

**MODELING HYBRID CARS ADOPTION USING  
AN EXTENDED VERSION OF THE THEORY  
OF PLANNED BEHAVIOUR**

**VINAYAGAN A/L P KARUPPIAH**

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OF PLANNED BEHAVIOUR**

by

**VINAYAGAN A/L P KARUPPIAH**

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## LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
CB	Covariance-based
f <sup>2</sup>	Effect Size
HTMT	Heterotrait-Monotrait Ratio
LM	Linear Model
PLS	Partial Least Squares Regression
Q <sup>2</sup>	Predictive Relevance
PHEV	Plug-in Hybrid Electric Vehicle
R <sup>2</sup>	Coefficient of Determination
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
SPSS	Statistical Package for the Social Sciences
TPB	Theory of Planned Behaviour

## **LIST OF APPENDICES**

- Appendix A    Survey Form
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**PEMODELAN PENGGUNAAN KERETA HIBRID DENGAN  
MENGUNAKAN VERSI LANJUTAN TEORI TINGKAH LAKU  
TERANCANG**

**ABSTRAK**

Isu pelepasan karbon daripada kereta konvensional telah menyebabkan kebimbangan di Malaysia. Penggunaan kereta hibrid oleh pengguna akan menjadi penyelesaian masalah ini. Maka, kajian ini ingin mengenal pasti faktor-faktor penting yang mempengaruhi hasrat pengguna untuk membeli kereta hibrid di Malaysia. Hal ini akan membantu pihak berkepentingan kereta hibrid untuk membangunkan strategi bagi meningkatkan hasrat pengguna untuk membeli kenderaan tersebut. Bagi membantu dalam pembangunan rangka kerja dalam kajian ini, teori tingkah laku yang dirancang telah digunakan sebagai teori asas, dengan dua teori sokongan, identiti diri dan keselarasan diri. Secara keseluruhannya, enam pembolehubah tidak bersandar telah dimasukkan ke dalam rangka kerja: sikap, norma subjektif, kawalan tingkah laku yang dirasakan, kepekaan terhadap alam sekitar, kepekaan harga, dan identiti diri. Antara pembolehubah tidak bersandar ini, sikap digunakan sebagai pengantara. Manakala moderator utama ialah kepekaan harga, dan pembolehubah bersandar iaitu niat membeli, turut disertakan. Tinjauan itu disebar ke seluruh Malaysia melalui dalam talian, dan data dengan saiz sampel 311 telah dianalisis menggunakan pemodelan persamaan struktur (SEM) melalui “smart PLS 3.0”. Dapatan kajian menunjukkan bahawa semua pembolehubah tidak bersandar - sikap, norma subjektif, kawalan tingkah laku yang dirasakan, identiti diri, dan kepekaan terhadap alam sekitar - mempunyai pengaruh positif ke atas niat membeli

pengguna Malaysia. Tambahan itu, didapati bahawa sikap turut memainkan peranan penting dalam pengantaraan hubungan antara kepekaan terhadap alam sekitar dan niat membeli. Selain itu, sebagai moderator, kepekaan harga didapati melemahkan hubungan positif antara kawalan tingkah laku yang dirasakan dan niat membeli. Penemuan ini penting bagi pihak berkepentingan kereta hibrid dalam membangunkan strategi berkesan untuk mengurangkan sensitiviti harga pengguna, seperti meningkatkan insentif kewangan dan memberikan pelepasan cukai kepada penduduk tempatan, bagi meningkatkan jualan kereta hibrid di negara ini. Akhir sekali, had kajian dan cadangan untuk penyelidikan masa hadapan juga telah dibincangkan dalam kajian ini.

# **MODELING HYBRID CARS ADOPTION USING AN EXTENDED VERSION OF THE THEORY OF PLANNED BEHAVIOUR**

## **ABSTRACT**

Malaysian environmental issues produced by conventional cars have long been a subject of concern, and must be addressed by consumers' adoption of hybrid cars. As a result, the purpose of this study is to identify significant factors influencing consumers' intentions to purchase hybrid cars in Malaysia. Identifying key factors influencing purchase intention will assist hybrid car stakeholders in developing strategies to increase consumers' intention to purchase the vehicles. Following that, theory of planned behaviour was employed as a base theory, with two supporting theories, self-identity and self-congruity, to aid in the development of the framework. In total, six independent variables were included in the framework: attitude, subjective norms, perceived behavioural control, environmental concern, price sensitivity and self-identity. Among these independent variables, attitude was used as a mediator, with price sensitivity as a key moderator and purchase intention as a dependent variable also included. The survey was disseminated across Malaysia via the online, and the data with a sample size of 311 were analysed using structural equation modelling (SEM) via smart PLS 3.0. The findings indicate that all independent variables - attitude, subjective norms, perceived behavioural control, self-identity, and environmental concern - have a positive influence on Malaysian consumers' purchase intention. Additionally, it was discovered that attitude plays a significant role in mediating the relationship between environmental concern and purchase intention. Furthermore, as a moderator, price sensitivity was discovered to weaken the positive relationship between perceived behavioral control and purchase

intention. This finding is significant for hybrid car stakeholders in developing effective strategies to reduce consumer price sensitivity, such as increasing financial incentives and providing tax breaks to locals, in order to improve hybrid car sales in the country. Finally, the present study's limitations and recommendations for future researchers have been highlighted.



# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Introduction**

This chapter discusses about the background of the study, overview of hybrid cars in the Malaysian automotive industry, problem statement, research objectives, research questions, scope of study, significance of study, and definition of key terms. Finally, the arrangement of chapters has been shortly described.

### **1.2 Background of Study**

The world is experiencing crucial environmental problems, such as greenhouse gas emissions, air pollution, climate change and energy scarcity (Bhat et al., 2021; Ghadimzadeh et al., 2015). Environmental protection is one of the greatest concerns worldwide, with governments and companies investing vast amounts of money in private and public initiatives to ensure a better planet. In 2015, almost all countries worldwide established an agreement known as the Paris Agreement, which aims to “combat climate change and strengthen initiatives required for a sustainable low-carbon future” (U.S. News & World Report, 2020). According to the World Resource Institute, China, the European Union, and the United States are the top three greenhouse gas polluters, accounting for more than half of total worldwide emissions (Friedrich et al., 2020). Many sectors contribute to worldwide emissions, including transportation, industry, electricity, and agriculture; however, statistics indicate that the transportation sector has a significant negative impact on the environment when compared to other sectors, and preventive measures must be implemented as top priority actions to save the world (Fan et al., 2018; Raza et al., 2019).

The transportation sector accounted for the largest share (29%) of greenhouse gas emissions in the United States in 2019 (Sources of Greenhouse Gas Emissions, 2021). According to estimates by the International Energy Agency, CO<sub>2</sub> emissions of fossil fuel from the transportation sector will continue to grow 0.6% per year from 2018 to 2050 (Scace, 2020). Apart from that, one of the world's primary energy sources, petroleum, is nearing depletion, primarily due to the transportation sector, which contributes to another environmental disadvantage of the transportation sector (Frumkin et al., 2009) (Impulse, 2021). On the other hand, the transportation industry is considered as vital for the country's social and economic growth since it facilitates trade, provides job opportunities, education, and leisure (Luoma & Sivak, 2012). Taking into account both the positive and negative aspects, there is a need for sustainable mobility, in which the transportation system must support economies without negatively impacting the environment.

Nowadays, due to a variety of factors, there has been a tremendous increase in personal car usage all over the world (Mutiara et al., 2018). A study in the context of understanding individual transport decisions reported that cars served Singaporeans more than utilitarian purposes and were viewed as success symbols and socially desirable status (Chng et al., 2019). In London, car ownership and usage were viewed as a necessity due to a perceived lack of accessible, and alternative transport (Chng et al., 2019). Similarly, Moody & Zhao (2019) noted that cars are imperative in providing personal mobility, sense of freedom, and demonstrating social status and identity. Cars can provide numerous benefits to people, however they can also have possible negative impacts to the environment such as greenhouse effect, deforestation, global warming and waste generation. Research has been undertaken over the last few decades to investigate various aspects of developing sustainable transport technologies to reduce carbon emissions and energy crises. As a result, several forms of

environmentally friendly cars exist in the global market presently, such as electric cars, hydrogen cars and hybrid cars (Wilberforce et al., 2017; Tarigan, 2019).

Electric cars have led the automotive industry to a whole new echelon in zero fuel dependency and increased fuel efficiency (Sang & Bekhet, 2015). However, electric cars infrastructure like charging stations are still lacking in certain nations, especially developing nations like Malaysia where the progress of infrastructure improvement is slow towards electric vehicles. Most notably, it has been shown that the production of electric cars has a global warming potential twice that of conventional cars due to the battery, which consumes a large amount of energy when manufactured, which consumes a large amount of energy when manufactured, resulting in higher emissions. (Qiao et al., 2017) (Eckart, 2017). Apart from electric cars, hydrogen cars have been claimed to have high pricing, low durability, and hydrogen storage issues (Wilberforce et al., 2017). Furthermore, hydrogen emissions have been linked to high methane and ozone burdens, which have the potential to exacerbate global warming (Derwent et al., 2006). Meanwhile, hybrid cars appear to strike the right balance between driving convenience and sustainable solutions for the global challenges of energy scarcity and environmental pollution.

Hybrid cars have a twin-powered engine (electric motor and gasoline engine) that uses both electricity and gas to reduce fuel consumption and preserve energy (Khajenoori, 2016). Unlike electric or hydrogen car drivers who could be stranded for miles due to a lack of charging stations, hybrid car owners do not have to worry about such stations because the dual system seamlessly changes from motor to internal combustion engine when the battery runs out of charge. While it runs on the engine, the regenerative braking system keeps charging the battery (Scott Gable, 2018).

Toyota Prius, the first hybrid mass-produced vehicle, introduced in Japan in 1997 and entered the US market in 2000 (German, 2015). The overall hybrid vehicle market, by volume, is reported to be 4,169 thousand units in 2018 and is expected to grow at a CAGR (Compound Annual Growth Rate) of 8.94% from 2018 to 2025, to reach 7,593 thousand units by 2025 (Hybrid Vehicle Market, 2019). Demand for the hybrid vehicle market is increasing as a result of strict emission regulatory requirements and growing demand for vehicles with low or zero emissions (Hybrid Vehicle Market, 2019). European countries continue to have the largest market share of hybrid cars in the world, while China is the only Asian country with a large market share of hybrid cars and is a significant player in hybrid vehicles adoption globally (Gersdorf et al., 2020). However, statistics indicate the market share of environment-friendly cars such as hybrid cars are still comparatively smaller than conventional cars (Vorrath, 2020). Thus, hybrid cars should be more widely adopted by consumers in order to alleviate environmental issues caused by transportation sector, particularly cars, and to move the world toward a more sustainable economy.

