INTENTION TO USE ELECTRIC VEHICLES IN MALAYSIA, A MODIFICATION THEORY OF ACCEPTANCE STUDY

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JUNE 2023

DECLARATION

We hereby declare that:

(1)This postgraduate project/case 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 research project/case analysis 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.

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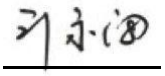
Liu Yongchuang	21ABM04634	

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ABSTRACT

Electric vehicles (EVs) have been developed as an efficient solution for reducing automobile emissions. To ensure the effective integration of EVs into current transportation systems, it is imperative to comprehend the factors that influence consumers' intentions to purchase them. This study aims to provide insights into these factors by focusing on Malaysia current and potential drivers' intention to use EVs. A questionnaire survey was conducted in March 2023 among current and potential drivers in Malaysia, resulting in the acquisition of 400 valid survey responses. The findings indicate that Perceived Ease of Use (PEOU), Environmental Concerns (EC), and Pricing Strategy (PS) are significantly associated with the intention to use electric vehicles among both current and potential drivers in Malaysia. Moreover, the study revealed that Perceived Usefulness (PU) and Safety Concerns (SC) exerted negative influences on consumers' intentions to purchase EVs. These findings can offer practical guidance for devising effective marketing strategies and serve as a valuable reference for EV stakeholders seeking to enhance the effectiveness of current policies related to EV adoption.

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APPROVAL SHEET

This dissertation/thesis entitled **"Intention to Use Electric Vehicles in Malaysia, a Modification Theory of Acceptance Study"** was prepared by Liu Yongchuang and submitted as partial fulfillment of the requirements for the degree of Master of Business Administration (Corporate Management) at Universiti Tunku Abdul Rahman.

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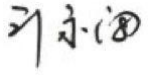

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(Liu Yongchuang)

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LIST OF ABBREVIATION

Remark	Code
Electric Vehicles	EVs
Battery Electric Vehicles	BEVs
Plug-in Hybrid Electric Vehicles	PHEVs
Fuel Cell Vehicles	FCVs
International Energy Agency	IEA
Department of Statistics Malaysia	DOSM
Internal Combustion Engine	ICE
Perceived Usefulness	PU
Perceived Ease of Use	PEOU
Technology Acceptance Model	TAM
Theory of Planned Behavior	TPB
Unified Theory of Acceptance and Use of Technologyp	UTAUT
Social Cognitive Theory	SCT
Theory of Reasoned Action	TRA
Malaysian Electric Vehicle Owners Club	MyEVOC
Independent Variables	IVs
Dependent Variable	DV

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CHAPTER 1

INTRODUCTION

1.1 Research Background

The modern economic model is exploiting natural resources and damaging the environment seriously. Man-made activities are the major driving force of non-renewable resource depletion as well as the global warming crisis. Banister (2005) asserted the ever-evolving transportation system generates harmful environmental effects such as safety, pollution, and maintenance cost issues which significantly affect human and animal health and mortality status.

In this regard, the "Green Economy" was introduced to address the trade-off between economic growth and environmental costs. Thanks to the advent of technology, Electric Vehicles (EVs) is invented. According to the U.S. Department of Energy (2021), EVs consist of Battery Electric Vehicles (BEVs), Plug-in Hybrid Electric Vehicles (PHEVs), and Fuel Cell Vehicles (FCVs). Under the Paris Agreement (2020) that aims to reduce the negative effect of global warming, EVs are benchmarked as an effective "decarbonized" tool. According to International Energy Agency (IEA) Global EVs Outlook's report, the annual global sales turnover of EVs between 2013 and 2018 increased by an average of 50% which encouraged the increase of model design from 90 to 370 (Bibra et al., 2021).

Although most of the world economy sectors were experiencing sluggish demand during the Covid-19 pandemic, the annual global sales turnover of

EVs had grown by 38% in 2020 as compared to 2019 (Govind, 2022). The demand for EVs is growing impressively in China, the United States, Europe, and Scandinavian. 67% of the sales turnover in the western region markets was achieved in Norway. China is the largest EV world market after the government implements the 'Saving and New Energy Vehicle Industry Development Plan' effective from 2012 to 2020 (Tu & Yang, 2019).

