

**FACTORS THAT MAKE PEOPLE CHANGE FROM PURE  
INTERNAL COMBUSTION ENGINE VEHICLES TO ELECTRIC  
VEHICLES IN THAILAND**



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**ABSTRACT**

Currently, there are many choices of Electric Vehicles around the world, and many countries support Electric Vehicles in many positive ways, but it seems to be very slow to change and adopt to use Electric Vehicles in Thailand which makes me doubt why that happens in Thailand. This thematic paper will find out what factors that can change Thai people from using Pure Internal Combustion Engine Vehicles to Electric Vehicles. This study is using semi-structured interviews in a qualitative research method in order to find out the main and actual factors to make people change from Pure Internal Combustion Engine Vehicles to Electric Vehicles. Finally, I found out that factors that will make Thai people change from Pure Internal Combustion Engine Vehicles to Electric Vehicles are Infrastructure, Financial and Authorized Dealers.

**KEY WORDS:** Electric Vehicles/ Charging Stations/ Battery Electric Vehicles/  
Factors for Change

27 pages

## CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENTS</b>	<b>ii</b>
<b>ABSTRACT</b>	<b>iii</b>
<b>LIST OF FIGURES</b>	<b>vi</b>
<b>CHAPTER I INTRODUCTION</b>	<b>1</b>
1.1 Background	1
1.2 Problem Statement	2
1.3 Research Questions	7
1.4 Research Objectives	7
1.5 Scope of the Study	7
1.6 Expected Benefit	7
<b>CHAPTER II LITERATURE REVIEW</b>	<b>9</b>
2.1 What is consumer behavior for buying cars?	9
2.2 Why do people buy Electric Vehicles?	10
2.3 Does oil price affect the demand of purchasing Electric Vehicles?	12
<b>CHAPTER III METHODOLOGY</b>	<b>14</b>
3.1 Research Methodology	14
3.2 Interview Questions	14
<b>CHAPTER IV RESULTS</b>	<b>16</b>
4.1 Results	16
4.2 Discussion	19
4.3 Conclusion	21
<b>CHAPTER V CONCLUSION</b>	<b>22</b>
5.1 Conclusion	22
5.2 Recommendation	22
5.3 Limitation	24
5.4 Future Research	24
<b>REFERENCES</b>	<b>26</b>

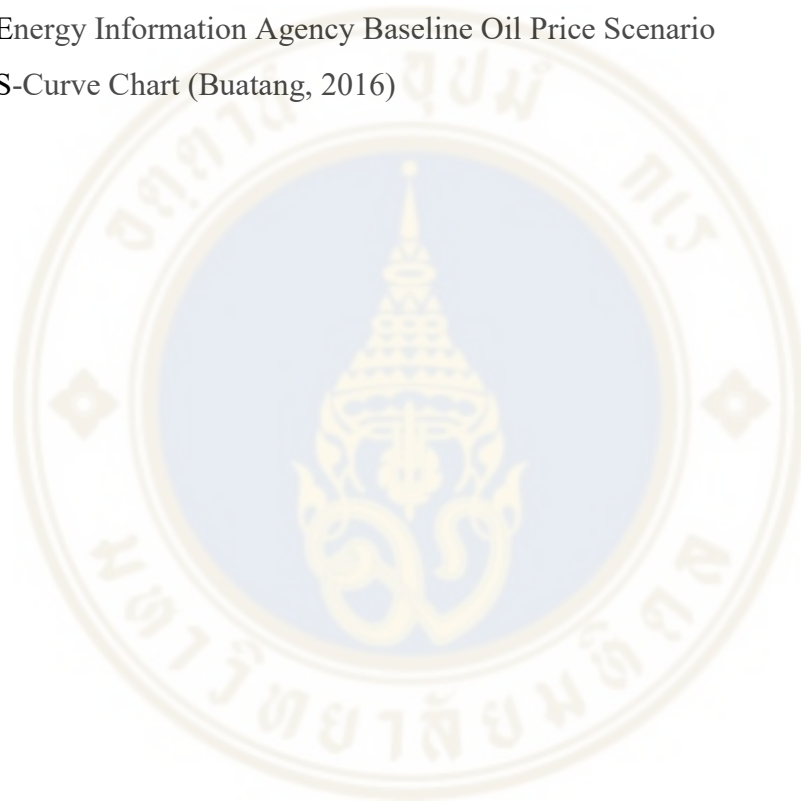
**CONTENTS (cont.)**

	<b>Page</b>
<b>APPENDIX</b>	<b>30</b>
Appendix A : Interview Questions	30
<b>BIOGRAPHY</b>	<b>32</b>



## LIST OF FIGURES

<b>Figure</b>		<b>Page</b>
1.1	Current Types of Electric Vehicles (Gaton, 2018)	1
1.2	Number of New Electric Vehicles Registration(2020 Thailand Electric Vehicle Outlook, n.d.)	5
2.3	Energy Information Agency Baseline Oil Price Scenario	11
4.2	S-Curve Chart (Buatang, 2016)	16