### **1.3 Overview of Hybrid Cars In The Malaysian Automotive Industry**

Malaysia emits 254.6 million tonnes of carbon dioxide and is ranked 25th on the list of countries with the highest carbon dioxide emissions (Tan, 2019). Notably, the transportation sector has been identified as one of the major contributors to high carbon dioxide emissions in this country (Khoo, 2019). Even though the transportation sector's carbon emissions are already high, car sales in the local automotive industry are expected to rise, potentially causing even more carbon emissions to the environment (Malaysian Automotive Association, 2021). This is because the country's economy is expanding in tandem with population growth

(Kondo & Kutani, 2017). Chart 1.1 depicts Malaysian passenger car sales over the last five years, from 2016 to 2020.

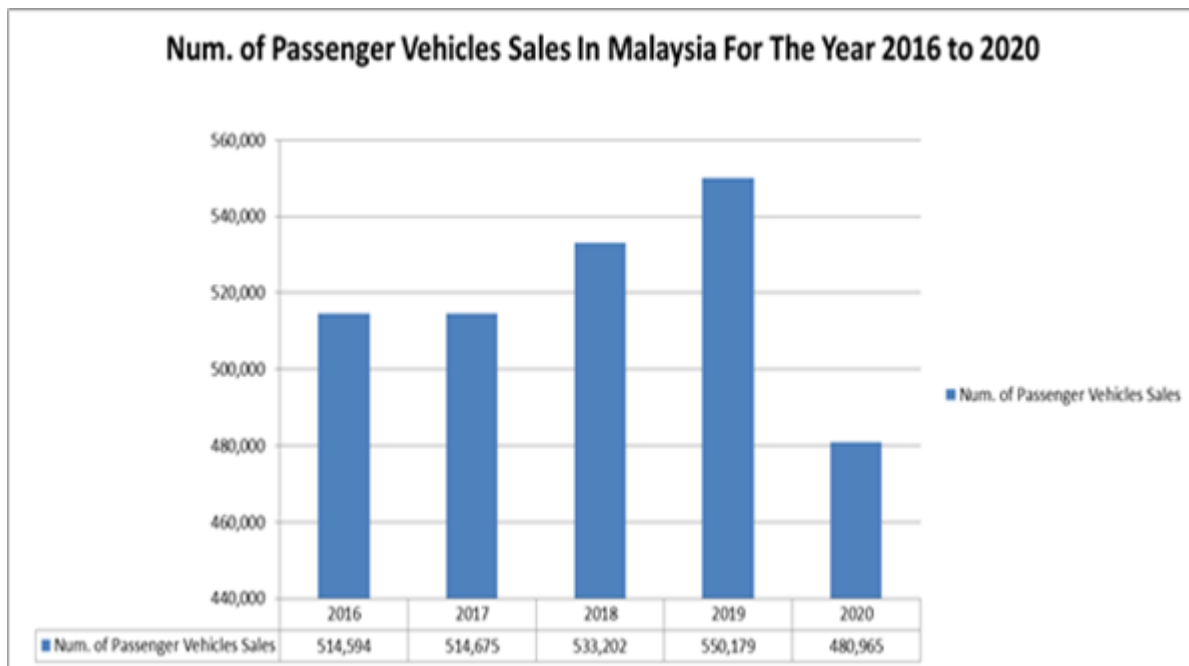


Figure 1.1: Chart of Number of Passenger Vehicles Sales In Malaysia For The Year 2016 to 2020 (Malaysian Automotive Association, 2020).

As shown in the graph above, the sales of the total number of passenger cars increased 6.92 percent for four years in a row, from 2016 to 2019. Following that, sales dropped 12.58 percent from the previous year in 2020, owing to the government's implementation of a movement control order during the pandemic. Even though there is a drop in sales for 2020, the Malaysia Automotive Association estimates that by 2025, car sales will be the highest ever recorded, at 595,890 units (Malaysian Automotive Association, 2021).

The continued rise in car sales, particularly of conventional cars that run solely on gasoline, may impede Malaysia's ability to achieve its environmental policies such as national policy on the environment, national transport policy, national green technology policy, green technology master plan (2017–2030), and national policy on climate change (G. Policies,

2019). The government enacted these environmental policies in order to encourage consumers to purchase environmentally friendly cars, such as hybrid cars, with the goal of reducing carbon emissions from conventional cars. Therefore, in order to achieve the goals of these government environmental policies, consumers should opt for environmentally friendly cars such as hybrids. Consumers, however, do not prefer hybrid cars despite government encouragement through environmental policies, as hybrid car sales continue to be lower than conventional car sales. Above all, the Malaysia Automotive Association report indicates that hybrid car sales have recently decreased by 37% to 13,049 units in 2019 from 20,744 units in 2018 (Yusof, 2020).

