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THE FACTORS INFLUENCING ADOPTION OF ELECTRIC VEHICLE AMONG CAR USERS IN MALAYSIA

BY

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DECLARATION

We hereby declare that:

(1)This undergraduate FYP is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2)No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3)Equal contribution has been made by each group member in completing the FYP.

(4)The word count of this research report is 10952 words.

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DEDICATION

The results of several, difficult sacrifices have gone into this study. We sincerely and proudly dedicate this work, which was made possible by the researchers' efforts, to all the individuals who have inspired us. We are appreciative of the professors and staff at Universiti Tunku Abdul Rahman, as well as our parents, students, and friends, who helped us out while we were having trouble with this assignment.

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LIST OF ABBREVIATIONS

AEV	Adoption of Electric Vehicle
BEV	Battery Electric Vehicle
CIA	Charging Infrastructure Accessibility
DOI	Diffusion of Innovation
DV	Dependent Variable
EA	Environmental Awareness
EV	Electric Vehicle
FB	Financial Benefit
GI	Government Intervention
HEV	Hybrid Electric Vehicle
IV	Independent Variable
MRA	Multiple Regression Analysis
PHEV	Plug-in Hybrid Electric Vehicle
SI	Social Influence
SPSS	Statistical Package for Social Science
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology

VBN	Value-Belief-Norm Theory

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PERFACE

The automobile industry worldwide has experienced a notable transition towards sustainability in recent times, with electric vehicles (EVs) surfacing as a viable substitute for conventional internal combustion engine vehicles. Malaysia, a country that is developing quickly, is leading this shift. In recent years, Malaysia has also begun to introduce different styles of electric vehicles and it is crucial to comprehend the elements impacting Malaysian car users' adoption of electric vehicles (EVs) as the country's automotive scene changes. The goal of this study project is to thoroughly examine the factors that influence car users' decision making on adoption of Electric Vehicles, such as environmental awareness, social influence, charging infrastructure accessibility, government intervention, and financial benefit. Additionally, this study seeks to throw light on these variables to provide policymakers, industry stakeholders, and researchers with useful information that can accelerate the adoption of EVs and promote a sustainable automotive future in Malaysia." Therefore, the topic of this study is "The Factors Influencing Adoption of Electric Vehicles among Car Users in Malaysia."

ABSTRACT

The gradual increase in car users in Malaysia has led to an increase in carbon emissions, which has become a matter of concern. Besides, EVs have just entered the Malaysian market in recent years and can serve as an alternative to conventional cars. Therefore, the purpose of our research is to examine the factors influencing adoption of EV among car users in Malaysia. The Theory of Reasoned Action (TRA) was used in the current study to provide a conceptual framework for understanding the factors that contribute to the adoption of EV by Malaysian car users. Based on the reference model, the variable includes environmental awareness (EA), social influence (SI), and three additional variables which were charging infrastructure accessibility (CIA), government intervention (GI), and financial benefit (FB) to examine whether they have the impact adoption of EV. In addition, a total of 298 eligible respondents were successfully collected for analysis in our study. We also utilized the Statistical Package for the Social Sciences (SPSS) as the data analysis tool for our study. Moreover, the findings in this study shows that there are four of the IVs including social influence (SI), charging infrastructure accessibility (CIA), government intervention (GI), and financial benefit (FB) have a significant impact on EV adoption, while only environmental awareness (EA) has no significant impact. Finally, this study offers scholars a fresh viewpoint and a more profound comprehension of the variables influencing Malaysian car users' adoption of EV. As a result, this study can serve as a reference for other researchers in the future.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

This study examines the variables influencing Malaysian drivers' adoption of electric vehicles. In the Chapter 1 will be discussed about the background, problem, objective, and significant of the study.

1.1 Research Background

Today, cars play a very important role by giving car users the freedom to move around without restriction. According to Wangsness et al. (2020), car owners can enjoy the right to avoid sharing with others, which is why many people want to own a car of their own. Malaysia currently has the most significant number of cars in Southeast Asia, confirming that most Malaysians are car users and that the demand for vehicles in Malaysia continues to grow (Ismail et al., 2023). According to Transport Minister Loke Siew Fook mentioned that the number of registered automobiles has surpassed the population in Malaysia (Daim, 2023). Additionally, he said that although there are currently 32.4 million people living in Malaysia, there are more than 36.3 million registered automobiles. The above data also shows that the number of car users in Malaysia is more than the total population and is constantly increasing.

According to Toolib et al. (2023), it is commonly accepted that carbon emissions and climate change are the two biggest issues facing the world today. Since growing quantities of greenhouse gases, such nitrous oxide and carbon dioxide, are the primary driver of climate change, these phenomena will also have a direct negative impact on natural ecosystems. (Langsdorf et al., 2022). Much of the world's

transportation relies on fossil fuels, 92% of which comes from petroleum. Kumar et al (2024) stated that these vehicles run on fossil fuels like gasoline and diesel, which contribute significantly to climate change by releasing massive volumes of carbon dioxide, methane, and nitrous oxide into the environment. Besides, Tu & Yang (2019) also mentioned that one of the primary factors to cause the climate change is the rise in car ownership, which has surpassed one billion units worldwide and utilizes more than 60 million barrels of oil per day. Transport accounts for global CO2 emissions and is expected to increase from 25% to 50% by 2035, with most CO2 emissions coming from cars and small trucks (McCollum et al., 2018). As the number of motor vehicles continues to increase, it will bring a series of environmental problems, including carbon dioxide emissions and air pollution (Manisalidis et al., 2020). Therefore, switching to vehicles powered by alternative energy sources instead of conventional ones may be seen as a useful option (Tu & Yang, 2019).

Electric vehicles (EVs) are vehicles powered by one or more electric motors to ensure that the vehicle can be propelled or driven with zero exhaust emissions and are also a viable socio-technical solution for the sustainable development of the transportation industry, especially for road passengers (Corradi et al., 2023). By connecting seamlessly to the grid, EV promise to minimize (or even eliminate) dependence on traditional fuels such as gasoline and diesel (Toolib et al. 2023). The EV revolution is about to bring about a major shift in the automotive industry, driven by the need to decarbonize personal transport and at the center of global goals to reduce greenhouse gas emissions and improve urban air quality (Toolib et al. 2023). There are 3 types of EVs in Malaysia, namely Battery Electric vehicles (BEV), Hybrid Electric vehicles (HEV), and Plug-in Hybrid Electric vehicles (PHEV) (Veza et al., 2022). Through the technology of EVs, it can not only reduce carbon emissions, air pollution, but also reduce vehicle noise, which has great potential to become a substitute for traditional cars (Jansen & Petrova, 2023).

Nowadays, the EV market has begun to go global and has gradually become a trend (Dioha et al., 2022). The total number of EVs globally, almost zero in 2010, has

increased to over 16 million in 2021 (IEA 2022). As the IEA suggests in its Global Electric Vehicle Outlook 2021, global EV ownership is growing and is projected to reach 145 million units by 2023, or 7% of total vehicle ownership (IEA 2021). The worldwide sales of EVs from 2016 to 2021 are shown in Figure 1. Bases on the figure 1 shows that the number of EVs sold worldwide is trending increasing. Besides, it also demonstrates that China, Europe, and the United States are the industrialized areas of the globe where the majority of the world's EV fleet is based which accounted for 95%; the remaining 5% went to emerging nations like Brazil, India, and Indonesia (Dioha et al., 2022).

With the rise in awareness of the need to protect the environment, green transport systems are being implemented worldwide to reduce carbon emissions. Therefore, Malaysia has also begun to convince car users to switch from conventional fuel vehicles to EVs and is heading towards an EV revolution (Hamzah et al., 2021). Malaysian government is now also very concerned about this series of issues affecting the environment and is actively achieving its low-carbon emission goals in accordance with the "Low Carbon Emission Standard". In addition, Malaysian government has also formulated a low-carbon travel blueprint for 2021-2030 to ensure that Malaysia's carbon emissions can be reduced (New Straits Times, 2021). The EV market is relatively new to Malaysia, but Malaysia has also begun to introduce various EVs in recent years. According to the year report for Malaysian Automotive Association, the total sales of EV in 2023 is 799731 units sold which has comfortably beat the 2022 total of 721,177 (EV Sales in Malaysia,2024). Based on Figure 2 below, the data shows that the adoption rate and sales of EVs in Malaysia are expected to increase dramatically by 2023, reaching 82% and increasing sales to approximately 5,840 units per year (Murugiah, 2023). This data also shows that Malaysia has begun to introduce more EVs and is driving the trend of the entire market. According to New Straits Times (2023), the well-known American EV company Tesla just formally unveiled its best-selling Model Y sport utility vehicle in Malaysia. Besides, Malaysian government has offered numerous incentives for the users of EV to support more customers to adopt on EV. For instance, until December 31, 2025, all newly registered CBU EVs will be completely exempt from import taxes and consumption taxes. Additionally, EV

owners will enjoy a 100% road tax exemption and can apply for personal income tax relief of up to RM2,500 and rental tax relief of up to RM300,000 for businesses leasing non-commercial EVs (Malaysia Considering One-off Subsidy for EV Purchase, 2024).

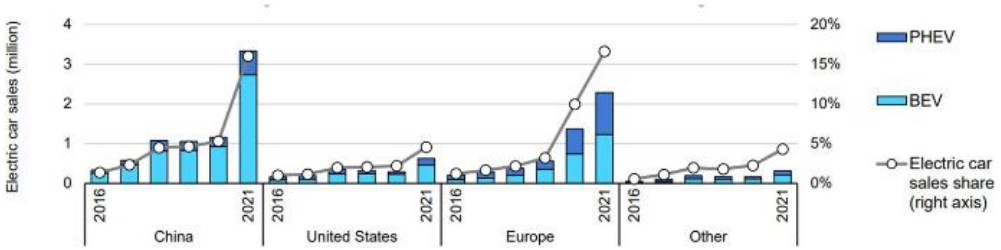

Figure 1.1: Worldwide Sales of EVs from 2016 to 2021.