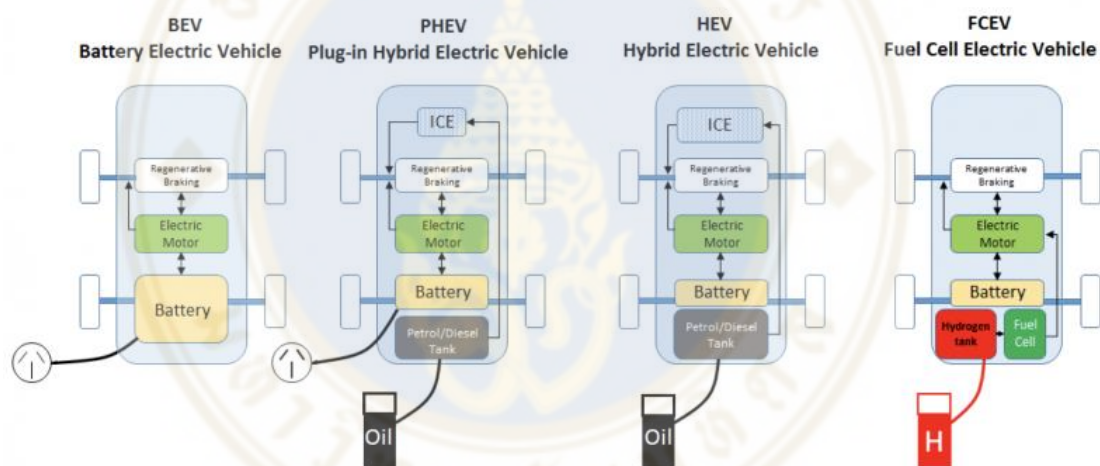


## CHAPTER I

### INTRODUCTION

#### 1.1 Background

The current situation on Electric Vehicles, currently we have 4 types of Electric Vehicles which are the Battery Electric Vehicle (BEV), the Plug-in Hybrid Electric Vehicle (PHEV), the Hybrid Electric Vehicle (HEV) and the Fuel Cell Electric Vehicle (FCEV) (Motor Technic, 2020).



**Figure 1.1: Current Types of Electric Vehicles (Gaton, 2018)**

Firstly, the Battery Electric Vehicle is the vehicle that has absolutely no Internal Combustion Engine, and it is driven by the Electrical Motor which is using the electricity from the outside charging, and a Regenerative Braking System which will charge the battery when the driver brakes the car and the Electrical Motor itself when the driver releases the acceleration pedal. Therefore, there is completely no pollution from the engine exhaust, and nowadays, in some models it can run up to 500 kilometers from one fully charged, but most models can do 200 to 250 kilometers. Secondly, the Plug-in Hybrid Electric Vehicle is the vehicle that can be driven by both an Electrical



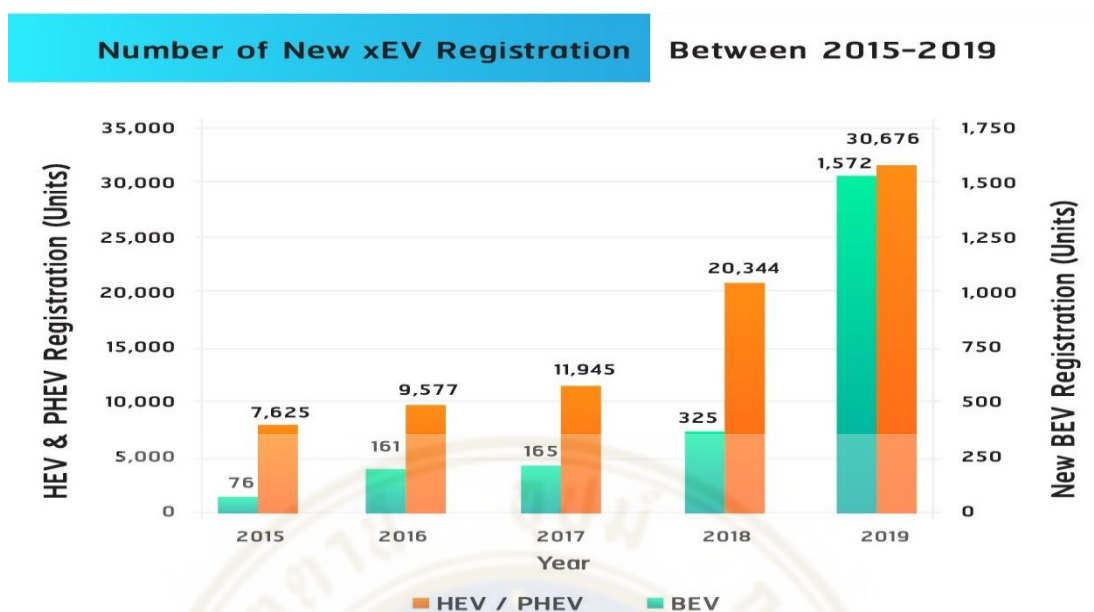
Motor and an Internal Combustion Engine. The battery can be charged from outside, and from a Regenerative Braking System and the Electrical Motor itself. Therefore, the driver can use only an Electrical Motor to drive the car until the car runs out of the battery which normally 20 to 80 kilometers depending on car models. Thirdly, the Hybrid Electric Vehicle is the same as the Plug-in Hybrid Electric Vehicle, but the battery cannot be charged from outside, so it requires fuel to top up the tank for the Internal Combustion Engine only. Fourth, the Fuel Cell Electric Vehicle is the same as the Battery Electric Vehicle which that it has no Internal Combustion Engine, but the Fuel Cell Electric Vehicle cannot be charged from outside. It requires Hydrogen for Fuel Cells to generate power to the Electrical Motor, in other words, the driver can fuel up the car by Hydrogen in order to generate the power to the Electrical Motor (Types of Electric Vehicles, n.d.).