Malaysia, a developing emerging country with 32.9 million population as of the third quarter of 2022 (Department of Statistics Malaysia (DOSM), 2022) is one of the potential markets for EVs. The massive growing count of passenger cars in Malaysia makes the transportation industry becoming the second largest air-polluting agent (Malaysian Automotive Association, 2019) and is considered the major culprit for climate change and the greenhouse effect (Higueras et al., 2019).

The usage of non-renewal resources: fossil fuels in operating internal combustion engine vehicles are less environmentally friendly. Nominated as the most air-polluted country in ASEAN in 2019, the Malaysian government introduced a new policy: the National Green Technology, 2019 that aims to gradually phase out the use of combustion engine vehicles. However, the policy is not progressing well, out of 450,000 newly registered passenger cars in 2021; only 274 were EVs (Automobile Association of Malaysia, 2022) despite the EV technology and EV demand in overseas market is progressing well. Therefore, this project aims to examine the behavioral factors that have

been influencing Malaysian non-EV drivers' intention to drive EVs in the future.

1.2 The Market Development of Electric and Fossil Fuels Vehicles

Actually, EVs is introduced way back in the early 1800s when horses and buggies were still the primary mode of transport, in which small-scale electric cars were invented in Hungary. EV attained its heyday in the 1900 but gradually being phased out in the 1930s due to the vigorous development of the petroleum industry. The robust economic development in the 20th century is closely related to the growing demand for vehicles that use fossil-fuel engines. As a result, global warming and depletion of non-renewable resources issues are becoming serious and at an alarming stage now. Therefore, worldwide governments contended to reduce the fossil fuel vehicles in the 2000s.

Driven by the depletion of non-renewable resources and the non-resolving impacts generated by fossil fuels vehicles, EVs dominates the world vehicle market (Tu & Yang, 2019). Over the course of a year, just one electric car on the road can prevent an average of 1.5 million grams of CO_2 from entering the atmosphere (Motorfinity, 2023). Hence, replacing internal combustion engine (ICE) vehicles with EVs is considered to be a viable solution from an environmental perspective for protecting the environment.

According to Nikkei Asia's report dated 10 Nov, 2021; six major car makers committed to phase out fossil fuel vehicles by 2040. In the late 20^{th} century,

the Japanese car maker, Toyota improves the EV's design and performance and introduces the hybrid energy concept in 1997. The Toyota Prius was endorsed as a legendary EV in the 21st century. According to the US Department of Energy (2022), the most expensive spare part of an EV relates to its main energy source tool: the battery. Thanks to the persistent effort from the energy department, the cost of batteries is decreasing gradually.

1.3 Statement of Problems

An MAA report (2022) discloses that only 274 out of 450,000 newly registered passenger cars in the 2021 year-end were EVs. According to social psychologist Gerard Hendrik Hofstede, Malaysians are collectivistic in nature, which is opposite to individualistic culture (News Strait Times, 2018). As a result, potential EV drivers are very much influenced by opinions voiced by EV and non-EV drivers. Therefore, in sourcing problems that impede Malaysian drivers' EV usage intention compared to the usage of fossil fuel vehicles, the author checked if any bloggers or website followers have expressed their perceptions of EVs.

On the Malaysian Electric Vehicle Owners Club (MyEVOC) website, more than 30,000 followers have registered as members and only a small number of them are EV users, and not all of them have driving licenses. The information presented by the MyEVOC website followers, therefore, is used as a reference in getting ideas about the possible barrier factors that discourage Malaysian from using EVs.