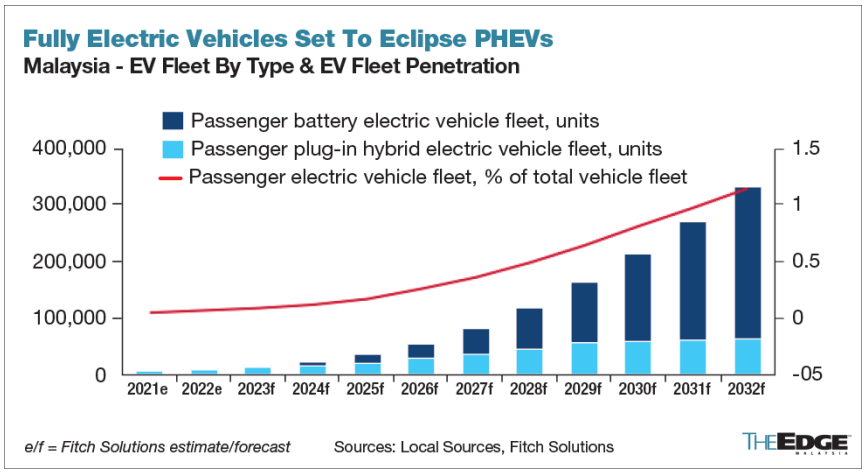

Figure 1.2: The adoption rate and sales of EV in Malaysia

1.2 Research Problem

Due to the sharp increase in the number of car users, the carbon emitted by the large number of vehicles has seriously pollute the air (Tu & Yang, 2019). Global warming and climate change have severely damaged the atmosphere and the impacts of these global warming have also made countries around the world begin to be more vigilant and find effective ways to reduce carbon emissions (Kim et al., 2020). The transportation industry is also considered to be the fastest and most carbon dioxide emitter, so the issue of reducing carbon emissions to control global warming has become the focus of various countries (Kim et al., 2020). Moreover, experts say that using zero-emission EVs could significantly reduce greenhouse gas emissions and the exploitation of natural resources due to oil dependency (Adnan et al., 2017). EVs can reduce the carbon emissions produced by gasoline vehicles and increase fuel efficiency up to 40-60%, so they are a hope for solving environmental problems (Wang et al., 2017). Besides, Jansen & Petrova (2023) also mentioned that to combat environmental pollution and make transport cleaner, EV are also the best alternative to conventional cars.

Besides, the high upfront cost of purchasing an EV compared to a conventional gasoline vehicle will be considered a barrier for consumers. Most studies show that consumers will support and adopt EV because of lower operating costs (Lashari et al., 2021). According to Adhikari et al. (2020), consumers can be more effectively persuaded to adopt EV by educating them on how to calculate the savings such as fuel costs and other expenses that will result from adopting EV. Furthermore, EV can save a lot of cost and money through its energy-saving features, but this is only benefits for consumers who use them for a long time (Borlaug et al., 2020). In addition, research by Dutta and Hwang (2021) shows that consumers will pay more attention to the current cost of EV than its long-term savings. Although EV bring economic benefits and cost advantages to consumers in the long term, these advantages are not obvious in the short term.

According to the Sustainability Development Agenda 2030, Malaysian government tend to achieve the goal of climate action among the 17 goals in the remaining 6 years (United Nations, 2024). Although the market of EV is slowly expanding, but it is still in the slow pace to achieve SDG in the remaining 6 years. Therefore, the government should implement more short-term incentives to encourage more consumers to adopt EV in Malaysia (Qian et al., 2019). Through many studies, it is also found that the policies implemented by these governments have brought positive effects and responses to consumers' adoption of EV (Khazaei & Tareq, 2021). Government subsidies provided to EV users could also play a role in their decision to adopt EVs (Asadi et al., 2022). Consumers will decide whether to adopt EV because of the policies implemented by the government. According to Ko & Hahn (2013), when the government implements stronger incentive policies, it will directly affect and increase consumer adoption of EV.

Until now, it is still low adoption rate of EVs in Malaysia due to the uncertainty among consumers in adopting EV (Khazaei & Tareq, 2021). The lack of adequate EV charging facilities in Malaysia is one of the reasons for the low adoption rate (Afshar et al., 2021). As stated by UMW Toyota Motor Sdn Bhd (UMWT) president K Ravindran, the growth of the Malaysian EV market has been impeded by the scarcity of charging facilities which could cause the EV owners faced inconveniences for charging their EV (The Malaysian Reserve (TMR), 2020). It is often observed that the "chicken and egg" conundrum which has an impact on charging stations, particularly since consumers' desire to purchase EVs is contingent upon the availability of chargers; adoption of EVs is low when market-driven expenditures on charging stations are less probable (Ramachandaran, 2023). Consequently, it is anticipated that governments would bear the lion's share of the early costs associated with such an extensive infrastructure for charging (Anjos et al., 2020).

This study is to explore the factors influencing Malaysian drivers' adoption of EV by referring to the TRA model, which includes Environmental Awareness (EA), Social Influence (SI), Charging Infrastructure Accessibility (CIA), Government Intervention (GI), and Financial Benefits (FB). In addition, this study also adds additional three variables which are CIA, GI, and FB to fills the gaps in previous

research. Therefore, this study benefits EV companies and brings a fresh perspective to EV manufacturers and marketers. Besides, based on above mentioned that there are three types of EV which are BEV, HEV, and PHEV. Our study is focused on battery electric vehicles (BEV), which is the pure electric vehicle with zero emissions.

1.3 Research Objective

Research objective defines the aim or purpose of this study, and it divides into two part of objectives which are general objective and specific objectives.

1.3.1 General objective:

The general objective to study at this research is to examine the factors that influencing adoption of electric vehicle by Malaysian car users.

1.3.2 Specific Objectives

I. To examine the relationship between environmental awareness (EA) and adoption of EV among car users in Malaysia.

II. To examine the relationship between social influence (SI) and adoption of EV among car users in Malaysia.

III. To examine the relationship between charging infrastructure accessibility (CIA) and adoption of EV among car users in Malaysia.

IV. To examine the relationship between government intervention (GI) and adoption of EV among car users in Malaysia.

V. To examine the relationship between financial benefits (FB) and adoption of EV among car users in Malaysia.

1.4 Research Question

I. Does the environmental awareness (EA) affect the car users on adoption of electric vehicles in Malaysia?

II. Does the social influence (SI) affect the car users on adoption of electric vehicles in Malaysia?

III. Does the charging infrastructure accessibility (CIA) affect the car users on adoption of electric vehicles in Malaysia?

IV. Does the government intervention (GI) affect the car users on adoption of electric vehicles in Malaysia?

V. Does the financial benefit (FB) affect the car users on adoption of electric vehicles in Malaysia?

1.5 Research Significance

Our research has significant ramifications for understanding the variables affect Malaysian car users to adopt of EVs. This study will help the Malaysian Government or policy makers know the requirement of car users for the adoption of EV and make some improvements to fulfil their requirements. Besides, this study might assist marketers in comprehending the EV consumer preferences and

concerns, so that the marketers can tailors the effective marketing strategies to attract more EV users. At the same time, this research provides academics or future researchers a foundation framework on EV adoption. Through this study framework, it can help academics to study the opinions and attitudes of Malaysian car users towards EV more clearly. Other than this, it also provides a better understanding of consumer behaviour toward EV adoption.

1.6 Conclusion

Chapter 1 mainly discussed the topic of the research, research background, research problems, and the objectives of this study. Next, Chapter 2 will discuss the relevant theoretical models and literature review in depth.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

The literature and underlying theories pertaining to this research will be covered in Chapter 2. Furthermore, a research hypothesis and framework are established to investigate the correlation between IVs and DV.

2.1 Underlying Theories – The Theory of Reasoned Action (TRA)

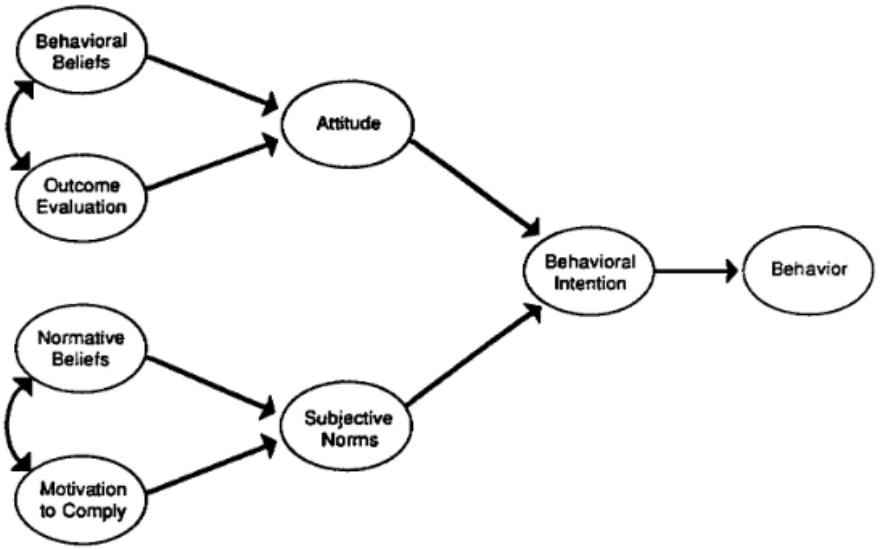

Figure 2.1 The Theory of Reasoned Action. Adapted from Vallerand et al., 1992. Ajzen and Fishbein's theory of reasoned action as applied to moral behavior: A confirmatory analysis. *Journal of Personality and Social Psychology*, 62(1), 98–109.

TRA is an approach that allows for understanding people's intentions and behaviours in various decision-making situations (Ajzen & Fishbein, 1980). TRA is determined by an individual's attitude towards a good or item, while behaviour is

determined by a person's beliefs about the outcomes of interacting with that good or thing (Featherman et al., 2021). Besides, the theory is based on a social psychological framework and has been shown to be effective in describing a variety of behavioural patterns (Jackling et al., 2012). According to Featherman et al. (2021), mentioned that previous studies on the adoption of EVs have been grounded on adoption theories such as UTAUT, TPB, VBN theory, DOI theory, and the Rational Choice Theory. For instance, Egbue and Long (2012) examine the obstacles to widespread consumer adoption of EVs by using the TPB study framework. In a similar study, Kaye et al. (2020) examined the adoption of fully autonomous vehicles in Europe prior to their introduction by combining the TPB and UTAUT research models. Another similar research which done by Lane and Potter (2007) examined the variables that influence consumers' purchase behaviour on low-carbon vehicles by combining the TPB and VBN theories.

