# THE FACTOR ATTRACTING CUSTOMER TO PURCHASE ELECTRIC VEHICLE CARS: GASOLINE PRICE FLUCTUATION

SINEENARD THAMMANUSARN

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on
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.........................................................
Miss Sineenard Thammanusarn
Candidate

.........................................................
Assoc. Prof. Randall Shannon,
Ph.D.
Advisor

.........................................................
Assoc. Prof. Sooksan Kantabutra,
Ph.D.
Chairperson

.........................................................
Assoc. Prof. Vichita Ractham,
Ph.D.
Dean
College of Management
Mahidol University

.........................................................
Assoc. Prof. Juthamas Kaewpijit,
Ph.D.
Committee member

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**THE FACTOR ATTRACTING CUSTOMER TO PURCHASE ELECTRIC VEHICLE CARS: GASOLINE PRICE FLUCTUATION**

SINEENARD THAMMANUSARN 6449054

M.M (MARKETING MANAGEMENT)

THEMATIC PAPER ADVISORY COMMITTEE: ASSOC. PROF. RANDALL SHANNON, Ph.D., ASSOC. PROF. SOOKSAN KANTABUTRA, Ph.D., ASSOC. PROF. JUTHAMAS KAEWPIJIT, Ph.D.

## ABSTRACT

The recent Covid-19 pandemic and increase in gasoline prices negatively affected the global market for all types of cars. However, the electric vehicle (EV) car market has still demonstrated a significant growth rate, with the global electric car sales share rising to almost 70% in 2020 and similar numbers in 2021. The large markets include China, the EU, India, Korea, the United Kingdom, and the United States. The global trends in the car industry are present in Thailand. In 2020, the government adopted a national roadmap aiming to transform the country into the EV hub of ASEAN within five years via state measures to boost demand and create a full-fledged EV ecosystem.

The study's research objectives are to understand the factors that influence EV owners to adopting the EV cars. Theoretically, there are many factors that directly and indirectly influence brand preference, including price fuel fluctuation, environmental concern, social influence, and cost effectiveness. Such analysis would benefit various stakeholders of the EV market, including the, EV cars company and charging equipment manufacturers, government officials, and EV car owners.

Consequently, the research was conducted on the main factors that have a significant role in consumers' adopting EV cars and to determine the significant attitudinal differences within the group of consumers in Thailand. The relationship hypothesis between factors and intention to buy was tested in this study, including price fuel fluctuation, environmental concern, social influence, and cost effectiveness. As a result of research phases and discussion, the research team determined several ideas that led to defining the actionable recommendations for improving the purchasing influence of EV owners from several factors.

KEY WORDS: Electric Vehicle Cars / Behavioral Usage Intention / Bangkok Malls /

Customer Perspective/ New Technology

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# CHAPTER I
# INTRODUCTION AND BACKGROUND

With gas prices drastically up over year over year, people might be thinking about switching to an electric car to save money. Several countries worldwide are implementing policies to promote electric vehicles (EVs car). But considering that electric vehicles tend to be more expensive than gas-fueled cars, and that electricity has its own costs, is it actually cheaper to go electric? Compare to paying for the gasoline cost for gasoline cars. Although it also depends on your driving habits, where you live and the type of vehicle you buy, too. You may even want to consider a hybrid vehicle that has both a gas and electric engine.
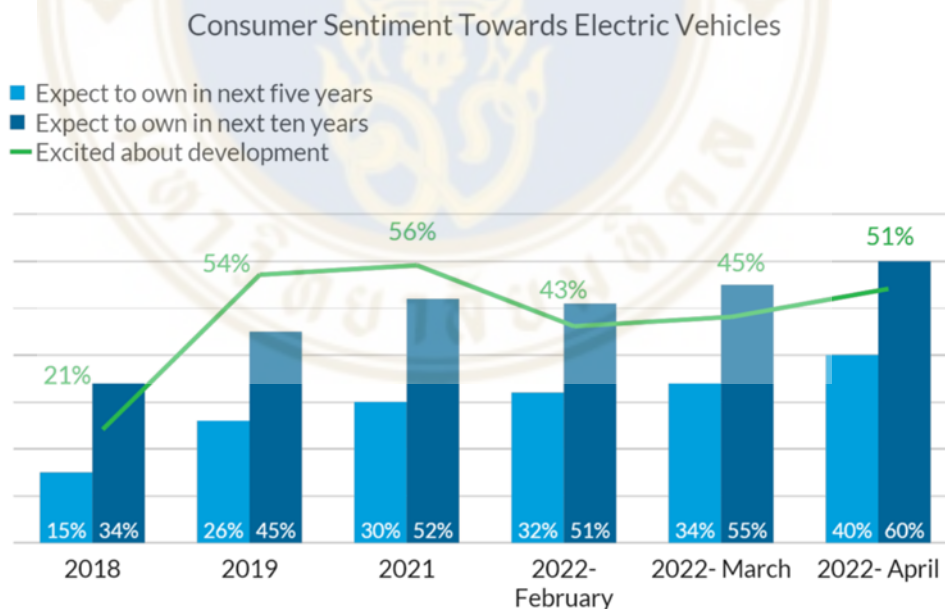


**Figure 1.1 The data, shared with TIME, looks at consumer sentiment toward electric vehicles based on an online survey of 2,176 U.S. automobile owners at various points this year.** CarGurus

Additional information from an unreleased report from CarGurus, an automotive research and shopping firm in America, shows that 53% of active shoppers say they are considering a more fuel-efficient vehicle in response to high gas prices. The data, shared with TIME, looks at consumer sentiment toward electric vehicles based on an online survey of 2,176 U.S. automobile owners at various points this year. It finds that 40% of Americans now expect to own an electric car in the next five years, up from 32% in February and 30% last year.

Currently, 15 brands sell EV cars in Thailand with the retail price starting from 438,000 THB for Thai car brand TACANO up to 11,700,000 THB for Jaguar. As of June 2022, the accumulated number of EV cars (BEV and PHEV) in Thailand surpassed 37,000 cars (figure 1.2). The registrations consist of 18,644 BEV and 37,075 PHEV. Such disbalance may imply several factors, including the perceived consumer's risk of owning a pure electric car with no alternative energy sources. Despite the fact that the lack of charging infrastructure is not the leading apprehension in Thailand (unlike in other SEA countries), another related factor, such as Fuel price and driving range, became a prevalent constraint for local buyers.
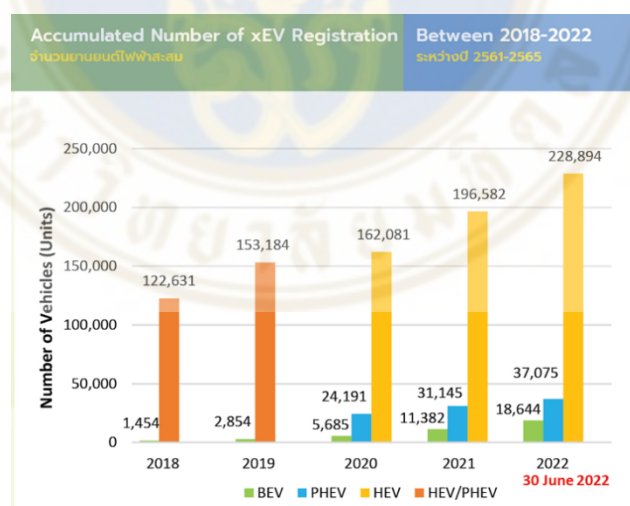