First, many are reluctant to use EVs because they are unaware of the usefulness of EVs. In this project, perceived usefulness (PU) is defined as the degree to which a person believes EV usage enhances their travel experience (Davis, 1989). The MyEVOC website followers question whether EVs have similar driving range performance or travel distance (around 500km) after being fully charged as compared with fossil fuels vehicles with similar engine capacity. Also, some EV owners complain that sometimes the battery power decreases rapidly which makes them reluctant to use EVs for long-distance traveling. Nevertheless, electricity recharging cost is cheaper than fuel filling by 28.3% (for RON95) and 51.0% (RON97) in Malaysia (Lim, 2022). Furthermore, some EV models – Tesla Model 3, Kia EV6, and upcoming model Toyota bZ4X support the use of 240V electrical appliances, in which users just need to attach an electrical appliances adaptor (like a toaster, induction cooker, and microwave) to the charge socket station in the mentioned EV models for power supply (Chan, 2022; Gaton, 2021). As the website followers discuss the beneficial and non-beneficial outcomes as a result of EV usage, the current researcher is motivated to examine how the overall Malaysian non-EV drivers perceive the usefulness of EVs and whether the PU of EV encourages or discourages them to use EVs in the future.

The second problem voiced by the MyEVOC website followers relates to EV's perceived ease of use (PEOU). This project defines PEOU as people's subjective evaluation of the ease and difficulty of driving and maintaining an EV. As compared to fossil fuel vehicles with equivalent model and age, the followers worried that the probability of higher failure of EV engine is higher

(Mike, 2022); EVs need longer electricity charging time (about 17 hours to charge a 24 kwh Nissan fully with a level 11.4 kw electrical transmission); and less availability of electric charge stations in a rural area as compared to petrol kiosks (Tham, 2022). According to Shahrol, the MyEVOC president, workshops or repair services for EVs are not sufficiently available in Malaysia (Amir, 2021). Therefore, the PEOU influence is examined in this project as well.

The third problem that discourages the usage of EVs relates to safety concerns since the functionality of EVs depends entirely on electrical systems. All EV models available in the Malaysian market are equipped with a high-voltage electrical system that ranges from 100 to 600V. This makes the MyEVOC website's followers fear for their safety – what will happen when the EV is overcharged and will an electrical short circuit happen at any time? Therefore, it is worth examining whether such a safety problem is a barrier factor that discourages non-EV drivers' intentional usage behavior in the main study.

Fourthly, MyEVOC website followers, especially EV drivers, support the use of EVs for environmental protection purposes. The usage of EVs reduces the emission of hazardous gas and noise pollution as compared to fossil fuel vehicles. Such a reaction is consistent with Asadi et al. (2021), Choi and Ji (2015), and Irfan and Ahmad's (2021) study results. Dominic (2021) asserted that the impressive growth of demand for EVs in the worldwide market is partially due to the increasing awareness of environmental protection. However, in Malaysia, EVs are only a small market segment. Therefore,

protecting the environment through the usage of EVs have yet infused into the local people's minds (Joshi, 2018) and this motivate the current researcher to examine how concerned Malaysian drivers are about environmental protection and whether the environmental concerns attitudes drive them to use EVs in the future.

Another problem source shows that the pricing factor is a significant variable that explains EV usage intention (Hidrue et al., 2011; Kelecsenyi & Safari, 2022). The selling price of EV vehicles sold in Malaysia ranges from RM140,000 to RM 700,000, which is beyond the mid and lower-income group earners' purchasing power (Chan, 2023). Nevertheless, Vafaei-Zadeh et al. (2022) argued that other financial benefits such as income tax relief for EV purchases and electricity charging costs can offset the selling price effect. Therefore, in examining the pricing effect, the initial purchasing and maintenance financial cost is taken into account in this project in measuring the EV's pricing strategies variable.

To solve problems related to PU and PEOU, the Technology Acceptance Model (TAM) is modified in developing the current project's research model by including three predictor variables: safety concerns, environmental concerns, and pricing strategies variables.

1.4 Research Questions

i. How are the perceived usefulness and ease-of-use of electric vehicles related to the electric vehicle usage intention in Malaysia?

ii. How are the safety and environmental concerns, and pricing strategies of electric vehicles related to the electric vehicle usage intention in Malaysia?

1.5 Research Objectives

Generally, this project proposes to examine how behavioral factors encourage and discourage EV usage intention in Malaysia, specifically;

i. To examine the direct effects created by perceived usefulness and ease-of-use of electric vehicles on the vehicle's usage intention in Malaysia; and
ii. To examine the direct effects created by safety and environmental concerns, and pricing strategies of electric vehicles on the vehicle's usage intention in Malaysia.