Hybrid cars are one of the primary forms of environmentally friendly cars in Malaysia and are generally occupied by mainstream brands such as Honda and Toyota (Tanwir & Hamzah, 2020). Compared to other environmentally friendly cars such as electric or hydrogen cars, hybrid cars are becoming more popular as Malaysians become more aware of their advantages (Adnan et al., 2018). For instance, hybrid cars are more convenient for Malaysians to use than other environmentally friendly cars because they do not require charging stations, which are not prevalent in the country. Despite this, hybrid car sales in Malaysia have consistently been lower than conventional car sales since the hybrid was introduced into the Malaysian automotive market in 2007 (Chai Wen & Mohd Noor, 2015).

To ensure the country's sustainability at its core, hybrid cars, which is one of the green products that represent the automotive industry, are crucial to be adopted more by consumers. The presence of hybrid cars on the market would not only be beneficial to the environment, but it would also provide Malaysia with the possibility to become the ASEAN automotive sector market leader (Medina, 2020). The Malaysian Ministry of Transport is optimistic about

hybrid car sales in the future, as are car manufacturers, who believe hybrid cars are the future cars (Ashaari, 2019; Malaysia, 2021; Cloete, 2019). However, Yunus (2020) predicted that hybrid car sales might become sluggish due to its high price, inadequate government support and lacking new models to stimulate the market. Hence, to boost hybrid cars sales in Malaysia, the car manufacturers, government agencies, and other stakeholders should understand the factors affecting hybrid cars purchase among locals.

#### **1.4 Problem Statement**

There has been a lot of concern about global environmental issues in recent years (Lampert, 2020). Malaysia, like many other countries, should take precautionary measures to protect the environment, as carbon emissions from transportation sector are rising (Najmuddin et al., 2018; Ghadimzadeh et al., 2015). It has been reported that car ownership per person and the high number of car sales are becoming significant issues in Malaysia (The Star Online, 2019; Mordor Intelligence, 2020), which must be addressed. First, in terms of car ownership per person, Malaysia has one of the highest rates in the world, with 54 percent of Malaysian households owning more than one car, making Malaysia the third most car-owning country in the world at 93 percent (Susskind et al., 2020; The Star Online, 2019). Second, in terms of vehicle sales, Malaysia has also seen a significant increase in car sales in recent years, including passenger and commercial vehicles, increased from 2017 to 2019. The total number of vehicles registered in 2017 was 576,625; this increased to 598,714 in 2018 and 604,287 in 2019 (Mordor Intelligence, 2020). High car ownership per person, along with high yearly vehicle sales, can contribute to increased carbon emissions, which can have adverse effects for the environment and, eventually, human health. Meanwhile, Malaysia has pledged to reduce carbon emissions by 45 percent by 2030 (Susskind et al., 2020). However, as previously stated, with high car ownership per person, along with high yearly vehicle sales,

Malaysia could find it difficult to meet its pledge to reduce carbon emissions. In relation to this, the purpose of this study is to delve into the problems of environmental issues, mainly in the transportation sector in Malaysia, by proposing hybrid cars as a solution.

Hybrid cars are not only benefiting the environment in terms of reducing carbon emissions, but it also helps to preserve energy in the world. Unlike hybrid cars, conventional cars solely depend on fossil fuel which causes an energy crisis. According to Howarth, 2019, if fossil fuels (energy) continue to be burned at current rates, it is projected that all fossil fuels will be depleted by 2060. Shifting from conventional cars to environmentally friendly cars, such as hybrid cars, would be the best solution to the energy crisis because these cars are known for their reduced fuel dependency and improved fuel efficiency. Many previous studies have focused on hybrid car purchases, but there are still many uncertainties to be explored, particularly in developing countries such as Malaysia, where hybrid car adoption is still in an early phase (Tanwir & Hamzah, 2020; Neizari et al., 2017). Therefore, a study is needed to explore more about hybrid cars adoption among consumers in Malaysia.

Apart from that, a study reported that Malaysian consumers have low acceptance towards green products compared to their non-green counterparts (Ogiemwonyi et al., 2020). Similarly, a study in the context of the automobile industry suggested that green technology-based vehicles should be advanced further in Malaysia due to consumers' low acceptance rate of environmentally friendly vehicles (Yunus, 2020; Mansor et al, 2014). Likewise, statistics from recent years show hybrid cars sales dropped from the year 2019 to 2018 by 37% between 2019 and 2018 (Yusof, 2020). Findings from previous related studies show that Malaysian consumers are becoming reluctant to adopt environmentally friendly cars, particularly hybrid cars, highlighting the need for deeper research into the subject.



Present study attempts to examine the factors influencing consumers' intention to purchase hybrid cars. Despite the fact that many Malaysians are aware of environmental degradation issues happening nationwide, they still prefer to adopt conventional cars rather than environmentally friendlier cars like hybrids. Therefore, investigating factors influencing consumers' purchase intention would be helpful for hybrid cars stakeholders who are looking to increase the consumers' adoption rate of the vehicles.

Scholars noted that psychological factors are the major factors influencing consumers' purchase intention for green products (Wang et al., 2016; Tan & Goh, 2018; Zhang et al., 2013). Thus, this study adopts TPB by means of psychological factors such as attitude, subjective norms and perceived behavioural control to gauge the purchase intention of consumers towards hybrid cars. Furthermore, the model will be expanded by adding new variables in order to discover more key factors influencing consumers' intentions to purchase hybrid cars, which can further increase the total explanatory power of TPB.