For prices of Electric Vehicles in Thailand, in July 2020, Nissan Leaf which is the Battery Electric Vehicle type and it cost 1.99 Million Baht from Nissan Thailand official website (Nissan2020, n.d.), and they have been cutting the price to 1.49 Million Baht which is a 500,000 Baht discount twice this year. The first time was in April 2020 then they sold it at the same price (Prukesangkul, 2020). The second time is in July 2020 (Admin, 2020) even though the price dropped down but it still showing in the Nissan Thailand official website that the price is starting from 1.99 Million Baht which it is the second most expensive Nissan Leaf price in the world (from 49 countries that they are selling Nissan Leaf), and when they drop the price to 1.49 Million Baht, Nissan Leaf in Thailand will be at the sixth place of the most Expensive Nissan Leaf (Prukesangkul, 2020). Moreover, Nissan Leaf is ranking in the size of C-segment cars (Details of Nissan Leaf EV, 2017). And it will be compared with All-New Mazda3 (price range from 969,000 to 1,198,000 Baht), All-New Toyota Corolla Altis (price range from 829,000 to 1,099,000 Baht), Honda Civic (price range from 874,000 to 1,220,000 Baht) (Updated All Prices of C-Segment, 2019). Therefore, the price of Nissan Leaf is still higher than other cars in the same segment. Not only Nissan Leaf, MG ZS EV which is the Battery Electric Vehicle also has higher price compared to its segment and itself. MG ZS EV is selling at 1,190,000 Baht in July 2020 (New MG ZS EV Easy, n.d.), but the New MG ZS which is the Pure Internal Combustion Engine has a price range only from 689,000 to 799,000 Baht, and it is using a 1.5 liter engine (New MG ZS Smart Up, n.d). For

Plug-in Hybrid Electric Vehicles in Thailand, this study will compare the price with 100 percent the same model, but there will be differences in prices between Plug-in Hybrid Vehicles and Pure Internal Combustion Engine Vehicles. For the BMW 5 Series CKD (Completely Knocked Down or produced in Thailand), In July 2020, the BMW 520d M Sport which is the Pure Internal Combustion Engine Vehicle using Diesel engine is selling at 3,499,000 Baht, and the BMW 530e M Sport which is the Plug-in Hybrid Vehicle using Battery and Benzine engine is selling at 3,899,000 Baht. In addition, For the BMW X5 CKD (Completely Knocked Down or produced in Thailand), the price of the BMW X5 xDrive 30d M Sport which is the Pure Internal Combustion Engine Vehicle using Diesel engine is 4,659,000 Baht, and the price of the BMW X5 xDrive 45e M Sport which is the Plug-in Hybrid Vehicle using Battery and Benzine engine is 4,959,000 Baht (BMW Price List, n.d.). Therefore, the Plug-in Hybrid Vehicles are more expensive than the Pure Internal Combustion Engine Vehicles. Moreover, for the Mercedes-Benz, in July 2020, the Mercedes-Benz C 220 d Avantgarde which is the Pure Internal Combustion Engine Vehicle using Diesel engine has retailed at 2,479,000 Baht, and the Mercedes-Benz C 300 e Avantgarde which is the Plug-in Hybrid Vehicle using Battery and Benzine engine has retailed at 2,599,000 Baht. And the Mercedes-Benz GLC 220 d 4MATIC Coupé AMG Dynamic which is the Pure Internal Combustion Engine Vehicle using Diesel engine is selling at 4,040,000 Baht, and the Mercedes-Benz GLC 300 e 4MATIC Coupé AMG Dynamic which is the Plug-in Hybrid Vehicle using Battery and Benzine engine is selling at 4,090,000 Baht (Mercedes-Benz Recommended Price List, 2020). Moreover, for Hybrid Electric Vehicles, all Toyota Hybrid Vehicles are more expensive than Pure Internal Combustion Engine Vehicles. In July 2020, the All-New Toyota Corolla Altis with Pure Internal Combustion Engines have price range from 839,000 to 999,000 Baht, but the All-New Toyota Corolla Altis Hybrids have price range from 939,000 to 1,099,000. Furthermore, the Toyota C-HR with Pure Internal Combustion Engines have starting price from 979,000 to 1,039,000 Baht, but the Toyota C-HR Hybrids have starting price from 1,069,000 to 1,159,000 Baht. Moreover, the Toyota Camry with Pure Internal Combustion Engines are selling from 1,455,000 to 1,599,000 Baht, but the Toyota Camry Hybrids are selling from 1,649,000 to 1,809,000 Baht. Lastly, comparing the Toyota Vellfire 2.5 with the Toyota Alphard 2.5 HV with the same options, the Toyota Vellfire 2.5 which is running by the Pure Internal

Combustion Engine is 130,000 Baht Cheaper than the Toyota Alphard 2.5 HV which is the Hybrid Electric Vehicle (Price List, n.d.).

For Electric Vehicles in Thai market, at the early of the year 2015, the Thai government attended to support Electric Vehicle technologies and policies, so this will help encourage research and development, usage and production of Electric Vehicles in Thailand resulting in forming the Electric Vehicle Association of Thailand or EVAT. According to the Electric Vehicle Association of Thailand website, the goal of Electric Vehicle Association of Thailand is “Electric Vehicle Association of Thailand promotes the use of Electric Vehicles in Thailand, which will lead to a reduction of road pollution especially in major cities. In addition, Electric Vehicles deployment will also improve energy efficiency in the mass transportation sector. The Electric Vehicle Association of Thailand supports industrial manufacturing, and research and development on Electric Vehicles technologies in Thailand. These will strengthen and increase the competitiveness of Thai Electric Vehicles entrepreneurs in the global market” (Laonual, n.d.), so it is good news that the government will support Electric Vehicles in Thailand. Currently there are 748 Alternating Current or AC chargers and 69 Direct Current or DC chargers’ places in Thailand. Moreover, there are 153,184 Hybrid Electric Vehicles and Plug-in Hybrid Electric Vehicles and 2,854 Battery Electric Vehicles in Thailand from 2015 to 2019, and the number of new registered Electric Vehicles is increasing year by year as on the below chart.