As discussed above, there are many adoption theories that could be applied in this study, but the current study chose to base it on TRA to assess the intention and behaviour of decision-making (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). We rely on TRA as our wide theoretical lens for several reasons. First, TRA is more suitable in comparison to other models of technology adoption since its focus on measuring the degree to which social variables impact a purchasing choice. Subjective norms reflect opinions about whether important actors would find a behaviour acceptable or unacceptable as well as the behavioural incentive to win over referents (Featherman et al. 2021). An additional rationale for using TRA is that prior studies on information systems have extensively used this theoretical framework to examine the adoption of novel technologies, such as EV adoption (refers to the review by Lai, 2017). Thus, to find out how customers feel about and respond to adopt an EV, this study adheres to previous research practices. Third, by using TRA as a generic model, researchers may create tailored study scales to examine more closely how people see and use a typical information technology (Tarhini et al., 2015). Thus, TRA has been applied and will be used as a base model in this study to provide a conceptual framework for understanding the factors that contribute to the adoption of EV by Malaysian car users.

Meanwhile, TRA outlines two different factors that influence intentions. The first is the behaviour's attitude, which expresses how the person feels about it and whether they find it positive or negative. (Jackling et al., 2012). Attitude can be referred to environmental awareness that Malaysian car users' awareness of the environmental problems caused by conventional fuel vehicles (Mei et al., 2016). For example, people who become aware of the environmental issues posed by conventional fuel cars may decide to convert to EVs. According to Jackling et al. (2012), the second factor is subjective norms, representing the perceived social pressure around performing the behaviour. It can also refer to the social influence which a person will be affected by certain actions of others around him. People are easily influenced by the people around them. This is because unnecessary risks can be reduced through the personal experience of the people around them.

Other than these two dimensions of the theory of reasoned action, this study also added three additional factors to fill in the gaps of previous studies. Since Malaysia's charging infrastructure is limited, this will also directly impact the adoption of EV by Malaysian car users. Kumar et al. (2021) mentioned that complete and sufficient charging infrastructure will increase the number of car users adopting EV, and the accessibility of EV charging has become the primary condition for their decision to adopt EV. Therefore, charging infrastructure accessibility can be investigated as an additional independent variable in this study. Besides, government intervention is also one of the extra independent variables to examine whether the government support such as incentives increases EV adoption. This is due to the high initial cost of EVs; thus, government incentives for EV users, such as exemptions from road taxes and lower personal income taxes, would encourage Malaysian car users to think about switching to EVs. (Li et al., 2017). Lastly, another additional independent added in this study which is financial benefit. Financial benefit is also a most important variable to investigate whether the economic benefits brought by EV can influence their decision to adopt EV. (Tamor et al., 2013). Moreover, car users may be more inclined to choose something more economical and cost-effective. In short, these five independent variables which

includes Environmental Awareness (EA), Social Influence (SI), Charging Infrastructure Accessibility (CIA), Government Intervention (GI), and Financial Benefit (FB) can influence the adoption of EV among car users in Malaysia.

2.2 Review of Variables

2.2.1 Dependent Variable (DV): Adoption of Electric Vehicle (AEV)

The term "EV adoption" in this study refers to a consumer's behavioural response to an invention, such as buying and utilizing it. (Featherman et al., 2021). It is hypothesized that multiple antecedents or predictors drive this behavioural response. The incorporation of several well considered criteria, such as customer preparedness and willingness to accept innovation, is one of the primary determinants of adoption behaviour. (Irfan & Ahmad, 2021; Featherman et al., 2021). In addition, adopting EV is often seen as a measure to protect the environment and as an environmentally friendly innovation, as adopting EV is considered an environmentally beneficial behaviour (Valdez et al., 2019; Zhang et al., 2022).

2.2.2 Independent Variable I: Environmental Awareness (EA)

Within the context of this study, the concept of environmental awareness is described as the degree to which an individual is aware of environmental issues, which includes support for the resolution of these environmental issues and an expressed willingness to contribute to the resolution of these issues actively. According to Pathak et al. (2022), awareness of renewable energy, energy conservation, and sensitivity to climate change issues are the explicit elements of environmental issues. In view of the gradual increase in general concern about environmental issues, Costa et al. (2021) strongly recommended a thorough investigation of this important relationship. Numerous studies have demonstrated that consumers' environmental concerns influence their purchasing behaviour for

environmentally safe products (Witek & Kuźniar, 2020; Kamalanon et al., 2022). In addition, there is also substantial evidence that environmental concerns have both direct and indirect effects on the tendency of some consumers to be willing to purchase green products at a higher cost (Wang et al., 2020; Nekmahmud & Fekete-Farkas, 2020; Zhang & Dong, 2020). Besides that, with the increasing number of car users on the roads, Malaysians' awareness of the deterioration of air quality is affirmed (Chin et al., 2019; Shafie et al., 2021). Malaysians' growing environmental consciousness has also increased their level of care and concern about the flaws in their environment and quality of life, which could alter their shopping behaviour.

2.2.3 Independent Variable II: Social Influence (SI)

Nuryyev et al. (2020) refer to the extent to which other people (e.g., family and friends) that a person considers important think they should use new technology, known as social influence. Thus, according to the concept of social influence, people who use technology can influence the behaviour of others. Moreover, social influence on behaviour is a critical factor that affects decision-making (Zhang et al., 2020). Purchase decisions may be influenced by societal externalities, including peer pressure, societal norms, and social influence (Shah & Asghar, 2023). Interpersonal influence has been found to play an essential role in car buyers' assessments of EV technology (Zhao et al., 2022). Chakraborty et al. (2023) suggested that the "neighbourhood effect" influences consumers to purchase "green" cars, such as EV. Meanwhile, peer pressure is an important factor influencing people's environmental purchasing decisions (Zhuang et al., 2021). Here, social norms have considerable value and individual behaviour is often influenced by the group with which one identifies, personal relationships, and the opinions of those who are considered important or authoritative in one's life, as well as the group that believes he/she should conduct in a particular behaviour (Charness & Chen, 2020).

2.2.4 Independent Variable III: Charging Infrastructure Accessibility (CIA)

Lack of accessibility to charging facilities will impact the introduction and adoption of EV (Skov & Schneider, 2022). This is particularly important when deciding whether to purchase and use of EV. According to research by Narasipuram & Mopidevi (2021), EV will only compete with conventional cars if the charging infrastructure is in place. Besides, people often think of EV as having a limited range of mobility (Noel et al., 2020). Therefore, if charging stations are unavailable, drivers may experience "stranded" and "mileage-anxious" feelings. According to Popiolek et al. (2023), the scarcity of charging stations may further exacerbate the view that EVs are unsuitable for long-distance travel. This hinders consumer adoption of EV despite their excellent energy efficiency and low environmental impact (Singh et al., 2020). Therefore, charging stations are undoubtedly essential when consumers decide to use EVs for medium and long-distance travel. That's why the researchers consider infrastructure readiness to be crucial for increasing market penetration (Yi et al., 2022). To realize the increased adoption of EV, it is crucial to establish more EV charging infrastructure (Mastoi et al., 2022).

2.2.5 Independent Variable IV: Government Intervention (GI)

Zhao et al. (2022) found that government support is one of the key determinants of persuading consumers to adopt EV in a survey to determine consumer acceptance of EV. According to Kong & Hardman (2019), these incentives implemented by the government have been proven to be effective in increasing the adoption rate of EV. Government subsidies for EV purchases are primarily a significant economic mean to persuade people to switch from high-emission cars to EV. (Song & Potoglou, 2020). In addition, the Canadian government also advocates low emission rates and implements incentives "tax-free purchase" to encourage more families to purchase and adopt EV (Potoglou and Kanaroglou, 2007). The Canadian EVs market has also been positively impacted and increased its market share significantly due to the tax rebate for purchasing EV (Chandra et al., 2010). In addition, the United States has

also passed data and evidence showing that the feebate program can effectively accelerate consumer adoption of EV (Gallagher and Muehlegger, 2011). According to Yan & Mohamed (2022), the role of the government was found to be a significant predictor of consumers' purchase behaviour towards EV in a study involving Malaysian consumers. The researchers also concluded through this study that government intervention will also increase Malaysians' desire to adopt EV.

2.2.6 Independent Variable V: Financial Benefits (FB)

According to the empirical research done by previous researchers, consumers are willing to reduce the use of fuel vehicles and the operating costs by adopt more environmentally friendly vehicle such as EV. Consumer adoption of EV also needs to depend on whether it brings more financial benefits and convenience compared to traditional fuel vehicles (Said et al., 2003). Today, the financial benefits and availability of EVs often outweigh environmental factors, so consumers will only choose EV that bring financial benefits at a price that is competitive with existing fuel vehicles (Bomb et al., 2007). Also, Stern (1992) proposed that if consumers can reduce the cost of time, money and comfort, the support behaviour and attitude towards EV will be changed and transformed into action. Therefore, consumers care about financial benefits is one of the factors for adopting EV (Mourato et al., 2004). One of the advantages of consumers adopting EV instead of gasoline vehicles is the reduction of fuel costs (Heffneret al., 2007; Ozaki and Sevastyanova, 2011). According to the star online (2014), a recent poll among Malaysians confirmed that Malaysian consumers would indeed adopt EVs due to the cost savings on vehicle fuel and tax incentives. In addition, Frost and Sullivan conducted a study showing that most Malaysians will still choose to adopt environmentally friendly vehicles such as EV if the price is reasonable and affordable (The Star Online, 2014).

2.3 Conceptual Framework

The framework below showed that the relationship between the IVs and DV. The five IVs refer to environmental awareness (EA), social influence (SI), charging infrastructure accessibility (CIA), government intervention (GI), and financial benefits (FB) that affect the adoption of EV which is the DV.