The first additional variable added into the framework is environmental concern, which is known to be a key driver of the consumers' green purchase intention (Verma et al., 2019; Chin et al., 2018). Past studies noted that consumers form positive attitude towards green products due to the influence of environmental concern (Verma et al., 2019; Onurlubaş, 2019; Chin et al., 2018). Besides, scholars reported consumers highly motivated to purchase green products when their environmental concern is high (Li et al., 2019; Chin et al., 2018). In Malaysia, a growing number of environmental issues cause consumers' concern towards the environment to rise, such as pollution, climate change and depletion of natural resources (Statista, 2021a). The government also plays a crucial role in rising consumer concern about

the environment by enacting environmental policies encouraging the purchase of green products, particularly environmentally friendly cars, such as the National Automotive Policy 2020 and the Green Technology Master Plan (2017–2030). Yet, hybrid cars sales are still slow-moving, with a 37 percent reduction in 2019 compared to the previous year (Yusof, 2020). Therefore, there are many uncertainties in regards to this variable, especially in the context of hybrid cars, which should be investigated further.

Next, self-congruity theory suggests that when consumers perceive a product's image as compatible with their own self-image, they are more likely to buy the product (Sirgy, 2018). In the context of green consumption, if consumers perceive themselves as green consumers, their intention to purchase green products would be much higher. According to scholars, consumers in Malaysia buy green products to express their identity as green consumers (Ogiemwonyi et al., 2020; Tan & Goh, 2018). As more consumers started to embrace green products these days, they want to be seen as green consumers, giving them a positive image and personal satisfaction (Moody & Zhao, 2019; Thananusak et al., 2017). Likewise, recent studies in the green purchase context reported self-identity is a strong motivating factor influencing consumers' intention to purchase green products (Carfora et al., 2019; Tan & Goh, 2018). However, since the majority of previous studies focused on self-identity in relation to green products with low consumer involvement, additional information is needed for green products with a high level of consumer involvement, such as hybrid cars.

On top of that, green products are generally costlier than conventional ones due to the general premium (Nguyen et al., 2019). Likewise, hybrid cars in Malaysia are pricier compared to conventional cars in the market due to their premium and high tax structure, imposing great challenge for consumers to adopt the vehicles. Despite the fact hybrid cars are higher in price,

scholars have discovered that consumers' price sensitivity, whether high or low, dictates their intention to purchase (Yue et al., 2020). If consumers are highly price sensitive, they are less inclined to purchase high-priced green products. Conversely, if consumers are low price sensitive, they are more inclined to purchase high-priced green products. In light of this, this study will examine the moderating effect of price sensitivity on the independent variables attitude, subjective norms, perceived behavioural control, and self-identity on purchase intention using the TPB model (Tan et al., 2019). The findings will establish whether price sensitivity acts as a moderator in the relationship between consumers' psychological factors and their intention to purchase hybrid cars.

Overall, the present study will employ an extended version of TPB to examine consumers' intentions to purchase hybrid cars in Malaysia. Aside from examining the main three psychological factors in the TPB model namely attitude, subjective norms, and perceived behavioural control, this study also examines additional variables such as environmental concern, self-identity, and price sensitivity to gauge the purchase intention of consumers towards hybrid cars. The findings of this research will unveil how these psychological factors influence hybrid cars' purchase intention among consumers in Malaysia.

### **1.5 Research Objectives**

Based on the problem statement above, the present study aims to examine the psychological factors influencing consumers' intention to purchase hybrid cars in Malaysia with the purpose of raising the nation's hybrid car adoption rate. Following that, the research objectives are as below:

1. To investigate the key factors influencing consumers' intention to purchase hybrid cars in Malaysia by using the TPB.
2. To examine the relationship of the main components of TPB, which include attitude, subjective norms, and perceived behavioural control, on consumers' purchase intention for hybrid cars.
3. To identify the direct association of the additional variables included in this study, namely self-identity and environmental concern, on consumers' intention to purchase hybrid cars.
4. To investigate the role of attitude in mediating the relationship between environmental concern and consumer purchase intentions for hybrid cars.
5. To determine whether price sensitivity has a moderating effect on the relationship between the independent variables, attitude, subjective norms, perceived behavioural control, and self-identity, and the dependent variable, purchase intention.

## **1.6 Research Questions**

This study aims to address the following questions, along with the previous objectives.

1. What is the relationship between attitude and consumers' intention to purchase hybrid cars?
2. Is there a relationship between subjective norms and consumers' intention to purchase hybrid cars?
3. Does perceived behavioural control influence consumers' intention to purchase hybrid cars?
4. Is there a relationship between self-identity and consumers' intention to purchase hybrid cars?
5. Does environmental concern affect consumers' intention to purchase hybrid cars?

6. Is the relationship between environmental concern and purchase intention mediated by attitude?
7. Is the relationship between attitude and purchase intention moderated by price sensitivity?
8. Is the relationship between subjective norms and purchase intention moderated by price sensitivity?
9. Does price sensitivity moderate the relationship between perceived behavioural control and the purchase intention?
10. Does price sensitivity moderate the relationship between self-identity and the purchase intention?