**Figure 1.2 : Number of New Electric Vehicles Registration (2020 Thailand Electric Vehicle Outlook, n.d.)**

For plans and road maps in South East Asia, the largest automotive industry is in Thailand, and it is the twelfth place in the world. Even though now they are producing more Internal Combustion Engine Vehicles, in the future they aim and will be ready to produce more numbers of Electric Cars. The Thai Energy Ministry's Energy Planning and Policy Office forecast that the number of Electric Vehicles will increase from nine thousand cars in the year 2018 to more than four hundred thousand cars in the year 2028, and in the far future it will be one point two million Electric Vehicles in the year 2036 with 690 charging stations around the country. Moreover, the government supports Electric Vehicles by providing low import tax for importers and tax exemption for makers (The Thaiger, 2020).

The Thai government has a draft roadmap for Electric Vehicles in Thailand that the manufacture will begin within three years, and the roadmap will be finalized within this year or year 2020. The roadmap must make car manufacturers confident to invest in Thailand, so they need the clear government procedure for investment, incentive and infrastructure. In order to make Thai people purchase for Electric Vehicles in huge



numbers, the prices must be the main point of consideration, for example, the Hongkong government gives a discount for Electric Vehicles purchasers for three years (Chantanusornsiri, 2020).

Moreover, Deputy Prime Minister Somkid Jatusripitak said "Strategies are in place for all parties to make Thailand an Electric Vehicle production base within five years. The Industry Ministry, the Energy Ministry and the Transport Ministry will implement the strategies with relevant parties,". These strategies are also including Electric Vehicles that will be used by the regiment organizations, the state corporations, buses and motorcycle taxis. And the target is becoming an Asean hub. In addition, PTT Public Company Limited and the Electricity Generating Authority of Thailand will work together in order to build more charging stations., and the Board of Investment or BOI will do promotional privileges. And the plan is to provide a charging station in the range of two hundred kilometers. By the year 2030, Thailand would produce at least 750,000 electric vehicles yearly or approximately thirty percent of the total number of automotive manufacturing in Thailand. And there must be fifty three thousand Electric Motorcycle Taxis within two years and five thousand Electric Buses within five years, an industry Minister Suriya Jungrungreangkit said (Online Reporters, 2020).

## **1.2 Problem Statement**

The reason why Thai people do not use Electric Vehicles much may be because they wait for more accessible Electric Vehicles infrastructures. Moreover, the Electric Vehicles prices are still comparable to Internal Combustion Engine Cars and less variety of choices. In addition, people are still confused and have less understanding of Hybrid Vehicles because they are not fully Electric Vehicles, and it has both Internal Combustion Engine and Electric Motor, and Hybrid Cars are using current car models, but which have both Internal Combustion Engine and Hybrid types to choose, but normally Electric Vehicles will have their own models or designs. Last but not least, Thai people may have an old understanding that Electric Vehicles have poor performance, Electric Vehicles have short range per one fully charged, Electric Vehicles

require battery replacement in a couple of years, and Electric Vehicles are hard to resell (The Thaiger, 2020).

### **1.3 Research Questions**

What factors make people change from Pure Internal Combustion Engine Vehicles to Electric Vehicles in Thailand?

### **1.4 Research Objectives**

To understand how Thai people change from Pure internal Combustion Engine Vehicles to Electric Vehicles.

### **1.5 Scope of the Study**

People who have been using Internal Combustion Engine Vehicles, and change to use Electric Vehicles in Thailand

Electric Vehicles in this interview are Battery Electric Vehicles and samples are told to answer about Battery Electric Vehicles because they will be the future vehicles and to avoid complication and confusion of the result due to the limitation of time.

### **1.6 Expected Benefit**

Car manufacturers or showrooms will benefit from this research because they will understand more in what factors make Thai people change to purchase Electric Cars, so car manufacturers and showrooms will not only adjust their products, but improve their marketing and ways to sell the Electric Vehicles.

Thai people who are considering buying new cars will have better decisions and considerations to buy.

## **CHAPTER II**

### **LITERATURE REVIEW**

In this chapter, it is a general review of the existing literature with the consumer behavior of buying cars. And then the reasons why people buy Electric Vehicles. Then ending up with the oil price affects the demands of buying Electric Vehicles or not.

#### **2.1 What is consumer behavior for buying cars?**

Car factors which are country of origin, quality, price and brand reputation and integrated marketing communication such as public relation, sponsorship, advertising and sale promotion can go along together. Therefore, Brand owners should use integrated marketing communication to communicate car factors for end users to see values. Moreover, car factors and brand loyalty such as satisfaction, word of mouth and repurchase are positively impacting each other which means that they support each other in positive ways. In addition, customer's psychological factors such as motivation, personality and attitude and brand loyalty have straight positive effect to each other, so when one factor raise the other will raise which support the theory that "Schiffman & Kanuk (2010) stated that in general a buyer prefers to buy a brand that matches his/her personality. A customer is motivated to become an advocate of a car's brand, if he/she develops a favorable attitude about the brand after having satisfactory experiences". and "Kotler & Keller (2016), Kotler & Armstrong (2016) as they stated that image, satisfaction, repeat purchase and word of mouth are linked to brand loyalty" (Sawmong, 2018).