1.6 Significance of the Study

In order to provide value added information, it is necessary to evaluate how the project's conceptual framework helps policymakers in revising current business strategies and giving research idea to academics in developing future research frameworks.

1.6.1 To The Policymakers

The National Automotive Policy 2020 is implemented to elevate Malaysia's automotive industry in the era of digital transformation. A list of public policies attributed to financial incentives on sales, excise, and import duties on EVs are implemented in aiming to encourage more car users to drive EVs. On

top of that, in encouraging the demand for EVs in the Malaysian market, EV sellers provide complimentary test drives and comprehensive explanations about EV usage and maintenance in order to garner higher interest for purchasing from potential buyers. In addition, EV suppliers provide a wide range of car models in the Malaysian market. As of early 2022, 16 EV models are sold in Malaysia (Wapcar.my, 2022) and parts of the models were under Hyundai, Nissan, Kia, and Mazda branding. These new models exude a futuristic aura, equip with high operating power, and an array of pricing options are provided. Furthermore, the government, EV suppliers, and the charging infrastructure industry are planning to collaborate in increasing the charging station counts in Malaysia. Sadly, compared with other emerging markets and neighboring countries' markets, the growth rate of EV usage in Malaysia is far behind (Veza et al., 2022).

EV manufacturers intend to invest RM1 billion and RM7 billion in Malaysia for the establishment of manufacturing plants. Such an investment plan is benefitting Malaysian in terms of the creation of a spill-over effect to domestic supporting industries which eventually increase the income and job opportunities of people residing in Malaysia. Nevertheless, such benefits can happen if the demand for EV vehicles is growing.

In summary, the public and related private agencies related to EVs are performing important roles in providing tangible short-term and long-term benefits to potential EV buyers but the demand for EVs in the Malaysian

market is not growing well. As a result, it's worthwhile to examine how behavioral variables relate to EV usage intentional behavior.

Compared to other studies, this project defined the items of each variable more precisely and in the EV usage context by getting feedback from pre-test and pilot study's participants so that the project's research model and results can provide comprehensive and related information to public and private agencies in understanding potential EV buyers' behavior holistically. For example, if PU is a significant variable, the government and EV sellers need to work harder in improving the technical aspects which relate to electric charging frequency and feasibility, longer travel distance, and maintenance cost. Also, the government and EV sellers need to alert potential car drivers that the electric energy stored in an electric vehicle can be used as an energy source/ supply in heating electrical appliances like toasters, induction hotplates, or microwaves, which could be useful during traveling or for outdoor activities if the hypothetical effect created by PEOU on intentional usage behavior supports.

In brief, this project provides useful information that helps public and private agencies to plan and implement tactical strategies that are the potential in increasing the growth of EV market demand in Malaysia.

1.6.2 To The Academics

The technological advancement of EVs has been vigorously improved and therefore EVs have the potential in becoming mainstream in the future

automotive industry (Veza et al., 2022). As a result, technical and behavioral studies about EVs are increasing over time. In behavioral studies, the Theory of Planned Behavior (TPB) and TAM frameworks have been widely used in helping past researchers to develop their conceptual framework in examining drivers' EV adoption intentional behavior. A number of variables have been incorporated into the TAM model, such as driving experience (Mailizar& Maulina, 2021); technical infrastructure (Kalayou & Tilahun, 2020); social influence; and social recognition (Vanduhe & Hasan, 2020).

Although the safety and environmental concerns, and pricing strategies variables have been tested in past studies, past research models that compiled the examination of the three variables in one empirical study are not published in Web of Science and Scopus journal databases. The project's research model fills the literature gap by enriching the modified TAM's theoretical framework, TAM2 with the three additional variables that serve as predictors of EV usage intention.