## **1.7 Significance of Study**

### **1.7.1 Theoretical Contribution**

Present study proposes the hybrid car adoption rate among Malaysians should grow more to mitigate the environmental risks caused by conventional cars. Studies in regards to hybrid cars were mainly conducted in western nations, with the focus of studies published on various aspects of consumers' adoption (Christidis & Focas, 2019; Higuera-Castillo et al., 2020; Liu et al., 2017). The findings cannot be generalised to Asian countries like Malaysia as consumer behaviour of Asian is heterogeneous due to cultural differences (Sann et al., 2020). As a result, the present study seeks to investigate Malaysians' consumer behaviour, particularly their purchase intention in the context of hybrid cars. Based on Malaysians' constantly changing consumption patterns, examining their current purchase intention will help organise the most up-to-date market information that will benefit hybrid car stakeholders who are looking to increase the vehicle sales.

Past studies in the green purchase settings reported TPB is appropriate to examine consumers' purchase intention (Neizari et al., 2017; Chaudhary & Bisai, 2018; Tan & Goh, 2018). Meanwhile, scholars have identified psychological determinants in TPB; attitude, subjective norms, and perceived behavioural control play a significant role in consumers' intention to make a green purchase (Policarpo & Aguiar, 2020; Tarigan, 2019). Following that, Wang et al., (2016) used the TPB model and found that psychological determinants in TPB have a significant effect on adoption intention of environmentally friendly cars. The results of the study verified that the TPB model is an appropriate theory to predict environmentally friendly behavioural intention, particularly in the context of environmentally friendly cars. Therefore, this study employed TPB to examine key factors that influence consumers' intention to purchase hybrid cars in Malaysia. Besides adding the main three psychological predictors of TPB, namely attitude, subjective norms, and perceived behavioural control, this study adds additional variables like self-identity, environmental concern, and price sensitivity to enrich the explanatory power of TPB. The study's findings will assist relevant authorities in developing appropriate initiatives to increase hybrid cars adoption among Malaysian consumers.

Self-identity is one of the additional variables incorporated in the present study to bridge the literature gap. Self-identity comes from Stryker's identity theory (Stryker & Burke, 2000), useful to understand and predict behavioural intention. Likewise, past studies in the context of green purchase behaviour reported self-identity has a strong correlation with consumers' purchase intention (Carfora et al., 2019; Patel et al., 2020). It is also noted as an essential factor driving consumers, specifically in Asian countries like Malaysia, to become pro environmentalists (Ogiemwonyi et al., 2020). However, previous research focused primarily on this variable in western nation contexts, with a greater emphasis placed on low

involvement green products such as organic milk (Carfora et al., 2019), eco-friendly apparel (Tung et al., 2017), green cosmetics (Altabbaa & Ors, 2019), bioplastics products (Confente et al., 2020), etc. Therefore, the current study contributes to the literature by exploring self-identity in the Malaysian setting, focusing on a product that has a high level of consumer involvement, hybrid cars.

Apart from that, environmental concern is widely acknowledged as the main motivator for consumers' intention to purchase green products (Verma et al., 2019; Chin et al., 2018). Although studies proved environmental concern influences consumers' purchase intention directly (Ahmad & Thyagaraj, 2015; Yadav & Pathak, 2016), it has also been discovered that this variable influences attitude first before affecting the intention. Adnan et al. (2018) provided empirical evidence that environmental concern plays an important role in forming positive attitude on consumers, subsequently influencing their purchase intention. In Malaysia, studies show consumers' environmental concern is on the rise (Adnan et al., 2017). However, hybrid cars sales in Malaysia show contradicted results with a significant drop in recent years instead of an increase in line with growing environmental concern (Yusof, 2020). Taking this into consideration, the current study will shed light on how environmental concern influences consumer purchase intentions for hybrid cars in Malaysia. According to scholarly suggestions, the relationship between environmental concern and purchase intention would be conducted both directly and indirectly, with attitude serving as a mediator in the indirect relationship.

Next, inclusion of price sensitivity into the research framework is to further examine whether this factor moderate the links between the antecedents of the TPB and the purchase intention of consumers towards hybrid cars. Since hybrid cars are significantly more expensive than

conventional cars, affordability has become a main concern among Malaysians (Jayaraman et al., 2015). However, some consumers who have a low price sensitivity to green products reported that they would still purchase them despite the high cost (Tan et al., 2019). Taking a different perspective, only a limited number of studies considered price sensitivity as a moderator, instead of causal antecedents, of the pro-environmental behavioural intention formation model. Hence, this study, in the context of hybrid cars, examines the moderating effects of price sensitivity among TPB determinants such as attitude, subjective norms, perceived behaviour control, and self-identity on consumers' purchase intention.

The incorporation of the aforementioned research angles into a new perspective is the study's main contribution to understand the key factors influencing consumers' intentions to purchase hybrid cars in Malaysia.

### **1.7.2 Managerial Contribution**

The rationale of present study is to determine key factors influencing consumers' intention to purchase hybrid cars in Malaysia. This study's valuable insights would benefit many stakeholders of hybrid vehicles, such as car manufacturers, government, and policymakers.