There are differences between two types of customers which are corporates or fleets and end users. Corporates are more functional benefits, they usually buy lower price with more powerful cars for instance, they choose to buy Lexus GS300 rather than BMW 728i because Lexus is cheaper but it has more power that comes along with a

bigger engine, more horsepower, rapid acceleration, and higher top speed, so they think worth the money even though they have the same insurance rates. On the other hand, end users prefer to buy BMW 728i more because they try to gain benefit from experiential and emblematic of the brand. Sometimes, customers' behavior to buy cars are distinguishing between essential and special needs, so corporate customers will focus more on essentials or basic needs and considering on the worth of money, but end consumers prefer more on their desirable for better and more expensive cars. Sometimes, luxury brands sell cars in lower segments and they cannot compete with the brands that match with the specific segment because they provide more cost effective to end customers in that segment which they aim for cars that are worth the money. Social influence is also important for customers to choose to buy cars. It depends on how they see the brands and how much they see the cars brands used by whom, for example, Thai people always see Thai Royal family, politicians, and millionaires sitting in Mercedes, so their perception of Mercedes is a very luxury car (Anurit, Newman, Chansarkar, 2015).

## **2.2 Why do people buy Electric Vehicles?**

The article tries to find the relationship between five factors to the purpose to buy Electric Vehicles which are Financial, Infrastructure, Performance, Environmental Concerns and Price-premium. For the Financial factor, it is about the higher price of Electric Vehicle compared to Internal Combustion Engine Vehicles, and the resale price for the second-hand market is unpredictable. Decrease in oil price and better or more efficient Internal Combustion Engine affect the decisions, and there are also cost of ownership and government tax incentives to be considered. For the Infrastructure factor, it is about availability of charging points and numbers of nearby charging stations, and the charging condition of charging at home, at work, or at highway. For the Performance factor, it is about the driving range per charge, charging time and safety and reliability of Electric Vehicles. Moreover, people are willing to pay more for a longer range or a quicker charge, so they are willing to pay approximately 35 to 75 US Dollars per mile in order to increase the driving range and 425 to 3,250 US



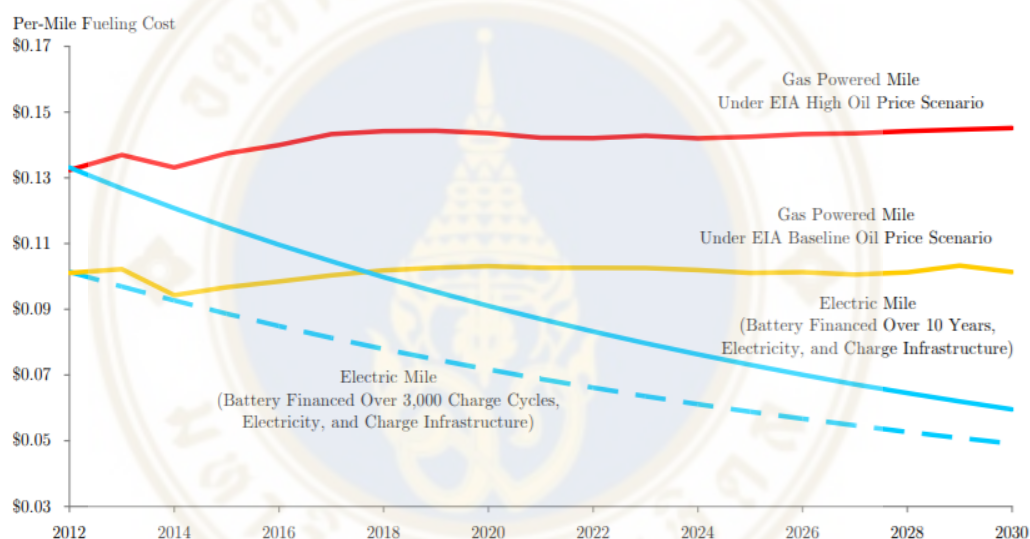
Dollars per hour for reducing the charging time. For the Environmental Concern factor, this would affect people who are environmentally friendly and who care and think about global warming issues, and driving Electric Vehicles make people feel that they are responsible to the world. For the Price-Premium, it is about the willingness to pay more for something in return. They may pay for showing their interest, social status or value. They may pay for quality, brand or trustworthy and reputable sellers. They may pay too much for uncertainty of resale prices or cost of using, or they may pay too much for inconvenience of a few number of charger stations. Therefore, the article shows that only 3 factors are directly impacting the intention to buy Electric Vehicles which are Performance, Environmental Concerns and Price-Premium. For the Performance factor, not only about acceleration, speed, or driving range but safety and reliability in Thai traffic and roads, and also flooded roads affect intention to buy EV. But it is astonishing that Thai people are not really concerned about places that provide charging stations for them, so the Infrastructure factor does not impact the intention to buy Electric Vehicles. For environmental concerns, it is positively affecting the intention to buy Electric Vehicles even though the environmental issues are not the high concerns in Thailand. For Price-Premium, Thai people are willing to pay more for being outstanding and show their social status and environmental concerns. Moreover, the Financial factor is not affecting the intention to buy Electric Vehicles because they may lack information about the cost of owning an Electric Vehicles such as maintenance cost, and also its reselling price (Thananusak, Rakthin, Tavewatanaphan, Punnakitikashem, 2018).

### **2.3 Does oil price affect the demand of purchasing Electric Vehicles?**

Electric Vehicles gained interest because of the increase in oil price which the article relates to the European Union reports that the oil prices between 2002 to 2010 have been five times increased. Therefore, Electric Vehicles are the way for car owners to cut themselves from oil prices (Valogianni, Erasmus, Collins, n.d.).