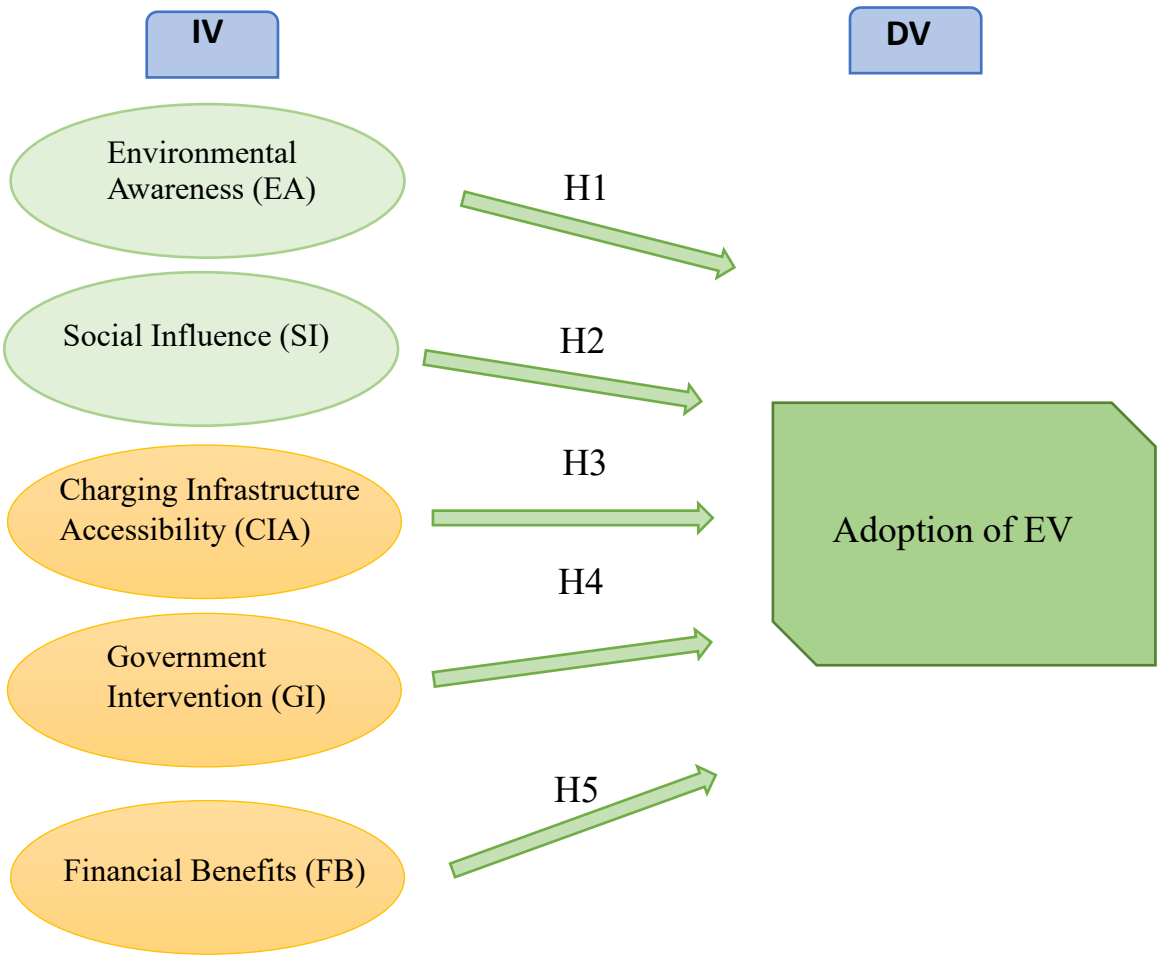

Figure 2.2 Research Framework

2.4 Hypothesis Development

H1: There is a significant relationship between EA and AEV.

For consumers with strong environmental awareness, the adoption of EV will be regarded as an effective means of environmental protection (Khazaei & Tareq, 2021). In the study of Khazaei & Tareq (2021), discovered that some customers enjoy using EVs due to the benefits they provide for the environment. Because owning a "green car" enables one to engage responsibly and proactively in the community. Besides, some people want to show their concern for protecting the environment by buying EV to reduce their carbon footprint (Yan & Mohamed, 2022). According to (Rafique & Town, 2019), when people recognize the environmental value of EVs, such as zero emissions and environmental protection, it will have a significant positive impact on the purchase intention of EV.

H2: There is a significant relationship between SI and AEV.

Social influence is defined as the degree to which customers believe that they will trust those around them more when using the technology, such as family or friends, and adopt behaviours that they consider important (Xu et al., 2019). According to several EV research, social interaction, and public knowledge of EVs play a significant role in encouraging EV adoption among consumers. Individuals are more prone to imitate their neighbours' actions and decide to buy the same kind of automobile that their neighbours just selected. (Adjemian et al., 2010). In addition, once people see EV technology being used in their social networks, they are more likely to embrace this type of vehicle. If customers want to buy a vehicle in the future and they will access to information and reviews from friends, neighbours, relatives, and other peers about the use of new technology, they may be more inclined to buy a certain vehicle (Wang et al., 2021).

H3: There is a significant relationship between CIA and AEV.

Many researchers have done research on whether infrastructure feasibility is directly related to the adoption of EV. If people can charge their EV at or near their home, their desire to explore the adoption of EV may increase (Canepa et al., 2019). According to Kumar et al. (2021), the primary driver of EV adoption was the quantity of charging stations per capita. This may be because installing sufficient charging stations is the smartest and most effective way to ensure frequent customer use and long-lasting service. In a survey done by Du et al., (2018), 68% of the participants indicated that they would be interested in purchasing EVs if the government strengthened the charging infrastructure. Besides, different types of vehicles such as BEV, PHEV, and HFCV need different types of places to refuel or recharge. Therefore, it is crucial to ensure that there are adequate charging facilities for different types of EVs (Harrison & Thiel, 2017).

H4: There is a significant relationship between GI and AEV.

Multiple studies have also proved that government intervention can directly affect consumers' preference and adoption of EV. For example, several government initiatives such as tax breaks, and subsidies are in place to encourage the growth of EVs. (Li et al., 2022). According to Gong et al. (2020), the preferential policies implemented by the government will encourage consumers' willingness to purchase and the development of green consumption. Consumers will be influenced by these preferential policies and adopt EVs to enhance environmental awareness. Therefore, there is a mechanism between government actions and consumers' willingness to adopt EV. Due to environmental incentives, Germany has therefore implemented various measures to encourage low-emission standard vehicles to replace high-emission vehicles (He et al., 2017). Therefore, government-passed incentives have

also helped to popularize the idea of "green cars," encouraging individuals to think about vehicles that are better for the environment.

H5: There is a significant relationship between FB and AEV.

According to relevant empirical research on EV adoption, consumers are more concerned about economic benefits when deciding to purchase EV. Lane & Potter (2007) discovered that price was the primary determinant of people's decision to buy an EV in two research on consumer attitudes toward low-carbon cars. Furthermore, they also found that one of the biggest barriers to the sale and acceptance of EVs is that the high purchase cost. Through a study of around 3,400 owners of pure EV in Norway, Bjerkan et al. (2016) found that over 80% of respondents thought that lowering direct costs such as purchase tax or value-added tax was the best method to encourage people to acquire EVs. At the same time, Featherman et al. (2021) also indicated that due to the consideration of pricing, the overall cost of gasoline and maintenance, buyers prefer cars with affordable prices. Therefore, "Tax-free purchase" incentives and low emission levels are a way of encouraging people to adopt for EVs.

2.5 Conclusion

This chapter has been discussed the topic’s underlying theories, research framework, and hypothesises. In the next Chapter will be discussed about the methodology of the research.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

This chapter will address research technique, including how the study was carried out, who the study's subject was, the research methodologies that were employed, etc.

3.1 Research Design

Quantitative methods were employed to collect and assess the data for this study. The most popular approach in quantitative research is deductive reasoning, which begins with a hypothesis and gathers data to see if the theory is supported empirically. To assist convey data rather than interpretation, goals are also quantified via actions and perspectives (Rashid et al. 2021).

Besides, this study used descriptive research design as its methodology. According to Rashid et al. (2021), data from large populations are the foundation of this methodology. By using the data from specific investigations to describe the data in the group, do comparison analysis, and then provide ideas and suggestions based on this. Examined the variables affecting Malaysian drivers' adoption of EVs is the aim of this study. Therefore, descriptive research helps researchers use questionnaires to collect vast amounts of data and information. The data obtained from the questionnaires allow us to know what the factors are influencing adoption of EVs among car users in Malaysia.

3.2 Sampling Design

3.2.1 Target Population

According to Whaley (2021), a target population is a certain set of persons chosen as the intended receivers of a research or product because they have common qualities. This group is uniquely identifiable and can be accurately distinguished from the wider population. So, this study will focus on Malaysian car users between the ages of 17 or above and who aware of the existence of EVs. It is because according to the Road Transport Act (APJ)1987 stated that the legal minimum driving age for obtaining a driver's license is 17 (UNDANG-UNDANG MALAYSIA, 2013). In summary, this study will be target on Malaysian car users aged between 17 and above.

3.2.2 Sampling frame

According to Lohr (2021), a sampling frame is a list or other description of the sampling units for the population from which a sample may be obtained. When a person purchases a car, their personal data and information is recorded on the car dealer’s computer system. At the same time, all the car user information will also be recorded in government records, and transportation departments. However, the car user’s information will only kept for relevant unit due to the consumer privacy and security, so that the contact number and the name list of the car user are available but not accessible.

3.2.3 Sampling technique

In this study, non-probability sampling was used. It is an arbitrary method of selecting units from a population. Furthermore, because non-probability sampling doesn't require a complete survey frame, it's a quick, easy, and inexpensive way to collect data. (Etikan & Bala, 2017). Additionally, this research has employed the judgemental sampling to collect the data. The researcher deliberately chooses a sample that is most likely to effectively address the research query (Marshall, 1996).