First, the present study would provide more valuable information about consumer behaviour in hybrid cars context for the local and foreign car manufacturers. Understanding consumers' behaviour, specifically their real needs and preferences, is crucial for car manufacturers to formulate the effective marketing strategy to boost hybrid cars' sales in the nation. On top of that, unlike conventional cars, Malaysia's local automotive market is dominated by a small number of hybrid car models for consumers to choose from, such as Toyota Prius, Honda Jazz, Honda City Hybrid. Thus, more options are needed in order for consumers to choose the



vehicles based on their individual needs and preferences (Yunus, 2020). Concerning this, current study's insights would help car manufacturers to position and market the hybrid cars in line with consumers' real needs and preferences, which could eventually result in sales growth of hybrid cars in Malaysia. When the sales are higher, hybrid car manufacturers are able to stay ahead of their other conventional car competitors in the local automotive industry.

Malaysia government has announced several policies such as National Automotive Policy 2020, and Green Technology Master Plan (2017–2030) to encourage consumers to adopt environmentally-friendly cars like hybrid cars. For the national automotive policy (NAP), the government's incentives for hybrid vehicles are still yet to be finalised to date (Lee, 2020). Therefore, this study will be a great reference for the government to incorporate useful inputs when establishing hybrid cars' incentives. Meanwhile, Malaysia's government has made a strong commitment to have all newly registered vehicles be hybrid or electric vehicles, with the goal of reducing greenhouse gas emissions by 45 percent by 2030 (Susskind et al., 2020). In order to make the government's plans succeed, an understanding of the consumers' behaviour in the context of hybrid vehicles is crucial in the first place. With a deeper understanding of consumers' behaviour, the government can plan their strategy accordingly to increase hybrid cars' adoption rate. Therefore, this study would ensure the progress of achieving the government's objective could run more effectively, resulting in a greener country.

Green consumption is also reported to be less in Malaysia compared to western countries (Hamzah & Tanwir, 2021). Therefore, Malaysians should embrace more green product consumption, which would not only benefit the environment but also strengthen nations'

economies (Adnan et al., 2017). The growth of hybrid cars sales would lead to more development of upstream and downstream businesses in the automobile industry, followed by the creation of more job opportunities. Hence, insights from the present study would be essential for public policymakers, precisely like Ministry of Transportation, Ministry of International Trade and Industry, Malaysian Automotive Association who are responsible for environmental protection in Malaysia, to formulate relevant policies or provide awareness through education campaigns or other communication platforms such as television, social media in order to encourage consumers purchasing hybrid cars.

### **1.8 Scope of Study**

As Malaysia is plagued by various environmental problems caused by the transportation sector, this study would like to propose hybrid cars as a solution to reduce the impact on the environment. Despite knowing the environmental issues happening nationwide, Malaysian consumers still prefer to adopt conventional cars rather than eco-friendlier cars like hybrid cars. Thus, the present study would like to examine the key factors influencing consumers' intention to purchase hybrid cars in order to increase the hybrid car adoption rate among Malaysians. Hybrid car stakeholders could use the present research findings as an input to increase the adoption rate among consumers. First, the relationship among psychological variables of TPB, namely attitude, subjective norms, and perceived behavioural control, would be studied with consumers' purchase intention towards hybrid cars. In order to bridge the literature gap, self-identity was added as an additional variable to gauge the purchase intention of consumers. Furthermore, environmental concern has been included to investigate its direct and indirect effects on consumers' purchase intention for hybrid cars, with the indirect effect being tested using attitude as a mediator. Moreover, price sensitivity is added as a moderator with the purpose of investigating its moderating role among the independent

variables (attitude, subjective norms, perceived behaviour control, self-identity) and dependent variable (purchase intention) in this study. Respondents for data collection would be Malaysian car drivers who hold a valid driving licence and reside in any state in Malaysia. They must also be at least 20 years old and have a monthly income of at least RM3000. Online questionnaires will be distributed to target respondents in Malaysia, and the data will be analysed through Smart PLS software to verify the hypotheses.

## **1.9 Definition of Key Terms**

### **1.9.1 Attitude**

It is one's evaluation about a certain behavior, whether it's favorable or unfavorable (Ajzen, 2020; Ajzen, 1991).

### **1.9.2 Subjective Norms**

Subjective norms are social pressure perceived by an individual to behave in a certain way. It is also known as the extent to which an individuals' perception that most people who are important to him/her such as family, friends, and colleagues think that he/she should perform or not perform a certain behaviour (Ajzen, 2020; Ajzen, 1991).

### **1.9.3 Perceived Behavioral Control**

Perceived behavioural control is the availability of the necessary resources and opportunities to perform a specific behaviour (Ajzen, 2020; Ajzen, 1991).

### **1.9.4 Environmental Concern**

Environmental concern is the extent to which people are aware of environmental issues and are willing to contribute their efforts to solve them (Hamzah & Tanwir, 2021; Dunlap & Jones, 2002).

### **1.9.5 Self-Identity**

Self-identity refers to the self-perception of an individual on how he/she thinks of themselves (Stryker & Burke, 2000). This self-perception of oneself is noted to have an effect on consumers' buying decisions and patterns such as buying green products that reflect their personality, beliefs, and social standing.

### **1.9.6 Price Sensitivity**

Price sensitivity is the degree to which a product's price influences consumers' buying decisions. Consumers' low price sensitivity positively affects green purchase behaviour, and conversely, consumers' high price sensitivity negatively affects green purchase behaviour (Joshi & Rahman, 2015).