**Figure 1.2 Accumulated Number of EV cars in Thailand by Electric Vehicles Association of Thailand (EVAT)**

But although carmakers are raising their prices, consumers still appear to want electric vehicles. "Two-thirds of people say that they agree EVs are the way of the

future," Chapman says. But there is other reasons that the consumer have to re-consider about it except from the fluctuate gasoline price such as Economic crisis and the Russian invasion of Ukraine that make the fuel cost drastically high and currently the inflation is happening worldwide including Thailand as well. Additionally, to how quickly consumers' real income grows in relation to the growth in their fuel costs of driving that they have to afford. If gasoline prices drop back to earlier levels, the effect of high prices on the overall passenger vehicle fleet might be limited to vehicles sold while consumers expected gasoline prices to remain high. Although the rise in EV sales is supported by several factors, cost effectiveness has been shown to be of significant factor as well as this situation make people have to carefully consider when adopting high value purchasing with EV ownership. However, it is important to also consider operating costs, including fuel and maintenance, when assessing the total cost of vehicle ownership.



**Figure 1.3 Gasoline Prices in Thailand average from Oct 2021 – Jul 2022**

In this research, I would like to specific to the factor of gasoline price fluctuation that recently it happens all over the world which we can see from the figure above that related to the problem in many countries that effect to the dramatically increase in fuel price, the unit prices of all fuel types are increasing over time between the years 2021 and 2022 with some exception towards the end of the year 2022. From this issue, I would like to conduct the research to see how much, and the perspective of people consider changing to Electric Vehicle cars from gasoline price fluctuation

## 1.1 Objective of the study

The purpose of this study is to obtain analyze that the factors gasoline price fluctuation and other factors will influence electrical vehicle purchase, to analyze how much this variable affects the EV purchase, and to identify the other factors that influences the decision to purchase an electric vehicle. The objectives of this study include the following:

a. To study the determining factors influencing how much gasoline price fluctuation influence the consumer to purchase EV cars in Thailand.

b. To examine the relationship between factors and consumer of the level of purchasing decision-making process that gasoline price fluctuation can create in the consumers.

c. To examine the relationship between customer awareness and gasoline price fluctuation.

## 1.2 Potential Output

d. Get a detailed picture of the gasoline price fluctuation factor that influence to the consumer.

e. Pinpoint growth sectors and identify factors driving change.

f. Gain insight about what customer perspective of gasoline price fluctuation towards Electric Vehicle cars.

g. This study aimed to contribute the element that customer consider to purchase Electric Vehicle cars.

# CHAPTER II
# LITERATURE REVIEW

Due to the escalated attention on environmental pollution, policy on emission standards has been fortified. This puts more pressure on the automobile industry, and it would be expected to focus on producing more eco-friendly vehicles. As of 2020, there are 10 million electric vehicles in operation worldwide. The number of registered vehicles of all types decreased by 16% due to the COVID-19 pandemic, but the number of registered vehicles for electric vehicles increased by 41% compared to 2019. Considering the total number of registered electric vehicles, the number of registered electric vehicles in 2020 is still high, which indicates that electric vehicle registrations are accelerating worldwide. Furthermore, despite the stagnancy in the automotive market due to COVID-19 in 2020, KAMA (Korean Automobile Manufacturers Association) announced that global sales of electric vehicles grew 46.1% in comparison to previous years. It is predicted that the world's electrical vehicle sales (CAGR) would increase by an average of 29% per year within the next 10 years between 2020 and 2030. As a result of the global automobile consumer survey, it was found that most consumers are considering purchasing an electric vehicle due to expectations of fuel cost reduction, concerns about climate change, and carbon emission reduction. It appeared that they were concerned about the inconvenience of use.

Several studies have analyzed fuel efficiency as an important factor influencing consumer preferences (Hensher, Greene, & Li., 2011; Tay & McCarthy, 1991, 1998; Train & Winston, 2007). Furthermore, the researchers identified that these product-related attributes had a positive effect on consumer brand preference (Cobb-Walgren, Ruble, & Donthu, 1995; Myers, 2003; Park & Srinivasan, 1994). However, the National Automobile Dealers Association identified fuel efficiency as one of the key factors that people consider when purchasing a vehicle (NADA, 2014). Hence, the following hypothesis is developed.

## 2.1 Keyword/Variable

### 2.1.1 Gasoline price (H1)

Fuel price has been introduced as an influential predictor of alternative fuel vehicle adoption (Soltani-Sobh et al., 2016; Eppstein et al., 2011). The combination of fuel price and electricity prices  makes up  the majority of EV operating expenses, and these two factors are positively correlated with the likelihood of EV adoption (Zubaryeva etal., 2012). In some studies, the availability of charging infrastructures was identified as an important criterion in consumer acceptance of alternative fuel vehicles (e.g. Ghamami etal., 2014; Yeh, 2007; Struben and Sterman, 2008; Egbue and Long, 2012).

Moreover, fuel prices, both gasoline and diesel, are found to be the strongest predictors of HEV adoption (Diamond, 2009; Beresteanu and Li, 2011; Gallagher and Muehlegger, 2011) and would similarly affect EV adoption depending on the relative price of electricity (Hidrue et al., 2011). In an econometric study using both panel and cross-sectional data of HEV adoption between U.S. States, Diamond (2009) found that gas price had the strongest effect on market share, where a 10% increase in the average price of gas would result in a 70-90% increase in state hybrid market share (depending on the vehicle). In Hawaii, this effect might be dampened. In the continental U.S., the price of electricity is generally dislocated from the price of gasoline and diesel. Due to Hawaii's dependence on oil for electricity, the price of electricity in Hawaii tends to move with the price of crude oil and, subsequently, gasoline and diesel. As Hawaii switches toward non-oil sources of electricity, this relationship will diminish.

In order to overcome barriers, different states have established a number of consumer incentives for adopting EVs. Literature reviews on the effect of incentives on adoption of alternative fuel vehicles present conflicting results. (Sierzchula et al. (2014) found financial incentives to be significantly and positively correlated to a country's EV market share, whereas (Zhang et al. (2014) showed insignificant correlation between financial incentives and an individual's willingness to buy EVs. Thus, analyzing other factors affecting electric vehicles share is imperative.

### 2.1.2 Social influence (H2)

The role of social influence arises from the individuals who influence the decisions of users such as their family and friends. Social influence is also defined as the power of a co-worker or supervisor to influence how technology users express themselves.