The cost of using Internal Combustion Engine will be higher because of the oil price will be increased continuously, so in year 2030 the oil price is forecasted to be 4 dollars per gallon in Energy Information Agency Baseline Oil Price Scenario, and it could be

reached to 5.50 dollars per gallon according to Energy Information Agency High Oil Price Scenario. As the oil price increases, the government supports car manufacturers to produce more fuel efficiency cars. Moreover, an increase in oil price affects the second-hand car price such as big SUVs and trucks which have less fuel efficiency. On the other hand, Electric Vehicles have high cost only with battery and battery replacement, but the study believes that in the future battery will be more effective which can be used for a longer route per one charge which will make battery cost cheaper when divided into dollars per mileage. Then the Fueling cost of Electric Vehicles will decrease year by year.



**Figure 2.3 Energy Information Agency Baseline Oil Price Scenario (Becker, 2009)**

## **CHAPTER III**

### **RESEARCH METHODOLOGY**

This chapter explains the overall scope of the methodology that is used for this thematic paper, and it uses qualitative research. This section contains the Research Methodology, and the Interview Questions.

#### **3.1 Research Methodology**

This study uses Qualitative methodology to gain information on factors that make Thai people change from Internal Combustion Engine Vehicles to Electric Vehicles.

This paper chose to use a Semi-Structured interview with 30 people, and there will be 15 people who are using any kind of Electric Vehicles, and 15 who are using Pure Internal Combustion Engine cars. Not require age, genders, education and incomes.

This paper chooses this technique because it is the most suitable and effective for gaining accurate information from real users. And not doing focus groups because it takes time and money to do it, and there is no need to test or try new products, so it is not necessary.

#### **3.2 Interview Questions**

Questions will be mainly about what will make and what made people switch from using Internal Combustion Engine Vehicles to Electric Vehicles. And these questions were developed from Factors affecting the intention to buy electric vehicles: Empirical evidence from Thailand (Thananusak, Rakthin, Tavewatanaphan, Punnakitikashem, 2018).

## **CHAPTER IV**

### **FINDINGS ANALYSIS**

This paper contains only one research method which is Qualitative for semi-structured interviews. The interview period was on 15th to 24th of July 2020 via telephone calls and face to face which took around 15 to 25 minutes for each interviewee. There are 30 samples which are 15 people who are using Electric Vehicles and 15 people who are using Pure Internal Combustion Engine Vehicles attend interviews, these are the results.

#### **4.1 Results**

For Infrastructure factors which are Charging Stations and Charging Condition, almost all respondents seriously see and consider it as an important factor to buy Electric Vehicles. This means that the majority of people are waiting for the Infrastructure to be ready first in order to support decision making for buying Electric Vehicles.

“I buy a car in order to drive around both urban and upcountry, and I am not a rich woman who can buy one car to use only in town and other cars for other purposes. Therefore, if Charging Stations are as many as Gas Stations, I will consider buying Electric Vehicles.” (Nissan Juke user)

If the government can take place to support Electric vehicles people need three things. The first one is to provide Charging Stations around the country as much as possible. The second rank is Reducing Both Import and Yearly Tax for Electric Vehicles, and the third need is to support Electric Vehicles Authorized Dealers in Thailand.

“I want a lot of Charging Points, so I will drive Electric Vehicles without worries, and the government is the only one who can do this.” (All-New Mazda 3 user).

If the Electric Vehicle has the same price as the Internal Combustion Engine Vehicle 75 percent of respondents choose to buy the Electric Vehicle and most of them think that it is more efficient and economical, and it helps the environment. But if the Electric Vehicle has significantly lower prices than the Internal Combustion Engine Vehicle, the rest 25 percent of respondents choose to buy the Electric Vehicle.

“If the Electric Vehicle is cheaper than the Internal Combustion Engine Vehicle, I will consider buying the Electric Vehicle but there should not be other expensive equipment such as wall charger and etc. to purchase.” (Nissan Sylphy user).

People who are using any type of Electric Vehicle are less concerned about Financials which are Price, Resale Price, Ownership Cost and Tax Incentives. To be more detailed, it is good for them if the price is low and the Thai government reduces the tax rate, but these are not the main factors for them. On the other hands, respondents who are using Pure Internal Combustion Engines are more concerned about Financial factors which are Prices and Tax Incentives.

“I can afford the price if the product is worth it, what I concern are charging stations and authorized dealers to service my car.” (Tesla Model 3 user).

“The prices of Electric Vehicles are still too high and I really want the Thai government to reduce taxes for Electric Vehicles” (Honda Civic Hatchback 1.5 Liter Turbo user).

For Performance factors which are Driving Range, Charging Time and Safety and Reliability, people see it as a factor to consider to change from Pure Internal Combustion Engine Vehicles to Electric Vehicles. The more Driving Range per charge the better it is. The shorter Charging time the better it is. But most of the respondents are not concerned about Safety and Reliability because they already trust and the technology has been launched for a long time.

“Do you know that Electric Vehicles are hard to rollover? because of the platform that they put the battery underneath the car, so the car has a low center of gravity. Moreover, as I did some research, Electric Vehicles are hardly broken” (Tesla Model 3 Performance user).

Respondents who are using any kind of Electric Vehicles are more likely not to think about Environmental Concern for a factor to change to use Electric Vehicles. These people already know that even though they use Electric Vehicles, the pollution



still occurs, it just changes the cause from drivers who are using Internal Combustion Engine Vehicles to factories producing Electric Vehicles and power plants. Moreover, most respondents who are using Internal Combustion Engine Vehicles are rarely concerned about the Environmental Concern factor for buying Electric Vehicles, and most of them think that it will help if a lot of people change to use Electric Vehicles.

“Electric Vehicles help the environment in the very long run, not in the short run.” (Toyota Camry Hybrid user)

“Electric Vehicles will help reduce the global warming issue if there are enough people to use it.” (Suzuki swift user).