### **1.9.7 Purchase Intention**

Purchase intention is an evaluation that consumers perform before purchasing a product (Peña-García et al., 2020). Higher purchase intention denotes a high likelihood of actual behaviour would be performed (Ajzen, 1991).

### **1.10 Organization of Chapters**

Chapter one discusses background of study, problem statement, research objectives, research questions, and significance of study, including theoretical and managerial contributions, scope of study, and definition of key terms.

Chapter two presents underlying theories in relation to the variables discussed in this study, a summary of important literature reviews based on past studies, literature gap, formation of theoretical framework and lastly hypotheses development.

Chapter three is about the method used by this study to conduct research. For instance, research paradigm, research design, analytical tools, research setting, and target population will all be thoroughly discussed.

Chapter four highlights the analysed data results and tests the hypotheses established in the earlier stage of the present study.

Chapter five sums up the conclusion of the present study. The limitation of study would be discussed, followed by suggestions for future research in this chapter.

### **1.11 Summary**

Finally, the TPB model is extended by including additional variables such as environmental concern, self-identity, and price sensitivity. In addition, research questions and objectives were defined. The conceptual framework and hypotheses will be discussed in detail in the following chapter.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter primarily addresses the study's underlying theories, framework development, and hypotheses. An extended version of the TPB is used as the main theory to investigate consumers' purchase intention towards hybrid cars.

#### 2.2 An overview of environmentally friendly cars, and some theoretical considerations

The world is experiencing crucial problems such as environmental pollution, global warming, declining fauna and flora caused by rapid industrialisation and new technological advancement. Developed nations have already started to realise the threat of environmental damages in the early 1970s (Du et al., 2018) and are striving towards minimising ecological repercussions. Meanwhile, developing nations also do their part in preserving the environment these days by promoting sustainability. As a result, consumer concern about the environment has grown, motivating them to embrace green products for environmental protection. Along with consumers' demand, many businesses are aggressively marketing green products in order to obtain a competitive advantage through cost reduction, increased profitability, and improved environmental performance (Moravcikova et al., 2017).

As time goes by, carbon emissions from the transportation sector begin to grow at a phenomenal rate than any other sector, paving the way for the emergence of environmentally friendly cars in the market. Studies were conducted to examine consumers behaviour in the context of environmentally friendlier cars by adopting many different theories such as theory of consumption value (Kim et al., 2018), actor-network theory (Sovacool, 2017), self-determination theory (Globisch et al., 2018), technology acceptance model (Müller, 2019)

and TPB. However, TPB is predominantly utilised by numerous studies and the findings proved it is appropriate to investigate consumers' behaviour in hybrid cars context (Tanwir & Hamzah, 2021; Adnan et al., 2018; Neizari et al., 2017). Therefore, the present study adopts TPB as a base theory to predict consumers' purchase intention, followed by another two supporting theories, namely identity theory and self-congruity theory, to support the framework development. Identity theory and self-congruity theory explain the self-identity concept which has been included in this study as a significant predictor of consumers' intention to purchase hybrid cars.

## **2.3 Underlying Theories**

### **2.3.1 Theory of Planned Behaviour (TPB)**

Icek Ajzen (1991) established the TPB as a broad model for predicting one's intention to engage in behaviour. According to this theory, the stronger the intention to engage in behaviour, the more likely the behaviour will be carried out. The TPB model is an outgrowth of Hill et al., 1977's Theory of Reasoned Action (TRA), which adds perceived behavioural control (PBC).

TPB has been found to be useful in predicting consumer behaviour intention in a variety of research settings, such as healthy eating intention (Malek et al., 2017), charity giving intention (Mittelman & Rojas-Méndez, 2018), and willingness to adopt grey water treatment technologies (Oteng-Peprah et al., 2020). In specific, it proved its applicability and robustness in the context of green purchasing behaviour of consumers such as green hotel visit intention (Verma & Chandra, 2018), organic products purchase intention (Ghali-Zinoubi & Toukabri, 2019), eco-friendly cars purchase intention (Adnan et al., 2018) and energy-efficient products

purchase intention (Tan et al., 2017). As a result, TPB would be the most appropriate framework to explain the consumers' hybrid car purchase intention in the present study.

The TPB emphasises that human behaviour is driven by three kinds of consideration: behavioural belief, normative belief, and controlled beliefs. Behavioural beliefs are beliefs about the possible outcomes and experiences associated with the behaviour. Next, normative beliefs are beliefs about the normative perceptions and behaviours of significant others, whereas control beliefs are individual beliefs of the presence factors that might facilitate or impede behaviours' performance. In their respective aggregates, behavioural beliefs create a favourable or unfavourable attitude toward behaviour, normative beliefs result in subjective norms and control belief contribute to perceived behavioural control (Ajzen, 1991).

The theory also noted that behavioural intention is formed by combining three primary variables: attitude, subjective norms, and perceived behavioural control. Perceived behavioural control influences actual behaviour, both directly and indirectly, via behavioural intention. Overall, positive attitude and subjective norms, together with better perceived behavioural control, result in a larger intention to perform the behaviour. Finally, when people have a sufficient degree of actual control over their behaviour, they are expected to carry out their intentions when chances such as skills, resources, and other prerequisites needed to perform the behaviour arises.