The influence of society has been identified through many studies. Generally, it is known as "person's perception" such as friends, family, colleagues and social groups who play an important role that affects individuals' attitudes and intentions toward a certain behavior (Rivis & Sheeran, 2003; Hsu & Lu, 2004). Social influence is the process of changing feelings and actions that can occur unconsciously or indirectly, where the majority can influence the minority (Rashotte, 2007). From the context of purchasing a car, the influences of a specific attitude from a large social group will affect individuals. It means that people will decide to purchase a vehicle influenced through socialization (Bartikowski & Walsh, 2014), which was also revealed in the research conducted by Dagher and Itani (2012). Social influencing and environmental concern on green purchasing behavior were also found to be important interrelated factors. The purpose of this research is to identify whether social influence has a significant effect on adopting EVs car.

### 2.1.3 Environment concern (H3)

The issues related to the environment are gaining importance in recent years. However, personal ethics on protecting the environment fluctuates with awareness and social influence, which is a prevailing social practice. It is realized that higher environmental concerns lead to a tendency to choose environmental-friendly products as well as brands (Junior et al., 2014), due to an increase in information and knowledge of environmental issues and green products. So, consumers are beginning to search for green products and that will contribute to the consumption of green products. Moreover, environmentally-conscious consumers tend to look at the features of the products that are involved with the environment before forming preferences (Kwon, Engils, & Mann, 2016). For example, the main features of a vehicle that consumers are interested in, should offer environment-friendly products and fuel efficiency. Therefore, the environmental concern of consumers tends to be related to fuel efficiency of any particular car. Based on the above discussion, the following hypotheses are developed.

Many studies have shown that the environmental concerns of car buyers have a positive effect on the intention to buy EVs (Bauer et al., 2014; Das et al., 2011; Heyvaert et al., 2015; Jensen et al., 2013). Customers who are environmentally sensitive and identified themselves as an environmentally-friendly person would be more likely to adopt EVs (Barbarossa et al., 2017; Krause et al., 2013). Moreover, people who are concerned with the environmental issues and take part in environmental organisations are likely to adopt EVs (Krishnamurthy & Kriström, 2016). For example, Erdem, Şentürk and Şimşek (2010) studied the willingness to adopt energy-efficient cars in Turkey and found that people who cared about global warming issues were likely to purchase EVs. Past literature has suggested that similar to performing altruistic actions (such as giving to a charity), EV owners could experience a "warm-glow" – "intrinsic emotional reward in [altruistic or] pro-environmental behavior" (Hartmann et al., 2017; Sexton & Sexton, 2014) because they would feel that they have played a part in reducing carbon emissions and conserving the environment. Thus, this warm-glow reward helps motivate car buyers to adopt EVs.

### 2.1.4 Cost effectiveness (H4)

Compared with conventional vehicles, customers who purchase EVs voluntarily pay a price-premium (Kotchen & Moore, 2008) due to the higher total cost of ownership (e.g., high purchase cost, inconvenience due to limited charging infrastructure, and uncertainty about running-costs and resale prices). Past research has shown many factors that motivate customers to pay a price-premium in many products and services. Quality is a determinant factor on willingness to pay for a price-premium. For example, in the grocery retailing sector, customers are willing to pay higher price for perceived high-quality or branded products (Anselmsson et al., 2014). Furthermore, customers are more willing to pay a price-premium to reputable sellers' products. Ye et al. (2013) found that in the online market (Ebay in the US and Taobao in China) with fewer sellers, reputation of the sellers was positively correlated to the sales price whereas in the market with many sellers, the reputation of the sellers was positively correlated to the sales volumes.

The purchase price of an EV is one of the financial factors that can affect the intention to buy EVs (Delang & Cheng, 2013; Lane & Potter, 2007). The price of EVs tends to be higher than conventional vehicles and could deter EV adoption

(Edelstein, 2017). The high price of the EV is partly due to the high cost of electric-power train and Li-ion battery. The cost of EV ownership also is another financial factor that car buyers consider. Since EVs are not widely adopted and not many people have experienced them, people may not be able to correctly calculate the cost of ownership (e.g., operating and maintenance costs) (Rezvani et al., 2015). The survey of US public knowledge conducted in 2013 showed that two-thirds of the respondents had incorrect basic facts about the advantages of EVs. They misperceived the purchase price and the expected fuel and maintenance savings (Krause et al., 2013). How the cost from electricity bills from the charge at the public charging station and at home would affect the total operating cost remains unclear to the public (Rezvani et al., 2015).

Although car buyers may want to adopt EVs for the financial gain from fuel economy, the payoff from investing in EVs may be limited if car buyers only use their EVs for a short distance (Degirmenci & Breitner, 2017). The resale price of EVs is a factor that many car buyers pay attention to. They may have resale anxiety (Banerjee & Pillania, 2009; Lim et al., 2014) because the secondary market for EVs is still unpredictable. If there was a lack of demand for second hand EVs, this would result in a low price for second hand EVs.

## 2.2 Research Framework

The conceptual framework is developed from studying the theoretical frameworks related to this research. It is adapted from the theoretical model of 'Environmental concern: an issue for poor or rich' (Teoh & Gaur, 2019), which aims to study and explore the direct and indirect factor attracting customer to purchase Electric Vehicle cars. This research examines Gasoline price, Social influence, Environmental concern and Cost Effectiveness that have an effect on adopting Electric Vehicle cars. The conceptual framework of this study is shown in Figure 2.1
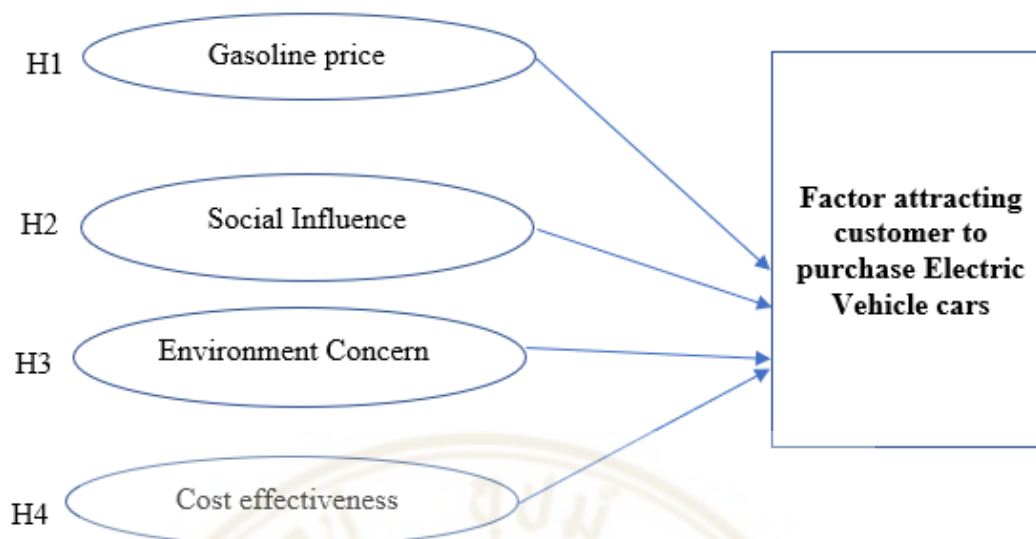
**Figure 2.1 Conceptual Framework**

Hypothesis 1. A positive relationship exists between gasoline price and adoption to buy.

