumption, safety, performance and safe environment friendly. Due to increased awareness and concern consumer may prefer converting a car to use hybrid car over pure petro to protect the environment with confident of safety feeling. The vehicle manufacturers and vehicle dealership in Thailand should carry out heavy campaigns to encourage consumers the benefit of using hybrid car with understanding of hybrid car knowledgeable, because a majority of the Thailand consumers are not sure about the performance and safety of the hybrid car. The consumers are still indecisive whether they convert their car to use hybrid car. They are highly suspicious regarding the real greenness of the eco-friendly products and tend to search for more information before buying. All these will have a negative impact on the success of hybrid electric car in Thailand.

Therefore, to provide the knowledge to gain confident to consumers in order to convert their car to hybrid car, and this is very important as the Thai consumers are in general concern of uncertain of economic and petrol price increasing which is costlier to their cost of living. If they are not convinced with the quality of the hybrid vehicle, they remain suspicious and will not convert their car and use hybrid electric vehicles.

#### **4.5 Limitations**

Although the research has reached its aims, there were some unavoidable limitations. First, because of the time limit, this research was conducted only on a small size of population who have been using petrol. Therefore, to generalize the result for larger group, the study should have involved more participants at different lifestyle and did not compare with other alternative fuel like CNG/LPG user. Second, this research was conducted to gather information by using qualitative strategy in order to collect the in-depth understanding of customer perception and possibly to convert their car to use hybrid car. With regard to future research, further analyses of information search strategy could use quantitative method to gain more validity result with

efficiency finding data to support the factors for users of LPG and CNG vehicles for overall results in order to contribute to overcoming the possible of hybrid car market in Thailand.



## CHAPTER V

### CONCLUSION AND RECOMMENDATIONS

This study was motivated by the intention to acquire knowledge that could be useful for assessing the potential of hybrid vehicle car from a consumer's point of view and to develop recommendations on how to support the market penetration of hybrid car in Thailand. Hybrid electric vehicles were identified as a valuable analogy as they have been available on the market for some time and have attracted a relevant number of users.

Our analyses indicate that economic, reference group, and performance and safety motivates are the central ones for those willing to convert in to hybrid car technology. In Thailand, (potential) users of hybrid vehicles can estimate on a relatively clear basis whether they are likely to realize economic benefits as their saving cost from petrol price and taxes reduce and if the user has basic knowledge of their typical yearly mileage and taxes, he/she can make a fairly reliable estimation. This underlines the fact that it will probably be very important to offer additional financial incentives for converting an alternative fuel. However, if economic advantages cannot be realized by non-users, measures will have to be taken to direct the public's attention to other motivates.

Environmental concerns from the point of view of the interviewees, this does not appear to be an importance factor, which analyses from the interviewees with non-users experiences of the use of hybrid car under less favorable environmental conditions. Even though using hybrid car indicated that reinforcing environmental motivates may be worthwhile – but the potential market share to be gained from building solely on environmental efforts is probably quite small.

Enthusiasm for performance and safety progress was one of a very dominant motivate in our study; it could, however, have supporting factor, especially, important when transferring our results to converting hybrid vehicles. Moreover, our analyses indicated that infrastructural concerns are lower among those willing to use hybrid vehicle with majority of interviewees not interested in the technology or

performance of the hybrid car. On the other hand, this insight seems banal as users who are seriously afraid of not being able to get fuel will certainly not acquire the respective.

Reference Group had some relevance in our studies and literature; it usually the first ranked. This indicates that is most motivate people to convert their car into hybrid car. Thus, it is likely that reference group have a greater potential for fulfilling motivate like showing personal willing to influence prospect consumer to convert the vehicle electric vehicles (HEVs).

Furthermore, the reseacher's analyses suggest that experience as communicated by other users seems to be one of the most important factors to boost the perceived reliability and safety of a technology, enhancing its perceived usefulness and ease of use as per mention above on our finding and discussion result. On this basis, we recommend creating possibilities for informal social interaction around hybrid car as an important element for successful marketing. Users with direct experience seem to place strong trust in first-hand information from other users – in this respect, projects like the field trials which are a popular instrument at the moment seem to be very promising.

Additionally, setting up and promoting internet forums on hybrid car is another way to induce contacts between users and potential users.



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