The judgmental sampling strategy depends on the researcher's judgment in determining who is most likely to provide important information to meet the

objectives of the study. Prioritizing people who have similar opinions and are prepared to provide the required information is crucial for the researcher (Etikan & Bala, 2017). The target respondents must be (1) Malaysian car users which the age in 17 and above, and (2) Malaysian car users with driver's license. It is because according to Road Transport Act (APJ) 1987 has set the rule that the minimum age to get the driver's license is 17 years old (UNDANG-UNDANG MALAYSIA, 2013). Therefore, this sampling method can help the researchers to deliver the questionnaire to the right respondents.

3.2.4 Sample Size

Malaysia has witnessed a steady rise in the number of automobile owners, surpassing 12 million now. (Rosli et al., 2014).

The margin of error, confidence level, and total population size of automobile users are the main factors that decide the sample size for this study. According to Rosli et al. (2014), the likelihood of the information supplied by the survey questionnaire will be determined using a confidence level of 95%, which is typically utilised in most research. It represents the overall length of time needed for the survey's result to fall inside the margin of error (confidence interval), expressed as a percentage. Survey researchers often select an "acceptable" margin of error, which falls between 4% and 8% at a 95% confidence level. (DataStar, 2008). Besides, researchers utilise a population percentage estimate of 0.50 (Krejcie and Morgan 1970). The greatest sample size will be obtained by maximising variance, which is the outcome of this percentage. Therefore, the outcome of sample size in this study is 267 with a 95% confidence level, 6% margin of error, 50% population proportion, and a population size of 12 million, as shown in Figure 3.1 below. Hence, this research will be set the sample size at a minimum of 270 respondents.

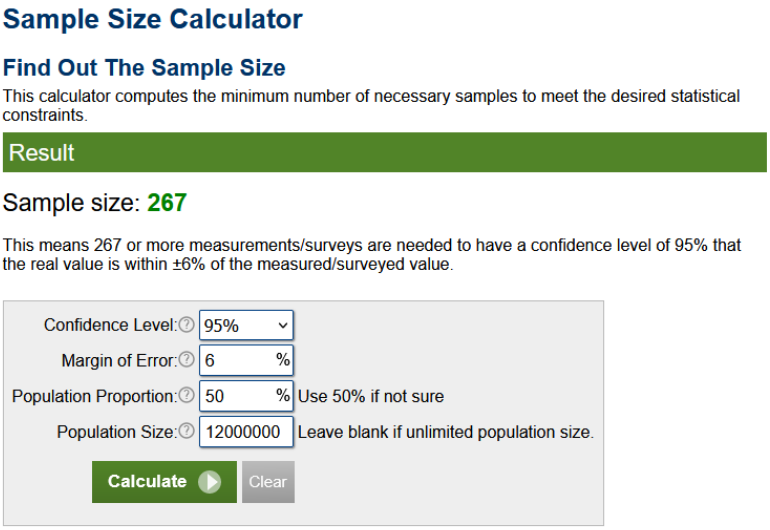

Figure 3.1 the calculation of sample size. Retrieved from https://www.calculator.net/sample-size-calculator.html?type=1&cl=95&ci=6&pp=50&ps=12000000&x=82&y=24.

3.3 Data Collection Procedures

3.3.1 Questionnaire Design

Questionnaires were employed as the data gathering approach in this research with English version. Besides, the questionnaire is sent to every respondent by using a google form to gather data. It will divide into 3 sections which include pre-screening section, section A (demographic questions), and section B (variables questions). There are three questions in the screening section to determine whether the respondent is qualified to continue answering the next section. Only respondent who pass the screening section can go to the section A (demographic questions), and section B (variables questions). The demographic questions in section A which is about the respondent's profile, and it contains 4 questions which are gender, race, age, and income level. Other than this, there are 5 variables about the factors influencing adoption of EV and each variable contains 5 questions in section B.

Besides, there are also 4 questions about the dependent variable (AEV). So, the total of 29 questions are compulsory to answer. In sections B, a five-point Likert scale ranging from strongly disagree to strongly agree was employed. (I = very disagree, II = disagree, III = neutral, IV = agree, and V = very agree).

Table 3.1:

Questionnaire Design

Variables	**Questions**		**Sources/ Citations**
Environmental Awareness (EA)	EA1	I am concerned about protecting the environment and conserving electricity.	Alzahrani et al., 2017, Wang et al., 2017
	EA2	I think that a large part of environment's pollution is caused by car exhaust.	
	EA3	To achieve sustainable growth, I believe that people should coexist peacefully with environment.	
	EA4	I believe we could be doing more to prevent the depletion of our limited natural resources.	
	EA5	I think that individuals have a responsibility to preserve the environment and save energy.	
Social Influence (SI)	SI1	My family or friends think that I should buy an electric car.	Khazaei, 2019, Venkatesh et al., 2012

	SI2	My friends or peer believe that purchasing electric vehicle is the proper choice.	
	SI3	The people around me will influence my decision making.	
	SI4	Opinions and suggestions from people around me will affect my decision to adopt electric vehicle.	
	SI5	I will adopt an electric car if most of my friends or peer have already used it.	
Charging Infrastructure Accessibility (CIA)	CIA1	The amount of charging infrastructure has a big impact on my decision to adopt electric vehicle.	Wang et al., 2017, Wang et al., 2021
	CIA2	Availability of charging infrastructure influences my consideration of buying an electric vehicle.	
	CIA3	I believe that adopting an electric car will make it easier for me to charge at home.	
	CIA4	The completeness of EV charging infrastructure, including ventilation, battery, and charging station will affect my consideration to adopt an EV.	
	CIA5	If EV charging facilities is near my house or place of	

		employment, this will influence my consideration of buying an EV.	
Government Intervention (GI)	GI1	A government direct subsidy strategy for the purchase of electric vehicle is appealing to me.	Wang et al., 2021
	GI2	For adopting the electric vehicle, toll road exemptions are significant to me.	
	GI3	Government incentives such as personal income tax relief is beneficial to me in adopting electric vehicle.	
	GI4	The value-added tax exemption is helpful to me in adopting electric vehicle.	
	GI5	The government give adequate support to electric vehicle users.	
Financial Benefits (FB)	FB1	The cost of electric vehicle for everyday usage is relatively low.	Wang et al., 2017
	FB2	I think that EV can save more to the conventional car as it might reduce travel expenses.	
	FB3	The price of electric car is relatively low and acceptable.	
	FB4	I think that adopting electric vehicle can save regular	

		maintenance costs such as engine oil.	
	FB5	I think the adoption of electric car will brings me financial benefits in the long term.	
Adoption of EV (AEV)	AEV1	I would choose to drive an electric car instead of a conventional car if I had an electric car.	Venkatesh et al., 2012, Wang et al., 2017, Wang et al., 2021
	AEV2	In the next five years, if I were to buy a vehicle, I would buy an electric vehicle.	
	AEV3	I would recommend people to get an electric vehicle.	
	AEV4	My next vehicle will probably be an electric vehicle, with a high probability.	

3.3.2 Pilot Study

Before the questionnaires were formally disseminated, a pilot test was conducted. To find and fix any possible problems with the first draft of the questionnaire, a limited group of participants underwent this test. Additionally, it allowed the participants to confirm the functionality of the survey questionnaire (Rosli et al., 2014). Conrad & Schober (2000) emphasized that this type of research should be carried out on the same or a highly similar group of respondents as those to whom the final questionnaire was distributed. According to Iarossi (2006), who has highlighted the three primary objectives for the pilot test which were to assess the

questionnaire's effectiveness, estimate how long it would take respondents to complete it, and assess the surveyor's level of skill.

Our target population in this research which is the Malaysian car users with the age in 17 and above. As Lackey & Wingate (1998) suggested that take 10% of the sample size to conduct in the pilot test, therefore there is a minimum of 27 participants will be conducted the pilot test. As a result, this study will be pilot tested using 30 Malaysian car users aged 17 years and above.

Table 3.2:

Reliability Analysis for Pilot Study

Variables		**Number of Items**	**Cronbach's Alpha**	**Results of Reliability**
Dependent Variable (DV)	AEV	4	0.897	Very Good
Independent Variables (IV)	EA	5	0.831	Very Good
	SI	5	0.922	Excellent
	CIA	5	0.820	Very Good
	GI	5	0.789	Good
	FB	5	0.927	Excellent

3.4 Proposed Data Analysis Tool

A potent software program designed specifically for statistical analysis and data visualization is called the Statistical Package for the Social Sciences (SPSS). (Mccormick et al., 2017). It performs perfect frequency analysis and lets researchers double-check and confirm test hypotheses (Ong & Puteh, 2017). Moreover, it is a trustworthy tool in the fields of social sciences, business, healthcare, etc., as it can perform a wide range of statistical tests and analyses and provides complete statistical functionality for analysing precise results (Mccormick et al., 2017). Thus, SPSS is also the best choice for this study.

3.4.1 Descriptive Analysis

To summarize and display data in a clear and relevant manner, descriptive analysis is an essential phase in the data analysis process. (Verma, 2013). Besides, by elucidating the correlations between the variables in a sample or aggregate, descriptive statistics are used to arrange and summarize data. (Kaur et al., 2018). Visualizations such as histograms or box-and-line plots are used to simplify and summarize data to reveal key patterns and features in the data. Descriptive statistics include variable categories (nominal, ordinal, interval, and ratio) and measures of frequency, concentration trend, dispersion/change, and location (Kaur et al., 2018).

3.4.2 Internal Consistency Analysis

According to Bonett & Wright (2014), in its most common application, when the results represent large number of questionnaire/test items, Cronbach's alpha is referred to be a measure of "internal consistency" dependability. One way to evaluate the test findings' reliability is to utilize Cronbach's Alpha. The general thumb rule is shown in Table 3.2 (Nawi et al., 2020).

Table 3.3:

The Thumb Rule of Cronbach's Alpha

Alpha Coefficient Range	Strength of Association
<0.60	Poor
0.60 to < 0.70	Moderate
0.70 to < 0.80	Good
0.80 to < 0.90	Very Good
0.90>	Excellent

Adapted from Nawi et al., 2020. A Review on The Internal Consistency of a Scale: The Empirical Example of The Influence of Human Capital Investment on Malcom Baldridge Quality Principles in TVET Institutions. Asian People Journal (APJ), 3(1), 19–29. https://doi.org/10.37231/apj.2020.3.1.121

3.4.3 Inferential Analysis

To investigate possible relationships and predicting factors between the study's variables of interest, inferential analysis will make use of Pearson correlation and multiple regression analysis.