Hypothesis 2. A positive relationship exists between social influence factors and adoption to buy.

Hypothesis 3. A positive relationship exists between environmental concerns factors and adoption to buy.

Hypothesis 4. A positive relationship exists between cost effectiveness factor and adoption to buy.

This study aims to study the factors attracting customer to purchase Electric Vehicle cars toward environment-friendly products like electric vehicle as regards various aspects such as Gasoline price fluctuation, Brand Preference, Environmental concern and Cost Effectiveness in Bangkok, Thailand. In addition, the research investigates the causal relationship between each variable to unveil the influence of these factors affecting adopting EVS car.

# CHAPTER III
# RESEARCH METHODOLOGY

This research will conduct For this study, the researcher used quantitative methods, improper sampling methods, and convenient sampling methods. Based on the research assumption, I would develop a questionnaire for further distribution via online channels aiming for response collection for collecting data from 100 consumers to the target group of Thais living in Bangkok, aged 18 years old and above, with knowledge of electric cars because most of the EV charging stations are in Bangkok. Moreover, focusing on the people who have their own cars and experience of gasoline price fluctuation to obtain different perspectives on the study. Indeed, the majority of electric car users are in Bangkok. The data has been analyzed for factors that attracting customer to purchase Electric Vehicle cars. The questionnaire consists of three parts. The first part includes screening questions to identify the respondents. Secondly, a 5-point Likert scale is used to measure four different variables, ranging from strong disagreement (1) to strong agreement (5) for the analysis of all hypotheses. Finally, questions on demographic factors have been collected based on respondent's gender, age, monthly income, occupation and the most factor that attracting to adopt the EVs cars.

**Secondary resources:** To introduce the conceptual literature of gasoline price fluctuation, I as the researcher will conduct based on past researches, periodicals, articles, published papers and referred previous studies in different countries which have been conducted on the same subject, the Internet sites and the available electronic versions.

**Primary resources:** A questionnaire has been used as a primary tool for gathering data from the customers which will have been done online platform in order to analyze the quantitative characteristics of the phenomena.

## 3.1 Panel Data Regression Model

The panel data regression was chosen for the analysis of EV adoption because this methodology provides various benefits, and overcomes some of the limitations of time-series and cross-section studies (Kennedy, 2003). Panel data can deal with heterogeneity resulting from the variation of some unmeasured explanatory variables that affect the behavior of people in different states. It also overcomes the problem of omitted time-series variables that influence the behavior of people in different states uniformly, but differently in each time period. Panel data alleviates multicollinearity problem by creating more variability through combining the variation across states with variation over time. The equation for a panel data regression is (Washington et al., 2011):
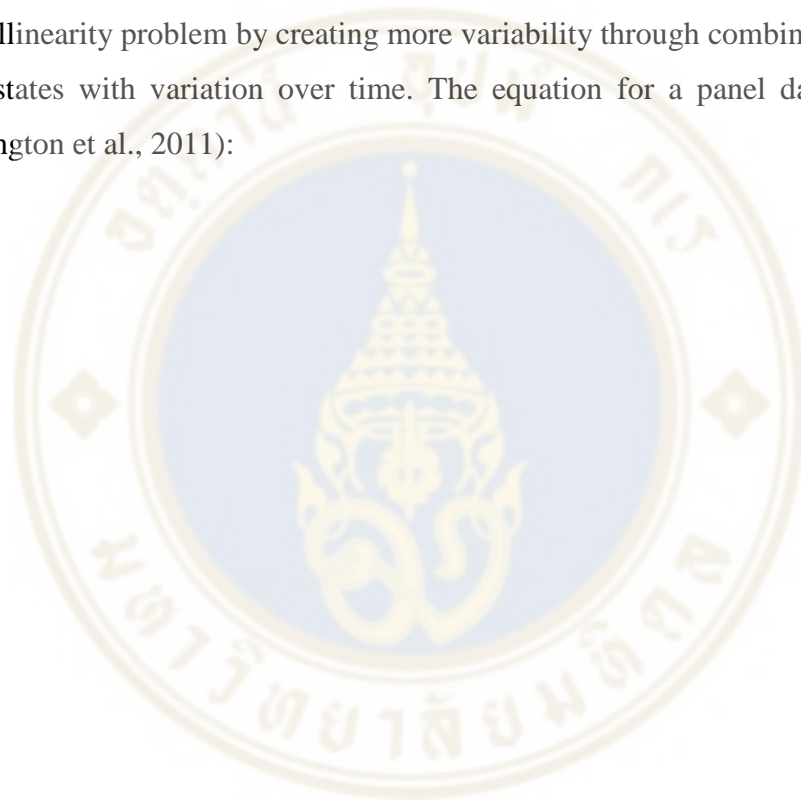
# CHAPTER IV
# ANALYSIS AND RESULTS

## 4.1. Descriptive Statistics of Respondents Constructs

Firstly, the demographic show as the table below of gender, the figure show that female response to survey more than a male account for 61 percent compared to male which has 39 percent.
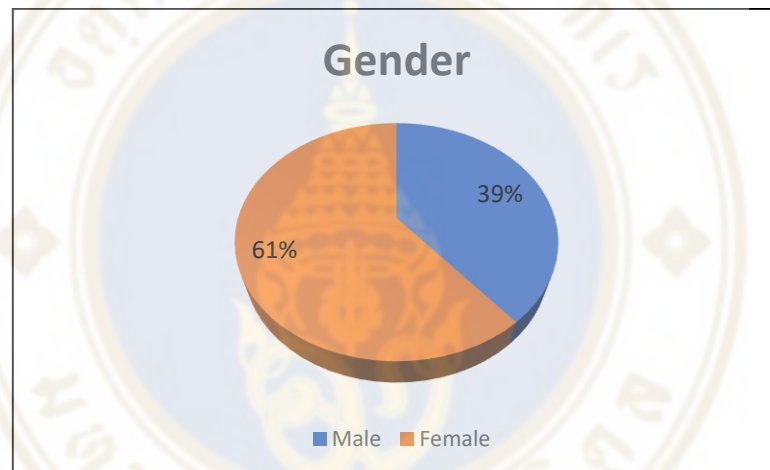


**Figure 4.1 The demographic of gender respondent**

Next is age which the majority of respondent show in age of 30-39 years old accounted for 47 percent, followed by age of 20-29 years old which show the number of 40 percent. The least number is 13 percent in age of 40-59 years old.
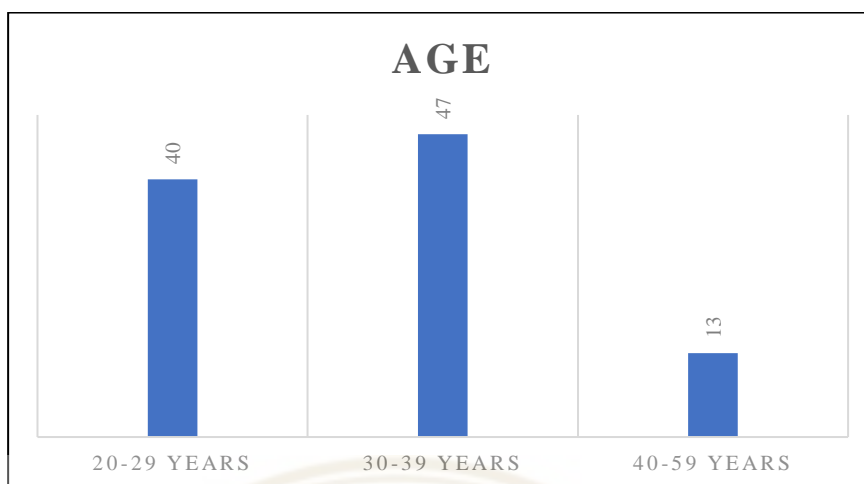
**Figure 4.2 The demographic of age respondent**