For Price-Premium factors which are Show Interest, Show Value, Be Recognition, Social Status, Inconvenience for Limited Charging Points, Quality, Brand, Reputable Seller, only few respondents take these as factors to buy Electric Vehicles, and there are just some respondents think about being recognize, or thinking about their social status.

“That's why I choose to buy Tesla not an MG.” (Tesla Model S user).

Asking about the liking between Electric Vehicles and Internal Combustion Engine Vehicles, most respondents like Electric Vehicles more because they are more economical. But respondents who like Internal Combustion Engine Vehicles more think that Internal Combustion Engine Vehicles are more suitable in Thailand nowadays, and Thai people already know its problem, and they can fix it easily.

Asking respondents about their thoughts of Thai people are afraid of new technologies such as Electric Vehicles that developed countries develop and use for a long time, most of them agreed with the statement. Therefore, people need time to trust and believe for change from Internal Combustion Engine Vehicles to Electric Vehicles, and they need government support and availability and readiness of infrastructure.

“It is the Thai culture that they fear new things and things that they do not understand, so if the government comes to support Electric Vehicles, it will be better.” (BMW 3 Series Diesel user)

For worries about using Electric Vehicles, answers are varies which are services, seek for information from users themselves, flooded, usability, charging, availability of fixing places, ability to fix the Electric Vehicles, Stability, popularity, technical issue, acknowledge the problem while driving, basic knowledge of Electric

Vehicles, hard to fix, expensive to fix, electricity at home is not support, the oil is too cheap, number of charging stations, etc.

Comparing the result with the literature, the literature states that there are 3 factors that have directly impacted the intention to buy Electric Vehicles which are Performance, Environmental Concerns and Price-Premium. But according to the research, this research found out that the most important factor for Thai people to buy Electric Vehicles is the Infrastructure factor which respondents are serious about and their decision to buy mainly depends on this factor. Moreover, Financial factor is also a concern for Pure Internal Combustion Engine Vehicles users. Therefore, the results from this study are opposite to the literature.

## 4.2 Discussion

As the result from Research Findings, it tells the very big and clear picture that this research supports the S-curve theory.

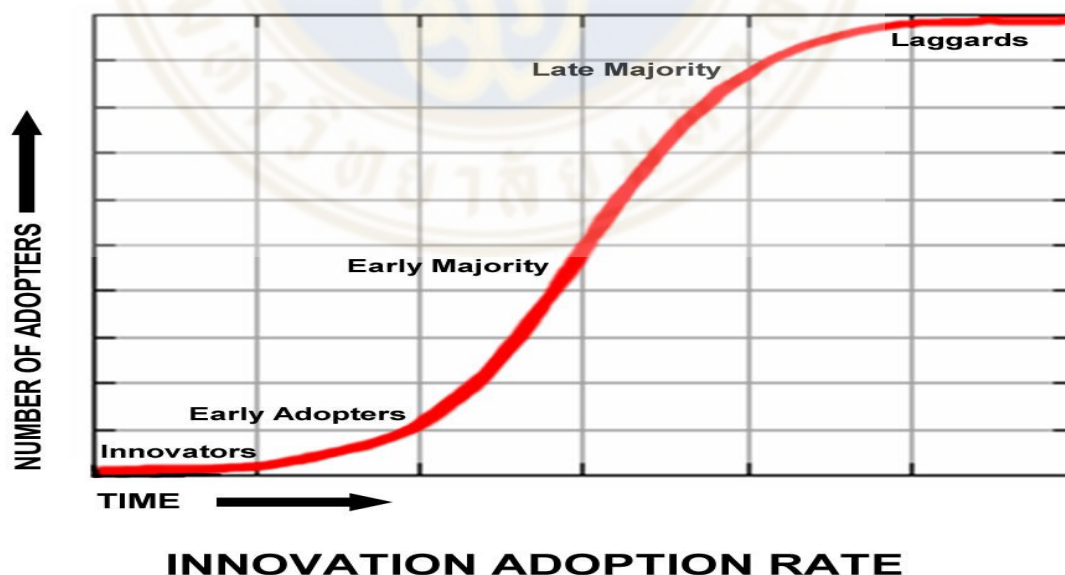


Figure 4.2: S-Curve Chart (Buatang, 2016)

Now Thai Electric Vehicles is in the Innovation to Early Adopters stage. So, in order to move to Early Majority is building infrastructure which is Charging Stations as much as possible. Moreover, the Thai government should support more for Electric Vehicles in order to make sure that Electric Vehicles are trusted to use. People can find standardized places to fix and service their Electric Vehicles, and they can buy Electric Vehicles at reasonable prices. People are waiting for other people to use it, and when many people use Electric Vehicles, people will follow. For car sellers, car sellers must provide more trials for clients to try Electric Vehicles in order to make them understand more about using Electric Vehicles. Moreover, it is also the car sellers' job to convince and enhance people to pass through all of the buying process.

### **4.3 Conclusion**

Comparing the result with the literature, the literature states that there are 3 factors that have directly impacted the intention to buy Electric Vehicles which are Performance, Environmental Concerns and Price-Premium. But according to the research, this research found out that the most important factor for Thai people to buy Electric Vehicles is the Infrastructure factor which respondents are serious about and their decision to buy mainly depends on this factor. Moreover, Financial factor is also a concern for Pure Internal Combustion Engine Vehicles users. Therefore the results from this study are opposite to the literature.



## **CHAPTER V**

### **CONCLUSION**

The research objective of this study or paper is to find out what factors make people change from Pure Internal Combustion Engine Vehicles to Electric Vehicles. In order to reach the goal of the paper objective, this study is finding 30 samples which are 15 samples using Pure Internal Combustion Engine Vehicles and 15 Sample using any type of Electric Vehicles. Therefore, this chapter will start with the Sum Up of this thematic paper, and it will follow with Recommendation, Limitation and Future Research.