3.4.3.1 Pearson's Correlation Analysis

According to Martelli and Greener (2022), the degree of relationship between two or more variables is shown by the Pearson's correlation coefficient analysis (r) metric. The purpose of this study is to evaluate how strongly the IVs (EA, SI, CIA,

GI, FB) and DV (AEV) are related. The correlation coefficient offers information and is a number between -1 and +1. The result of -1 indicates a complete negative correlation, which occurs when one variable grows while the other lowers. Conversely, a value of +1 indicates a perfect positive correlation, meaning that the two variables rise simultaneously. There is no connection and no linear relationship when the value is 0 (Schober et al., 2018). Table 3.4 below shows that its indicator:

Table 3.4

The indicator for Pearson's Correlation Coefficient Analysis

Absolute Magnitude of the Observed Correlation Coefficient	Interpretation
0.00-0-10	Negligible correlation
0.10-0.39	Weak correlation
0.40-0.69	Moderate correlation
0.70-0.89	Strong correlation
0.90-1.00	Very strong correlation

Adapted from Schober, P., Boer, C., & Schwarte, L. A. (2018). Correlation coefficients: Appropriate use and interpretation. *Anesthesia & Analgesia*, *126*(5), 1763–1768. https://doi.org/10.1213/ane.0000000000002864.

3.4.3.2 Multiple Regression Analysis

A statistical method called multiple regression analysis (MRA) is used to determine the degree of correlation and correlation strength between a DV and IVs (Petchko, 2018). According to Shetty et al. (2020), the equation of multiple regression is commonly expressed as follows:

$$\mathbf{Y = A + b_1X_1 + b_2X_2 + b_3X_3 \ldots + b_kX_k}$$

As a result, the following is the MRA equation for this study:

$$\mathbf{Y = A + b_1\,(EA) + b_2\,(SI) + b_3\,(CIA) + b_4\,(GI) + b_5\,(FB)}$$

Whereby,

Y= Adoption of Electric Vehicles.

A = Constant

EA = Environmental Awareness

SI = Social Influence

CIA = Charging Infrastructure Accessibility

GI = Government Intervention

FB = Financial Benefits

3.5 Conclusion

In summary, the research techniques and methods used in this study are discussed and explained in Chapter 3, which will guide data analysis in the following chapters.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In Chapter 4, data analysis and discussion will be conducted based on the questionnaire responses. Furthermore, 298 of the 303 respondents that were qualified for our survey will be used for data analysis by SPSS software.

4.1 Descriptive Analysis

4.1.1 Gender

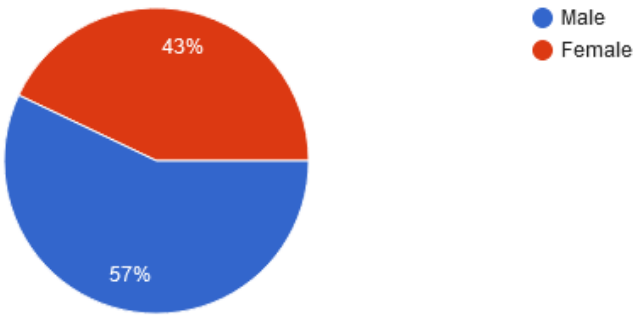

Figure 4.1 Gender

Figure 4.1 clearly shown that male participants are higher than female participants in this questionnaire survey. Male participants accounted for 57% (170 participants) of the 298 participants, while female participants accounted for only 43% (128 participants). Through data analysis, it appears that there are more male participants than female participants.

4.1.2 Race

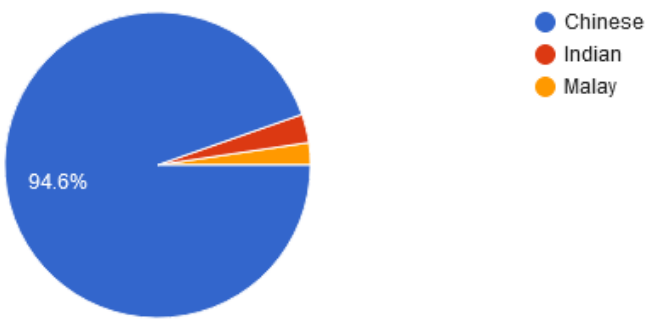

Figure 4.2 Race

As shown in Figure 4.2, the proportion of Chinese respondents is higher than that of Malay and Indian respondents, with 94.6% (282 respondents) of the 298 participants. Meanwhile, there were 3% (9 respondents) and 2.3% (7 respondents) of Indian and Malay respondents, respectively.

4.1.3 Age

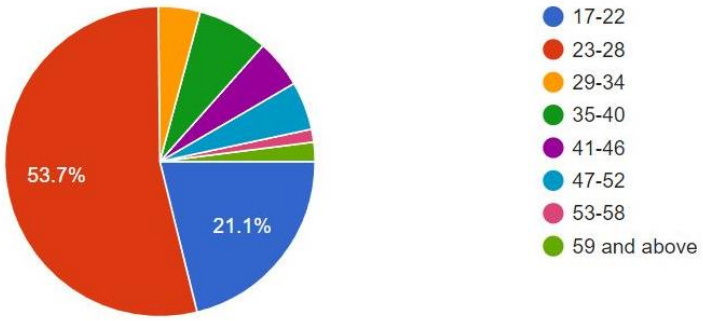

Figure 4.3 Age

Figure 4.3 shows that the highest proportion of respondents were aged 23-28 years, accounting for 53.7% (160 respondents) of the 298 respondents, followed by 21.1% (63 respondents) aged 17-22 years and 7.4% (22 respondents) aged 35-40 years. In addition, 5% (15 respondents) were aged 41-46 and 47-52, respectively. Meanwhile, 4.4% (13 respondents) were aged 29-34, 2% (6 respondents) were aged

59 and above, and 1.3% (4 respondents) were aged 53-58. It shows that the age range between 23-28 is the most.

4.1.4 Monthly income

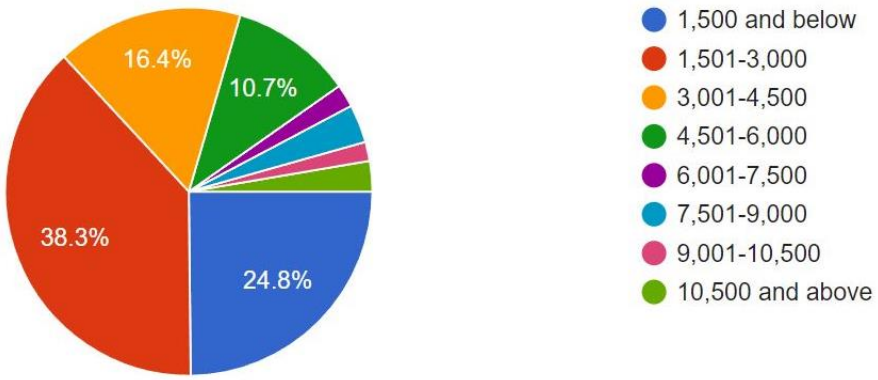

Figure 4.4 Monthly Income

According to Figure 4.4, the highest percentage of respondents with a monthly income of RM1,501-RM3,000 which is 38.3% (114 respondents) of all respondents. Following that, 24.8% (74 respondents) stated that they earn RM1,500 or more per month, 16.4% (49 respondents) stated that their earn between RM3001 and RM4500 per month, and 10.7% (32 respondents) stated that they earn between RM4501 and RM6000 monthly. Additionally, 2.7% (8 respondents) earn RM10,500 or more per month, 2% (6 respondents) earn between RM6001 and RM7500 per month, and 3.4% (10 respondents) earn between RM7501 and RM9000 per month. Finally, 1.7% (5 respondents) earned between RM 9001 and RM 10500 monthly.

4.2 Internal Consistency Analysis

According to Nawi et al. (2020), variables with a Cronbach's alpha value of more than 0.7 are considered to have good reliability and more than 0.8 are considered to have great reliability. Most of the examined variables that lie between 0.8 and 0.9, while only one of the variables (GI) is between 0.7 and 0.8 are shown in Table 4.1. This suggests that our variables show a high level of precision and consistency.

Table 4.1:

Reliability Analysis

Variables		Number of Items	Cronbach's Alpha	Results of Reliability
Dependent Variable (DV)	AEV	4	0.879	Very Good
Independent Variables (IV)	EA	5	0.842	Very Good
	SI	5	0.833	Very Good
	CIA	5	0.845	Very Good
	GI	5	0.771	Good
	FB	5	0.847	Very Good

Source: Created for research purpose

4.3 Inferential Data Analysis

4.3.1 Pearson Correlation Coefficient Analysis

The table 4.2 below shows that all IVs have the moderate correlation with AEV. It is because the findings show that EA (0.581), SI (0.624), CIA (0.676), GI (0.643), and FB (0.679), which is under the range between (0.40-0.69). As a result, those IVs has the moderate relationship with DV.

Table 4.2:

Pearson Correlation Coefficient Analysis

Correlations

		EA	SI	CIA	GI	FB	AEV
EA	Pearson Correlation	--					
	N	298					
SI	Pearson Correlation	.541**	--				
	Sig. (2-tailed)	<.001					
	N	298	298				
CIA	Pearson Correlation	.692**	.640**	--			
	Sig. (2-tailed)	<.001	<.001				
	N	298	298	298			
GI	Pearson Correlation	.643**	.526**	.667**	--		
	Sig. (2-tailed)	<.001	<.001	<.001			
	N	298	298	298	298		
FB	Pearson Correlation	.541**	.645**	.614**	.626**	--	
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		
	N	298	298	298	298	298	
AEV	Pearson Correlation	.581**	.624**	.676**	.643**	.679**	--
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	
	N	298	298	298	298	298	298

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

4.3.2 Multiple Regression Analysis

As seen by Table 4.3, the R-squared value of the research is 0.605. This indicates that all IVs in this study account for 60.5% of the Malaysian car users having the intention to adopt the EV in Malaysia.