Level of education is the significant demographic that can show which level have high interesting in adopting EVs car more. The figure represents that Bachelor degree level have higher number at 27 percent in respondent compared to Master degree that have number only 27 percent.
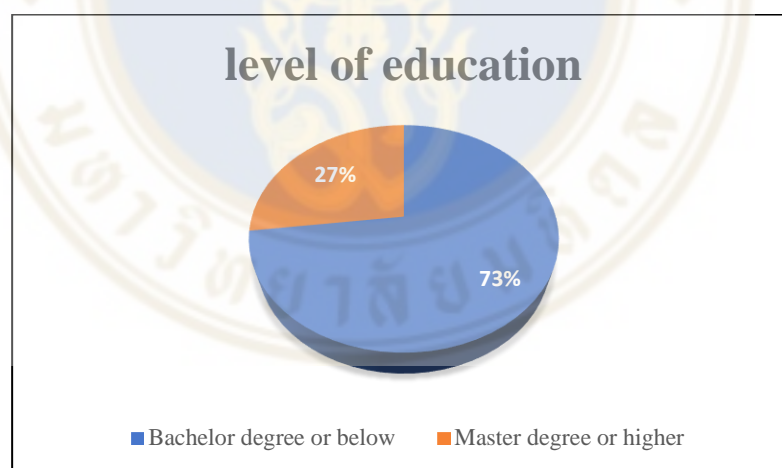


**Figure 4.3 The demographic of level of education respondent**

Next table is the occupation. The majority of number represent of people work in the private company as we did the survey in Bangkok area accounted for 68 percent. Followed by business owner or personal business which have 15 percent and government service or state enterprise employees which have 10 percent respectively. The least number show in work of general employees accounted for only 7 percent.
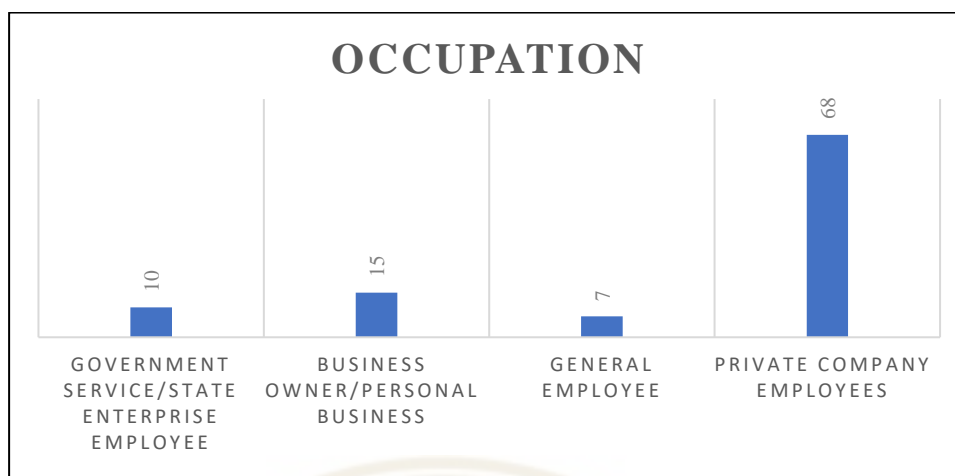
**Figure 4.4 The demographic of occupation respondent**

Lastly demographic is income which can represent the power of purchasing. The significant number show that having 39 percent that have income more than 30,000 to 45,000 Thai baht. Follow by the similar number at 38 percent of below 15,001 to 30,000 Thai baht. the least number show in level more than 45,000 Thai baht accounted for 23 percent.
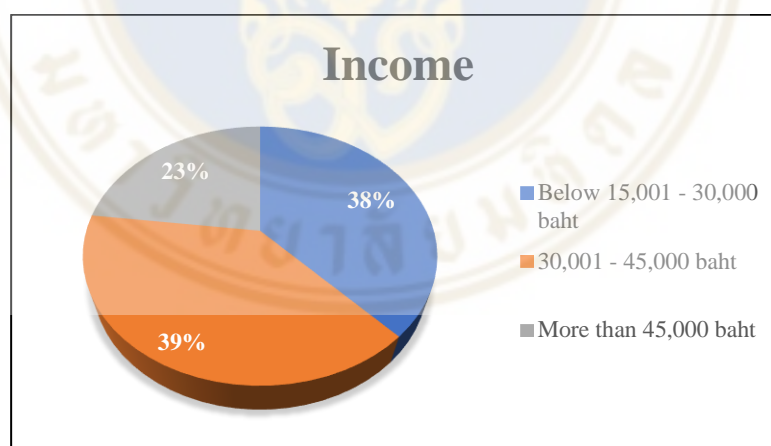


**Figure 4.5 The demographic of income respondent**

The descriptive statistics of respondents are reported in Table 4.1. The majority of respondents were Female (61%), were aged between 30 and 39 (47%), The major marital status is single accounted for 65%, had Bachelor degree or below (73%), were Private company employees (68%), had a monthly income in the range from THB 30,001 to 45,000 (39.%)

**Table 4.1 Descriptive statistics of survey respondents (n = 100)**

| Category | Number | Percentage |
|---|---|---|
| **Gender** | | |
| Male | 39 | 0.39 |
| Female | 61 | 0.61 |
| **Age** | | |
| 20-29 years | 40 | 0.40 |
| 30-39 years | 47 | 0.47 |
| 40-59 years | 13 | 0.13 |
| **Marital status** | | |
| Single | 65 | 0.65 |
| Married | 35 | 0.35 |
| **level of education** | | |
| Bachelor degree or below | 73 | 0.73 |
| Master degree or higher | 27 | 0.27 |
| **Occupation** | | |
| Government service/state enterprise employee | 10 | 0.10 |
| Business owner/personal business | 15 | 0.15 |
| General employee | 7 | 0.07 |
| Private company employees | 68 | 0.68 |
| **Income** | | |
| Below 15,001 - 30,000 baht | 38 | 0.38 |
| 30,001 - 45,000 baht | 39 | 0.39 |
| More than 45,000 baht | 23 | 0.23 |

The descriptive statistics of all variables in the hypothesized model were computed. It was found that there was no missing information. The mean scores indicated positive results for all constructs in Table 4.2. The mean scores show the information that Environment have high score agree in the variable, followed by Cost effectiveness and Price fuel.