#### **5.1 Conclusion**

Factors that will make Thai people change from Pure Internal Combustion Engine Vehicles to Electric Vehicles are Infrastructure, Financial and Authorized Dealers. People need Infrastructure such as Charging Stations available for them in order to make sure that they will not run out of batteries while driving. When the prices of Electric Vehicles drop to equal and lower than Pure Internal Combustion Engine Vehicles, people tend to buy Electric Vehicles. People need Authorized Dealers of Electric Vehicles such as Tesla in order to gain trust and know where to service and fix their car.

#### **5.2 Recommendation**

For the government, first, the government should support and work for Charging Stations in order to provide as many Charging Stations as possible. Therefore, the government should deal with the current gas stations in order to set up Charging Stations for Electric Vehicles by offering some benefits or investment. For example, any gas station that has Charging Stations will get tax benefits or lower the tax payment for

them, or the government should invest in Charging Stations for them and may build some waiting areas for them for exchanging with areas or space. Moreover, the government should encourage and acknowledge gas station owners that they can get benefit from people who are waiting for charging, so car owners can eat, drink, get massages, etc. while waiting. Next step would be investing in Charging Stations at landmarks or tourist attractions, so people will not be afraid of driving their Electric Cars around Thailand. Secondly, the government should reduce both import and yearly taxes and support the prices of Electric Vehicles. Therefore, the government should attract Thai people to buy Electric Vehicles by playing with taxes and prices or cash back. For example, the government should reduce import tax for imported Electric Vehicles from around the world not only from China, And the government should set 0 percent yearly tax for all Electric Vehicles not only for Board of Investment (BOI) Electric Vehicles (Resolution of the Cabinet on Tax Deduction for Truck and Electric Vehicles, 2019), or the government can do the same as few years ago that eco car buyers who never purchased cars before get benefits for approximately 100,000 Baht, so the government can use these ideas for supporting Thai people to buy Electric Vehicles. Third, the government should support Authorized Dealers by providing financials such as low interest rate or extended period, and tax. Moreover, the government can rent out infrastructure such as land or buildings at fair or low prices. Therefore, Thai people will have more choice to choose Electric Vehicles from, and Electric Vehicles users will have places to service and repair their Electric Vehicles. All of these above are the government duty to do, and the government is the only department that can handle these big projects.

For companies that sell Electric Vehicles, they should try to make people get used to Electric Vehicles. Firstly, launch financial promotions such as low or zero interest rate, no down payment, free of installment for 1 year, etc. Secondly, the car companies should extend the warranty and maintenance free in order to get more users to buy and drive Electric Vehicles more on the roads, and doing this the car companies will get more trust from customers. Third, not only making people see Electric Vehicles more on the roads or advertisements, but giving opportunities for them to try, so the car companies should find any possibility for people to try and use it. This way will make people understand more about Electric Vehicles. Companies can start with social media

influencers and celebrities to spend time using Electric Vehicles, these people will be a good message sender, and people are more likely to listen to them. Doing these will drag followers to follow, therefore people will buy more Electric Vehicles.

### **5.3 Limitation**

Limitation on this research is time which leads to the number of samples. The number of samples is very small, so it is less accurate to represent huge numbers of car users. In addition, samples have less knowledge about the topic and subject that they will get interviewed, so this is also the limitation for this research. Moreover, the limitation is using only one research method which is qualitative research method.

### **5.4 Future Research**

The future research must contain more samples because Vehicles is sold for a large number, and only few respondents cannot answer for all people. And samples need to have more knowledge about the topic for more accurate results. Moreover, for future research, it needs to contain both research methods which are qualitative and quantitative research methods.

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## Appendix A: Interview Questions

No	Questions
1	What car are you driving? Brands? Model? Types?
2	What factors make you decide to buy this car?
3	<p>Do you consider these factors to buy Electric Vehicles?</p> <p>Financial (Price, Resale Price, Cost of Ownership, Tax Incentive)?</p> <p>Infrastructure (Charging Points, Charging Conditions e.g. at home, at work, at highways)?</p> <p>Performance (Driving Range, Charging Time, Safety &amp; Reliability)?</p> <p>Environmental Concern?</p> <p>Price-Premium (Show Interest/Value/Recognition/Social Status, Inconvenience for Limited Charging Points, Quality, Brand, Reputable Seller)?</p>
4	Is your old car a Pure Internal Combustion Engine Vehicle? If yes, Why and what factors make you change from a Pure Internal Combustion Engine Vehicle to Electric Vehicle? (Ask who are using Electric Vehicles)
5	What factors influence you to buy Electric Vehicles? Why? (Ask who are using Pure Internal Combustion Engine Vehicles)
6	Which one do you like more, an Electric Vehicles or an Internal Combustion Engine Vehicles? Why?
7	What do you want more from Electric Vehicles?
8	What will you worry about by using Electric Vehicles?
9	How much do you think that Electric Vehicles will help solving greenhouse effects?
10	Please describe the benefits and loss of both Electric Vehicles and Internal Combustion Engine Vehicles.
11	What do you suggest the Thai government do when they want to support Thai people to use more Electric Vehicles?



12	Which one will you buy if Electric Vehicles are selling at the same price as Internal Combustion Engine Vehicles? Why? What if the price of Electric Vehicles are lower than Internal combustion Engine Vehicles?
13	What do you think about Thai people that are afraid of new technologies such as Electric Vehicles that developed countries develop and use for a long time?