Table 4.3:

Model Summary

Model	R	R-Square	Adjusted R Square	Std. Error of the Estimate
1	.778[a]	.605	.598	.52224

a. Predictors: (Constant), FB, EA, SI, GI, CIA
b. Dependent Variable: AEV

According to Table 4.4, the significant value of the study is < 0.001, and the F-value of the study is 89.529. It demonstrates that IVs are related and significant to DV because the P-value is < 0.05. Therefore, the IVs (EA, SI, CIA, GI, FB) can predict the DV (AEV) which is the factor influencing adoption of EV among car users in Malaysia.

Table 4.4:

ANOVA Result

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	122.088	5	24.418	89.529	<.001[b]
	Residual	79.638	292	.273		
	Total	201.727	297			

a. Dependent Variable: AEV
b. Predictors: (Constant), FB, EA, SI, GI, CIA

4.3.3 Coefficient of Equation

Table 4.5 indicates that the P-values for SI, CIA, GI, and FB are less than 0.05, which those significant level < 0.01. This suggests that these four IVs have significant influence on AEV. Additionally, EA has a P-value of 0.293, which its significant level > 0.05. This suggests that there is no significant relationship between EA and AEV. Furthermore, while FB has the biggest absolute value among the IVs, its standardised coefficient of 0.289 indicates that it is the greatest influence on AEV. Although EA is no significant relationship between AEV, but it is still having a positive correlation between AEV. As a result, there is a positive correlation between AEV and the unstandardised EA, SI, CIA, GI, and FB coefficients. The following is the multiple regression equation:

AEV = -0.110 + 0.074 (EA) + 0.168(SI) + 0.268(CIA) + 0.231(GI) + 0.289(FB)

According to this equation, there is a corresponding rise in AEV of 0.074, 0.168, 0.268, 0.231, and 0.289 units for every unit increase in EA, SI, CIA, GI, and FB.

Table 4.5:

Coefficient of Equation

Model		**Unstandardized B**	**Coefficients Std. Error**	**Standardized Coefficients Beta**	**t**	**Sig.**
1	**(Constant)**	-.110	.221		-.500	.617
	EA	.074	.070	.058	1.054	.293
	SI	.168	.055	.163	3.073	.002
	CIA	.268	.069	.234	3.882	<.001
	GI	.231	.068	.188	3.399	<.001
	FB	.289	.056	.281	5.172	<.001

a. **Dependent Variable: AEV**

In conclusion, H1 has no significant relationship while H2, H3, H4, and H5 has significant relationship.

4.4 Conclusion

Finally, this chapter presents the analysis and interpretation of the data collection results. The results of the data collection are produced using SPSS software, which is then interpreted in table form in this study.

CHAPTER 5: DISCUSSION, IMPLICATION, AND CONCLUSION

5.0 Introduction

The significant findings, research limitations, implications from theoretical and managerial viewpoints, and suggestions for additional research will be discussed in this Chapter.

5.1 Discussion of Key Findings

Table 5.1:

Summary of the hypothesis testing results.

Hypothesis	Sig.	Result
H1: The Relationship Between EA and AEV	0.293	Not Significant
H2: The Relationship Between SI and AEV	0.002	Significant
H3: The Relationship Between CIA and AEV	0.000	Significant
H4: The Relationship Between GI and AEV	0.000	Significant
H5: The Relationship Between FB and AEV	0.000	Significant

Source: Created for research purpose

H1: The Relationship Between EA and AEV

A previous study done by Yan & Mohamed (2022), mentioned that adopt EV may help some individuals lessen their carbon footprint and demonstrate their commitment for the environment. However, this previous study is not consistent with our findings. Environmental Awareness does not significant impact to the adoption of EV. This is because it is not a priority for car users. Consumers will give priority to whether there are sufficient charging facilities to ensure that EVs can go on the road with confidence (Austmann & Vigne, 2021). Based on the research done by Munzel et al. (2019), it shows that environmental awareness will not be a factor in car users adopting EV. This is because if they adopt EV for the sake of environmental protection, they will have to pay a greater price, such as the high upfront cost of adopting EV. Therefore, environmental awareness will not be a key factor in their consideration of adopting EV. Most car users care more about the benefits that they get from it rather than adopting EV because of certain behaviours. In addition, car users can also find other ways to show their awareness of environmental protection, which can also avoid paying higher prices.

H2: The Relationship Between SI and AEV

The findings link with the researcher who called Singh et al. (2020), mentioned that social influence can have the direct impact to the adoption of EV. If most of a person's relatives and friends adopt EV, this also affirms and proves that EV can bring certain benefits and will have a certain impact on his adoption of EV (Wang et al., 2021). This is because people are usually more inclined to listen to the experience and advice of family or friends before making adoption decision. Since long-term contact will create a relationship of mutual trust and knowing that the other person has personal experience with EV will increase persuasiveness. However, the result is in line with the study done by Xu et al. (2019), who found

that car users will follow the actions, advice, and information provided by people around them (such as family or friends) in deciding to adopt EV.

H3: The Relationship Between CIA and AEV

The findings in line with other research that adequate charging facilities are a major consideration for EV adoption among car users, so there is a significant impact among them (Austmann & Vigne, 2021). Since Malaysia has only introduced EV in recent years, the government has not yet fully completed the construction of charging infrastructure. In addition, due to different geographical conditions or economic development levels, the construction of charging infrastructure in some areas may be relatively lagging. This has also led to EV users feeling uneasy due to the insufficient of charging infrastructure (Kumar et al., 2021). Therefore, the accessibility of charging infrastructure has become the concern and primary condition for EV users when making adoption decisions. Moreover, countries or regions must have sufficient charging facilities to allow car users to use EV with confidence. Our findings support research by Canepa et al. (2019), which suggests that people may be more inclined to adopt EV if they can charge their vehicles at or near home.

H4: The Relationship Between GI and AEV

According to Yan & Mohamed (2022), government intervention has the significant impact to the adoption of EV. Preferential policies implemented by the government can increase consumers' awareness of environmentally friendly consumption and the adoption rate of EVs. Since the current upfront cost of EV is higher than that of traditional fuel vehicles, users who want to adopt EV will feel burdened and give up adopting EV. Therefore, users who want to adopt EV will need more government incentives to reduce the upfront cost of purchasing EV, which will also make EV users less burdened (Gong et al., 2020). At the same time, strengthening

government incentives can also attract and increase the adoption of EV by more car users. This is because incentives provided by the government to EV owners, such as subsidies and vehicle import tax exemptions, will directly influence the adoption of EV. However, this research finding is consistent with earlier study done by Li et al. (2022), who indicates that Policies implemented by the government to promote the development of EV, including subsidies, tax exemptions, and unlimited EV plans, can directly affect consumer preferences and adoption of EV.

H5: The Relationship Between FB and AEV

According to Bjerkan et al. (2016), the main factor for most car users to adopt EVs is the financial benefits it brings which in line with the study findings. Therefore, car users will carefully consider about their financial benefits before deciding on a car type. Besides, car users are very sensitive to the economic benefits brought by EV, and they will carefully observe and analysis the EV long-term economic benefits before deciding to adopt them. Although EVs have no obvious economic benefits compared to traditional fuel vehicles in the short term, but in the long run EV can save more fuel, oil, and other expenses than traditional fuel vehicles (Dutta and Hwang, 2021). Therefore, when compared to other factors, financial benefits are the most significant factor driving Malaysian car users' adoption of EV. Furthermore, this finding is also consistent with the research done by Lane & Potter (2007), who mentioned that financial benefits can increase consumers' willingness and acceptance of EVs.

5.2 Implications of the Study

5.2.1 Theoretical Implications

TRA was utilised to determine the factors influencing adoption of EV among car users in Malaysia. This study had also extended the Theory of Reasoned Action by

adding another three factors which are CIA, GI, and FB. However, only EA shows that it is not significant while SI, CIA, GI, and FB is significant. It indicates that Malaysian car users will not adopt the EV because of the environmental awareness. Furthermore, research findings indicate that financial benefit is the most significant variable in the extended Theory of Reasoned Action because financial benefit has the highest beta value (0.281). The extended theory of rational action adopted in this study also helps to understand the great impact that financial benefits have on the adoption of EV by car users. Car users hope that they can help save more fees and costs by adopting EV. As a result, academics and future researchers may utilise this as a resource for their work, and it can also help them analyse and estimate Malaysian car users' perceptions of financial benefits of EV adoption.

5.2.2 Managerial Implications

The adoption of EVs in Malaysia is significantly influenced by several variables, including SI, CIA, GI, and FB. For the social influence, marketers could collaborate with the local influencers to advocate for EV adoption and address the common misconceptions by customers toward EV. In terms of charging infrastructure accessibility, consumers will also give priority to whether there are sufficient charging facilities in the region or country before purchase EV. This is because a lack of charging facilities creates a lot of constraints and inconveniences for EV owners. Therefore, Malaysian Government and EV manufacturer should ensure the sufficient of EV's charging infrastructure distributed in each different region. EV manufacturers could also develop a software to provide their consumers with the location and availability of all EV charging facilities in Malaysia.

For the government intervention, Malaysian government need to keep offering more incentives such as personal income tax refund to those who purchase EV consequently. Besides, government could also provide some unique incentives to encourage more EV manufacturers in Malaysia, such as reduced corporation tax rates for a period of 10 years to automobile manufacturer that produce EV in Malaysia. Lastly, in terms of financial benefit which has the most significantly

influence to the EV adoption shows that price and quality are often factors consumers consider before purchasing any product. Therefore, marketers could use the long-term benefits brought by EV as a marketing tool to flood the public with advertising and highlight about the long-term financial benefits from EV to attract more people to adopt EV.

5.3 Limitations and Recommendations of the Study

Although this study collected and analysed 298 questionnaires, it can be influential in determining the factors that influence the adoption of EV by Malaysian car users. However, it must also be acknowledged that this study still has some limitations that need to be addressed for future researchers to be aware of them. Firstly, one of the limitations is the uneven ethnicity of the respondents; the proportion of respondents to the questionnaire survey is mainly dominated by the Chinese, who accounted for more than 90 percent of the respondents. One of the reasons is that connections in our region. This is because most of the people around us when we distributed the questionnaires were Chinese, thus creating a lack of accessibility for Malays and Indians to answer the questionnaires. This also resulted in uneven racial representation that may lead to common method bias in the results of the study. Therefore, to address the imbalance in racial representation, future researchers could set an average number of responses for different races so that the questionnaires are evenly distributed to different races for responses. In this way, information and opinions from different races can also be collected and a more accurate data can be achieved.