**Table 4.2 Descriptive statistics of the constructs (n = 100)**

| Descriptive Statistics | | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| Price Fuel | 100 | 2.00 | 4.00 | 3.0057 | .45806 |
| Social Influence | 100 | 1.40 | 3.80 | 2.7640 | .55877 |
| Environment concern | 100 | 2.33 | 4.00 | 3.3767 | .42218 |
| Cost Effectiveness | 100 | 1.80 | 4.00 | 3.1300 | .41718 |
| Adoption to buy | 100 | 1.00 | 4.00 | 2.4800 | .96901 |
| Valid N (listwise) | 100 | | | | |

Overall, the mean score shows that the respondent gives an important to variable of Environment concern in majority which have mean score 3.3767. followed by the second variable that people have significant influenced to adopt EV cars is cost effectiveness have mean score at 3.1300. The third price fuel which is the key to this research having mean score accounted for 3.0057, it can assume that people will not consider about the fluctuation of the price fuel at the most. The lowest mean score shows in variable of social influence account for 2.7640.

**Table 4.3 Descriptive statistics of the constructs (n = 100).**

| Price Fuel | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Electric cars reduce costs because No need fuel | 100 | 2.00 | 4.00 | 3.2800 | 0.62085 |
| Electric cars have a quieter operation than petrol-powered cars | 100 | 2.00 | 4.00 | 3.2800 | 0.62085 |
| You will not worry about the price of gas when you use an electric car. | 100 | 1.00 | 4.00 | 3.1200 | 0.71464 |
| Do you think that the electric price for electric cars is cheaper than the price of petrol | 100 | 1.00 | 4.00 | 2.9900 | 0.71767 |
| Do you feel that electric cars are more economical in travel expenses compared to petrol. | 100 | 1.00 | 4.00 | 3.1100 | 0.77714 |
| Do you think that the economy will not affect the adjustment of electricity prices. | 100 | 1.00 | 4.00 | 2.3700 | 0.97084 |
| Do you think the price of electricity is less volatile compared to fuel. | 100 | 1.00 | 4.00 | 2.8900 | 0.86334 |

Price fuel defined by the consumers is economical driving. The highest meaning of Price fuel show in "Electric cars reduce costs because No need fuel" which have mean score of 3.28 and "Electric cars have a quieter operation than petrol-powered cars" which have mean score of 3.28 same. Thus, the brand of electric car that provides better economical driving and quieter operation is more likely to be preferred by the consumers to adopt the EV cars.

**Table 4.4. Descriptive statistics of the constructs (n = 100)**

| Social Influence | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| The advice of friends and family contributes to the decision to purchase an electric vehicle | 100 | 1.00 | 4.00 | 2.9600 | 0.80302 |
| You are likely to buy an electric car. If people in the society where you live popular to buy used electric cars. | 100 | 1.00 | 4.00 | 2.7200 | 0.80503 |
| You believe that electric cars will help your social status is more reliable. | 100 | 1.00 | 4.00 | 2.4500 | 0.90314 |
| The use of electric cars makes you feeling of being modern. | 100 | 1.00 | 4.00 | 2.4800 | 0.96901 |
| The use of electric cars makes me feel that there is contribute to reducing air pollution and environmental problems | 100 | 1.00 | 4.00 | 3.2100 | 0.76930 |

The mean score of social influence shows the figure that "The use of electric cars makes me feel that there is contribute to reducing air pollution and environmental problems" have highest mean score of 3.21 it mean that the customer including the influence of society and environmental concerns on the behavior of using environmental friendly products. The second "The advice of friends and family contributes to the decision to purchase an electric vehicle" have mean score of 2.96, It can predicate that social influence, in the sense of influences from family, friends or close people, affects personal attitudes while deciding to purchase or use the service toward products or brands.

**Table 4.5 Descriptive statistics of the constructs (n = 100)**

| Envirionment concern | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| You know that environmental problems in the present have severe effect on Thailand. | 100 | 2.00 | 4.00 | 3.3100 | 0.61455 |
| You are interested in learning about the problem of environment and how to fix as much as possible. | 100 | 2.00 | 4.00 | 3.2600 | 0.59662 |
| Do you think that the source of air pollution is caused by human action. | 100 | 2.00 | 4.00 | 3.5400 | 0.59323 |
| Think of the main cause of pollution The air in Bangkok is caused by the burning of fuel in vehicles. | 100 | 1.00 | 4.00 | 3.4200 | 0.66939 |
| Do you think that the problem of noise pollution in the central business district of Bangkok caused by using a car. | 100 | 2.00 | 4.00 | 3.3200 | 0.61759 |
| One of the reasons you will decide to buy an electric car is because of the technology that Help to protect the environment and energy saving. | 100 | 2.00 | 4.00 | 3.4100 | 0.60461 |

If we looks at the mean score of those having environmental concern will consider products that less harm the environment, the mean score show high significant in all area of question. "Do you think that the source of air pollution is caused by human action" is ranked highest at 3.54 . followed by "Think of the main cause of pollution The air in Bangkok is caused by the burning of fuel in vehicles" have mean score of 3.42. Therefore, environmental conscious consumers would consider fuel efficiency as one of the factors when considering adopting for electric vehicles. The better fuel efficiency, the lesser harm and better preservation of environment.

**Table 4.6 Descriptive statistics of the constructs (n = 100)**

| Cost Effectiveness | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Electric cars reduce the cost of car maintenance because there are few spare parts. | 100 | 1.00 | 4.00 | 3.1200 | 0.75585 |
| You accept the risk that the price of electric cars is higher than petrol cars. | 100 | 1.00 | 4.00 | 2.9300 | 0.72829 |
| Do you think it is worthwhile to use electric cars in the long term. | 100 | 1.00 | 4.00 | 3.0600 | 0.69369 |
| The price of electric cars is worth it. compared to the technology received. | 100 | 1.00 | 4.00 | 3.1000 | 0.68902 |
| If the electric car has a lower price, it will be more interesting to you. | 100 | 1.00 | 4.00 | 3.4400 | 0.65628 |
| Valid N (listwise) | 100 | | | | |

The last one is cost effectiveness variable which is the key to this research as well. The mean score indicates the highest is "If the electric car has a lower price, it will be more interesting to you" which have number of 3.44 mean that people will be more influence to adopt EV cars if the price is lower than current.

## 4.2 Regression Analysis

Regression analysis shows the relationship between each variable based on the model in this study. As we have adoption to buy as a dependent variable, we have two variables which show a significant relationship with adoption to buy.

Adjusted R square: 0.465

**Table 4.7 Descriptive statistics of the constructs (n = 100)**

| Model Summary | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .697[a] | 0.486 | 0.465 | 0.70908 |
| a. Predictors: (Constant), Cost Effectiveness, Price Fuel, Social Influence, Envirionment concern | | | | |

| Model Summary | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .697[a] | 0.486 | 0.465 | 0.70908 |
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**Table 4.7 Descriptive statistics of the constructs (n = 100) (cont.)**

| | | | | | | |
|---|---|---|---|---|---|---|
| **ANOVA**[a] | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 45.194 | 4 | 11.298 | 22.471 | <.001[b] |
| | Residual | 47.766 | 95 | 0.503 | | |
| | Total | 92.960 | 99 | | | |
| a. Dependent Variable: Adoption to buy | | | | | | |
| b. Predictors: (Constant), Cost Effectiveness, Price Fuel, Social Influence, Envirionment concern | | | | | | |

From the Coefficients table, the final result yielded indicates the Price fuel and Social influence has significant relationship with Adoption to Buy. Price fuel has a positive relationship with '.198' beta score. Social influence also has a positive relationship with the dependent variable with a beta of '.672'. The highest meaning of Price fuel topic is "Electric cars reduce costs because No need fuel." And "Electric cars have a quieter operation than petrol-powered cars" with 3.28 mean score. The highest mean score of Social influence topic is "The use of electric cars makes me feel that there is contribute to reducing air pollution and environmental problems." with 3.21 mean score.

**Table 4.8 Descriptive statistics of the constructs (n = 100)**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Coefficients**[a] | | | | | | |
| | | Unstandardized Coefficients | | Standardized Coefficients | | |
| Model | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | -1.111 | 0.677 | | -1.639 | 0.104 |
| | Price Fuel | 0.418 | 0.182 | 0.198 | 2.292 | 0.024 |
| | Social Influence | 1.166 | 0.142 | 0.672 | 8.209 | 0.000 |
| | Envirionment concern | -0.037 | 0.224 | -0.016 | -0.164 | 0.870 |
| | Cost Effectiveness | -0.244 | 0.200 | -0.105 | -1.223 | 0.224 |
| a. Dependent Variable: Adoption to buy | | | | | | |

For the correlation, we found that there are two variable have significant relationship with the dependent variable adoption to buy. First is price fuel with have sig 2-tailed at .002 and follow by Environment concern with have sig 2-tailed at .002.

**Table 4.9 Descriptive statistics of the constructs (n = 100)**

| | | Price Fuel | Social Influence | Envirionment concern | Cost Effectiveness | Adoption to buy |
|---|---|---|---|---|---|---|
| **Correlations** | | | | | | |
| Price Fuel | Pearson Correlation | 1 | .213* | .521** | .283** | .303** |
| | Sig. (2-tailed) | | 0.034 | 0.000 | 0.004 | 0.002 |
| | N | 100 | 100 | 100 | 100 | 100 |
| Social Influence | Pearson Correlation | .213* | 1 | .396** | .358** | .670** |
| | Sig. (2-tailed) | 0.034 | | 0.000 | 0.000 | 0.000 |
| | N | 100 | 100 | 100 | 100 | 100 |
| Envirionment concern | Pearson Correlation | .521** | .396** | 1 | .484** | .303** |
| | Sig. (2-tailed) | 0.000 | 0.000 | | 0.000 | 0.002 |
| | N | 100 | 100 | 100 | 100 | 100 |
| Cost Effectiveness | Pearson Correlation | .283** | .358** | .484** | 1 | 0.184 |
| | Sig. (2-tailed) | 0.004 | 0.000 | 0.000 | | 0.067 |
| | N | 100 | 100 | 100 | 100 | 100 |
| Adoption to buy | Pearson Correlation | .303** | .670** | .303** | 0.184 | 1 |
| | Sig. (2-tailed) | 0.002 | 0.000 | 0.002 | 0.067 | |
| | N | 100 | 100 | 100 | 100 | 100 |

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

## 4.3 Conceptual framework conclusion
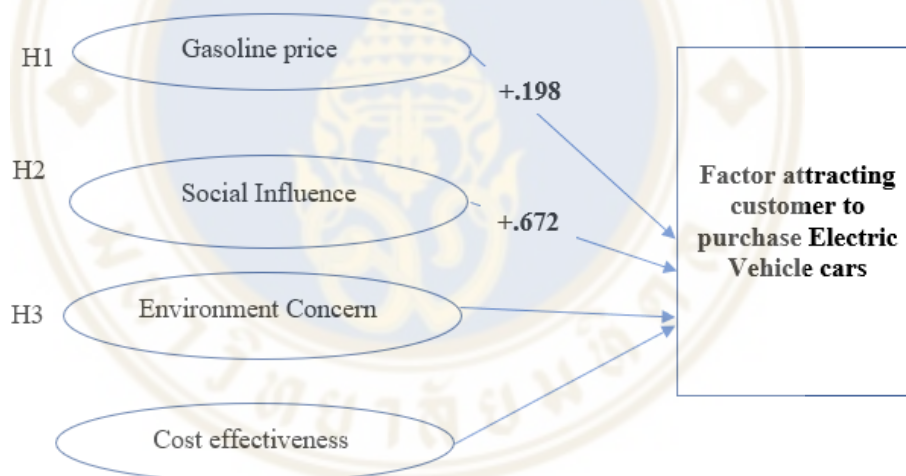


This is our result declared on our hypothesis frameworks. The two factors that have a relationship with our dependent variable are Gasoline price and Social influence. Both of them are positive. Other factors, which are Environment Concern and Cost Effectiveness did not have a significant relationship to the dependent factor.

# CHAPTER V
# CONCLUSION, RECOMMENDATION AND LIMITATION

## 5.1 Conclusion

In this study, the research has expanded the current literature by understanding and investigating the influence of people in adopting EV cars. This research aims to study the factors that affect consumers' attracting toward electric vehicles in Bangkok, Thailand. A total of 100 questionnaires were distributed in Bangkok to Thais who has interest and knowledge of electric vehicles. The conceptual framework was applied from theory and statistics, which consisted of Price fuel fluctuation, social influence, environment concern and cost effectiveness for examining all hypotheses. The outcome of this research was validated to ensure reliability by Descriptive statistics of mean score, regression analysis and coefficient that were used to verify the influence of measuring variables and construct a conclusion of this study.

The research describes all factors affecting influencing of adopting EV cars. When ranked by its effect significance, it would begins with price fuel, social influence and environment which represent the high significantly number in affect influencing of adopting towards environment-friendly products such as electric vehicle consistent with existing studies

The findings of this research show that price fuel fluctuate and environmentally conscious consumers would highly consider the electric vehicle functions and features that would preserve the environment, and economical driving (fuel efficiency). Apart from consumers' environment concern, attitude is another crucial factor that affects consumers' social influence which show high number and beta in regression model. A positive attitude towards environment-friendly products such as electric vehicles is mainly driven by persuasion from their family and friends (social influence) and other aspects of psychological and price effectiveness response to price, convenience, including car functionality. Personal norms for the brand and social influence, are key elements that affect a person's attitude and intentions toward certain

behaviors (Rivis & Sheeran, 2003; Hsu & Lu, 2004). Therefore, any electric vehicle brand that is able to moderate the highlighted fuel efficiency and environment concerns and got recommended from consumers' closed ones would be more preferred over the competitors.

## 5.2 Recommendations

The result of this research indicates factors that brands should consider to impress and receive recognition from consumers. The crucial factors are EV battery efficiency of car operation that will effect using less power and make less pollution of environmentally-conscious consumers and building favorable marketing of attitudes toward environment-friendly electric vehicles, including the battery efficiency that is economical and consumes less petrol. Social influence is a significant factor to persuade environment concerns and build positive attitudes.