In addition, another limitation is that the majority of the respondents are between the age of 17 to 28. People in these age groups have just entered society as university students. Most of them are earning less than or just around RM3,000, and they do not have much ability to buy the higher priced EV. The reason to cause this problem is because the way we distribute the survey through offline and online

channels. Since most of the users of social media platforms are young people and the survey was also conducted in English. However, the main users of Internet are the young people, and they are more following to the current trend which may be more interested in EV. Thus, to address the respondents' limited purchasing ability, future researchers could use precision marketing databases such as send questionnaires directly from users who participated in EV expos or purchased high-end cars to target groups with ability and willingness to purchase EV.

Also, another limitation lies in socially desirable bias, as this study primarily relies on self-reported surveys. Although it may provide valuable insights into the perceptions and behaviours of the respondents, they are susceptible to social desirability bias or recollection bias, among others. Therefore, respondents may provide answers that they consider socially acceptable, resulting in potentially inaccurate data. To enhance the robustness of future research in this area, future researcher could highlight to respondent that they are participating in an anonymous survey before they participate in the survey. This will allow them to be more confidence and more inclined to complete the questionnaire with their own opinions. By using this method, the data will be more accurate and reliability for future research.

5.4 Conclusion

The results of the study allow us to draw the conclusion that only EA has no significant impact on the adoption of EV, whereas SI, CIA, GI, and FB has. Additionally, customers in the 17-28 age range, male demographic, basic income, and Chinese race need to be the focus. Although young people in this age group have just stepped out of society, their average income is not very high, but these people tend to have more dreams to pursue what they want. EV can also bring them long-term cost savings and it for sure the way of the future for transportation worldwide.

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Appendices

Appendix 1.0 Survey Questionnaires

Pre-Screening Questions

1. Do you have your own car?

***Yes** ☐ ***No** ☐

2. Do you have a driver's license and driving experience? *(Anyone without will be counted as "No".)*

***Yes** ☐ ***No** ☐

* For those who answered 'Yes', you can proceed to answer Section A and Section B.

**For those who answered 'No', you are not allowed to answer the questionnaire. Thank you for your participation.

3. How frequently you drive a car in a week?

Not even for a day/ week ☐
One day/ week ☐
Two days/ week ☐
Three days/ week ☐
Four days/ week ☐
Five days/ week ☐
Six days/ week ☐
Seven days/ week ☐

Section A: Demographic Profile

*In this section, we are interested in your basic personal profile which include **four** of the **demographic question**. Please tick your answer.*

A1: Gender: ❑ Male ❑ Female

A2: Race: ❑ Malay ❑ Chinese ❑ Indian ❑ Others:_____

A3: Age:

- ❑ 17-22
- ❑ 23-28
- ❑ 29-34
- ❑ 35-40
- ❑ 41-46
- ❑ 47-52
- ❑ 53-58
- ❑ 59 and above

A4: How much for your monthly income? （RM）:

- ❑ 1,500 and below
- ❑ 1,501-3,000
- ❑ 3,001- 4,500
- ❑ 4,501-6,000
- ❑ 6,001-7,500
- ❑ 7,501-9,000
- ❑ 9,001-10,500
- ❑ 10,500 and above

Section B: Variables Items

This section is seeking your opinion on the factors influencing adoption of electric vehicle among car users in Malaysia.

Respondents are asked to indicate the extent to which they agree or disagree with each statement using 5-point Likert scale [(1) = strongly disagree; (2) = disagree; (3) = neutral; (4) = agree; (5) = strongly agree] response framework. Please circle one number per line to indicate the extent to which you agree or disagree with the following statements.

		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
IV1	ENVIRONMENTAL AWARENESS (EA)					
EA1	I am concerned about protecting the environment and conserving electricity.	1	2	3	4	5
EA2	I think that a large part of environment's pollution is caused by car exhaust.	1	2	3	4	5
EA3	To achieve sustainable growth, I believe that people should coexist peacefully with environment.	1	2	3	4	5
EA4	I believe we could be doing more to prevent the depletion of our limited	1	2	3	4	5
EA5	I think that individuals have a responsibility to preserve the	1	2	3	4	5

		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
IV2	Social Influence (SI)					
SI1	My family or friends think that I should buy an electric car.	1	2	3	4	5
SI2	My friends or peer believe that purchasing electric vehicle is the proper	1	2	3	4	5
SI3	The people around me will influence my decision making.	1	2	3	4	5

SI4	Opinions and suggestions from people around me will affect my decision to	1	2	3	4	5
SI5	I will adopt an electric car if most of my friends or peer have already used it.	1	2	3	4	5

		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
IV3	Charging Infrastructure Accessibility (CIA)					
CIA1	The amount of charging infrastructure has a big impact on my decision to adopt	1	2	3	4	5
CIA2	Availability of charging infrastructure influences my consideration of buying	1	2	3	4	5
CIA3	I believe that adopting an electric car will make it easier for me to charge at home.	1	2	3	4	5
CIA4	The completeness of EV charging infrastructure, including ventilation, battery, and charging station will affect	1	2	3	4	5
CIA5	If EV charging facilities is near my home or place of employment, this will influence my consideration of buying an EV.	1	2	3	4	5

		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
IV4	Government Intervention (GI)					
GI1	A government direct subsidy strategy for the purchase of electric vehicle is	1	2	3	4	5
GI2	For adopting the electric vehicle, toll road exemptions are significant to me.	1	2	3	4	5
GI3	Government incentives such as personal income tax relief is beneficial to me in adopting electric vehicle.	1	2	3	4	5

GI4	The value-added tax exemption is helpful to me in adopting electric vehicle.	1	2	3	4	5
GI5	The government give adequate support to electric vehicle users.	1	2	3	4	5

		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
IV5	Financial Benefits (FB)					
FB1	The cost of electric vehicle for everyday usage is relatively low.	1	2	3	4	5
FB2	I think that EV can save more to the conventional car as it might reduce travel expenses.	1	2	3	4	5
FB3	The price of electric car is relatively low and acceptable.	1	2	3	4	5
FB4	I think that adopting electric vehicle can save regular maintenance costs such as	1	2	3	4	5
FB5	I think the adoption of electric car will brings me financial benefits in the long	1	2	3	4	5

		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
DV1	Adoption of EV (AEV)					
AEV1	I would choose to drive an electric car instead of a conventional car if I had an electric car.	1	2	3	4	5
AEV2	In the next five years, if I were to buy a vehicle, I would buy an electric vehicle.	1	2	3	4	5
AEV3	I would recommend people to get an electric vehicle.	1	2	3	4	5
AEV4	My next vehicle will probably be an electric vehicle, with a high	1	2	3	4	5

Appendix 2.0 Pilot Test for Internal Consistency Analysis

Scale: Environmental Awareness (Pilot Test)

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.831	5

Scale: Social Influence (Pilot Test)

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.922	5

Scale: Charging Infrastructure Accessibility (Pilot Test)

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.820	5

Scale: Government Intervention (Pilot Test)

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.789	5

Scale: Financial Benefits (Pilot Test)

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.927	5

Scale: Adoption of Electric Vehicle (Pilot Test)

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.897	4

Appendix 3.0 Analysis of Internal Consistency (Fieldwork)

Reliability

Scale: Environmental Awareness

Case Processing Summary

		N	%
Cases	Valid	298	100.0
	Excluded[a]	0	.0
	Total	298	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.842	5

Reliability

Scale: Social Influence

Case Processing Summary

		N	%
Cases	Valid	298	100.0
	Excluded[a]	0	.0
	Total	298	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.833	5

Reliability

Scale: Charging Infrastructure Accessibility

Case Processing Summary

		N	%
Cases	Valid	298	100.0
	Excluded[a]	0	.0
	Total	298	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.845	5

Reliability

Scale: Government Intervention

Case Processing Summary

		N	%
Cases	Valid	298	100.0
	Excluded[a]	0	.0
	Total	298	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.771	5

Reliability

Scale: Financial Benefit

Case Processing Summary

		N	%
Cases	Valid	298	100.0
	Excluded[a]	0	.0
	Total	298	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.847	5

Reliability

Scale: Adoption of Electric Vehicle

Case Processing Summary

		N	%
Cases	Valid	298	100.0
	Excluded[a]	0	.0
	Total	298	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.879	4

Appendix 4.0 Analysis of Pearson Correlation Coefficient

Correlations

		EA	SI	CIA	GI	FB	AEV
EA	Pearson Correlation	--					
	N	298					
SI	Pearson Correlation	.541**	--				
	Sig. (2-tailed)	<.001					
	N	298	298				
CIA	Pearson Correlation	.692**	.640**	--			
	Sig. (2-tailed)	<.001	<.001				
	N	298	298	298			
GI	Pearson Correlation	.643**	.526**	.667**	--		
	Sig. (2-tailed)	<.001	<.001	<.001			
	N	298	298	298	298		
FB	Pearson Correlation	.541**	.645**	.614**	.626**	--	
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		
	N	298	298	298	298	298	
AEV	Pearson Correlation	.581**	.624**	.676**	.643**	.679**	--
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	
	N	298	298	298	298	298	298

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

Appendix 5.0 Multiple Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.778[a]	.605	.598	.52224

a. Predictors: (Constant), FB, EA, SI, GI, CIA

b. Dependent Variable: AEV

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	122.088	5	24.418	89.529	<.001[b]
	Residual	79.638	292	.273		
	Total	201.727	297			

a. Dependent Variable: AEV

b. Predictors: (Constant), FB, EA, SI, GI, CIA

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.110	.221		-.500	.617
	EA	.074	.070	.058	1.054	.293
	SI	.168	.055	.163	3.073	.002
	CIA	.268	.069	.234	3.882	<.001
	GI	.231	.068	.188	3.399	<.001
	FB	.289	.056	.281	5.172	<.001

a. Dependent Variable: AEV