Therefore, this research provides recommendations that brands should be involved in development with engineer team to make EV car have the most capacity in batter power. And, for the factor of social influencer marketing as well, such as sponsoring cars to influencers who have numerous followers and huge credibility for test drive and let them review along with promoting brands in their channels. The key message of this promotion should be to emphasize the eco-friendliness (environment concern), performance efficiency (fuel efficiency) and affordable price (cost effectiveness) to create desirable (attitudes) is needed. This would provide product knowledge and create consumers' trust through social influence.

In addition, the brands should be continually improved to create or maintain competitive advantage over the competitors in terms of economical and efficient performance of electric vehicle. This can be done by developing or innovating technologies that respond to the evolving nature and environmental concerns and scarcity.

## 5.3 Limitation and Further Study

This study has certain limitations that should be explored in further research. Firstly, the data covers only the automotive industry, specifically green vehicles. Moreover, the total number of obtained responces is limited compared to the standard of an industry which required 200 respondents. This limitation could be explained with the low number of private EV owners in Thailand. However, the government scheme on supporting EVs, which will take place in the middle of 2022, will possibly increase the number of respondents in the future studies. For this reason, future research should focus on expanding the study and focus on existing electric vehicles users to study the various of factor affects influence adopting EV cars. This will help answer whether the brand preference leads to purchase intention or not by coordinating with more respondents in diverse geographical areas.

In addition, future research should include qualitative surveys such as interviews or focus groups for more reliable and quality data, as electric vehicles tend to be more popular in future. Therefore, research should expand the scope of purchase intention because brand preference would be reflected in purchase intention (Chang & Liu, 2009). Further study can be extended to identify factors that influence purchase intention and factors from brand reference that allow brand owners and marketers to fully understand the way customers consume products. However, factors to be considered should change or being prioritized, such as trust or brand loyalty, for more comprehensive research

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**APPENDICES**

## Appendix A: Questionnaire

You are invited to participate in a survey "Is the gasoline price fluctuation factor attracting customer to purchase Electric Vehicle cars?". The aim of research is to learn the factor and impact from the gasoline price fluctuation factor to customer interesting in the case of adopting EVs car. This survey is a part of my postgraduate degree study, Marketing and Management, College of Management, Mahidol University. Your participation is voluntary. I would be pleased for your participation

This survey would take time to complete approximately 5-10 minutes.

This survey comprises of 4 parts

Part 1: Screening Question (3 questions)

Part 2: General Question (4 questions)

Part 3: Specific Question (23 questions)

Part 4: General Information of respondents (6 questions)

Your responses would not identify your personal information; names, email-address, data are solely used for the academic purposes and concern about your personal securities as priority according to Personal Data Protection Act, PDPA.

**Part 1: Screening question**

1. Have you use a car or not?

- Yes
- No

2. Have you ever interest or thought about purchasing EVs car?

- Yes
- No

3. Do you think about purchasing EVs car in the futures?

- Yes
- No

**Part 2: General questions**

4.  The purpose of adopting EVS cars?

      1) For the convenience of traveling to work/study

      2) For the convenience of tourism

      3) For travel safety

      4) to show social standing and being accepted by society

      5) To avoid using public transport

      6) Others

5. The frequency of car use per week?

      1) 1-2day/week

      2) 2-4day/week

      3) 4-6day/week

      4) Everyday

6. The amount of distance traveled by the vehicle in each day ?

      1)  < 10 Kilometer

      2)  10-30 Kilometer

      3)  31-50 Kilometer

      4)  51-70 Kilometer

      5)  71-90 Kilometer

      6) >90 Kilometer

7. What do you care about the most? when deciding to buy an electric vehicle?

      1) Preference/ appearance

      2) Fairness price

      3) Safety

      4) Charging station

      5) After service

      6) Others (Identify) ...................

## Part 3: Factor Questions

Strongly disagree =1 / disagree =2 / Agree = 4 / Strongly agree = 5

| | **Price Fuel** | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| 1 | Electric cars reduce costs because No need fuel | | | | |
| 2 | Electric cars have a quieter operation than petrol-powered cars | | | | |
| 3 | You will not worry about the price of gas when you use an electric car. | | | | |
| 4 | Do you think that the electric price for electric cars is cheaper than the price of petrol | | | | |
| 5 | Do you feel that electric cars are more economical in travel expenses compared to petrol. | | | | |
| 6 | Do you think that the economy will not affect the adjustment of electricity prices. | | | | |
| 7 | Do you think the price of electricity is less volatile compared to fuel. | | | | |
| | **Social Influence** | Strongly disagree | Disagree | Agree | Strongly agree |
| 8 | The advice of friends and family contributes to the decision to purchase an electric vehicle | | | | |
| 9 | You are likely to buy an electric car. If people in the society where you live popular to buy used electric cars. | | | | |
| 10 | You believe that electric cars will help your social status is more reliable. | | | | |
| 11 | The use of electric cars makes you feeling of being modern. | | | | |
| 12 | The use of electric cars makes me feel that there is contribute to reducing air pollution and environmental problems | | | | |
| | **Envirionment concern** | Strongly disagree | Disagree | Agree | Strongly agree |
| 13 | You know that environmental problems in the present have severe effect on Thailand. | | | | |
| 14 | You are interested in learning about the problem of environment and how to fix as much as possible. | | | | |
| 15 | Do you think that the source of air pollution is caused by human action. | | | | |
| 16 | Think of the main cause of pollution The air in Bangkok is caused by the burning of fuel in vehicles. | | | | |
| 17 | Do you think that the problem of noise pollution in the central business district of Bangkok caused by using a car. | | | | |
| 18 | One of the reasons you will decide to buy an electric car is because of the technology that Help to protect the environment and energy saving. | | | | |
| | **Cost Effectiveness** | Strongly disagree | Disagree | Agree | Strongly agree |
| 19 | Electric cars reduce the cost of car maintenance because there are few spare parts. | | | | |
| 20 | You accept the risk that the price of electric cars is higher than petrol cars. | | | | |
| 21 | Do you think it is worthwhile to use electric cars in the long term. | | | | |
| 22 | The price of electric cars is worth it. compared to the technology received. | | | | |
| 23 | If the electric car has a lower price, it will be more interesting to you. | | | | |

**Part 4: Personal questions** ข้อมูลส่วนตัว

1. Gender

   - Male

   - Female

2. Age

   1) 15-19 years old

   2) 20-29 years old

   3) 30-39 years old

   4) 40-49 years old

   5) 50-59 years old

   6) over 60 years old

3. Status

   1) Single

   2) Married

4. Education level

   1) Bachelor's degree

   2) Master's degree

   3) Others …………

5. Occasion

   1) Government service/state enterprise employee

   2) Business owner/personal business

   3) general employee

   4) private company employees

   5) Others

6. Income

   1. Below 15,000 baht

   2. 15,001 - 30,000 baht

   3. 30,001 - 45,000 baht

   4. More than 45,000 baht