1.7 Organization of the Project

This project consists of five chapters. The first chapter aims to detect the knowledge gap so that the author has an idea of which behavioral variables need to be examined. Appropriate research questions and objectives then are developed. The author also examines how the current research model assists policymakers and academics in revising current business strategies and research work. Chapter two discusses how past studies' conceptual frameworks help the authors in detecting the literature gaps and; developing

current research models and hypotheses. Meanwhile, the methodology of the project in chapter three discusses ways to collect reliable and valid data. In chapter four, the descriptive and inferential statistics results were presented and interpreted to confirm the current study's hypotheses. Last, the accomplishment of the current study's objective is discussed in chapter five so that appropriate implications to policymakers and academics can be recommended based on the current study's result. The study limitations and recommendations for future research are provided as well.

CHAPTER 2

LITERATURE REVIEW

2.1 The Theory of Technology Acceptance Framework

Introduced by Davis, Bagozzi, and Warshaw (1989), the Technology Acceptance Model (TAM) is introduced to enhance the predictive power of the Theory of Reasoned Action (Fishbein & Ajen, 1975); gauge users' pre-acceptance of new technology (Aziz et al., 2020) and innovative product. Referring to Figure 2.1, external variables are presumed to have both antecedent positive and negative impacts on PU and PEOU. PU shows the degree to which users believe that the implementation of technology will enhance an individual's overall performance while PEOU shows an individual's perception of using the technology effortlessly.

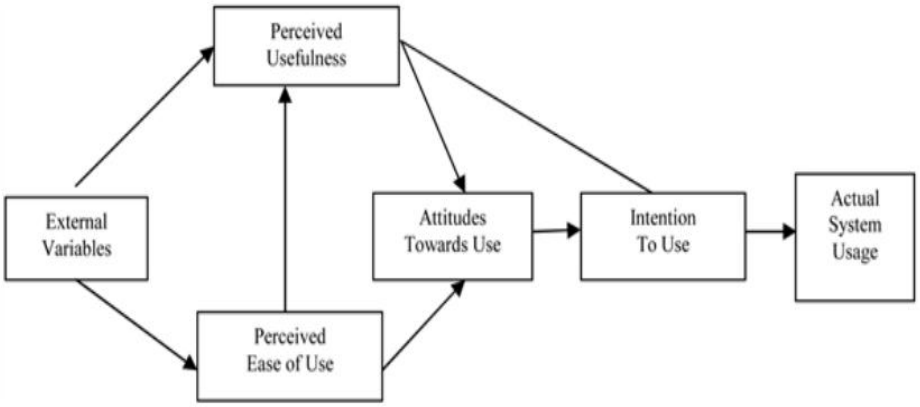

Figure 2.1: The Technology Acceptance Model's Original Framework
Source: Davis et al. (1989)

Both PU and PEOU variables create indirect effects on the user's actual usage behavior through the respondent's attitudes and intention to adopt the studied

object (Ajzen et al., 2008) - see Figure 2.0. However, the definition of the first version is relatively narrow, and past studies' findings show that the variables were producing different magnitude effects in different study contexts (Ibrahim et al., 2018; Rarhini et al., 2013).

King and He (2006); and Dugar (2018) argued that the rationale behind the wide usage of the TAM model across various research disciplines is mainly because this theory is simple and easy to understand (Aziz et al., 2020). Venkatesh and Davis (2000) proclaimed that TAM is only able to explain about 50% of the variance in the acceptance level of technology of the usability evaluations. Therefore, Venkatesh and Davis (1996) later remove the mediator: attitude from the original version to become TAM2 or the PU and PEOU variables now serve as direct predictors of behavioral intention.

Inspired by the TAM2 model, Venkatesh et al. (2003) introduced the Unified Theory of Acceptance and Use of Technology (UTAUT) that combines a total of eight models, including TRA, TPB, TAM, Motivational Model (MM), Combined Theory of Planned Behavior (TPB) and TAM (CTPB-TAM), Model of PC Utilization (MPCU), Diffusion of Innovation Theory (DOI) and Social Cognitive Theory (SCT). Oye et al. (2012) suggested that UTAUT overcomes the loopholes of TAM that ultimately enhanced the predictive efficiency to 70%.

In the latest version, Venkatesh and Bala (2008) integrate TAM2 with the following antecedent variables of PEOU: individual differences, system

characteristics, social influence, and facilitating conditions so that the study result facilitates better implications for managers in making IT adoption decisions. Figure 2.2 summarizes the evolution of TAM.

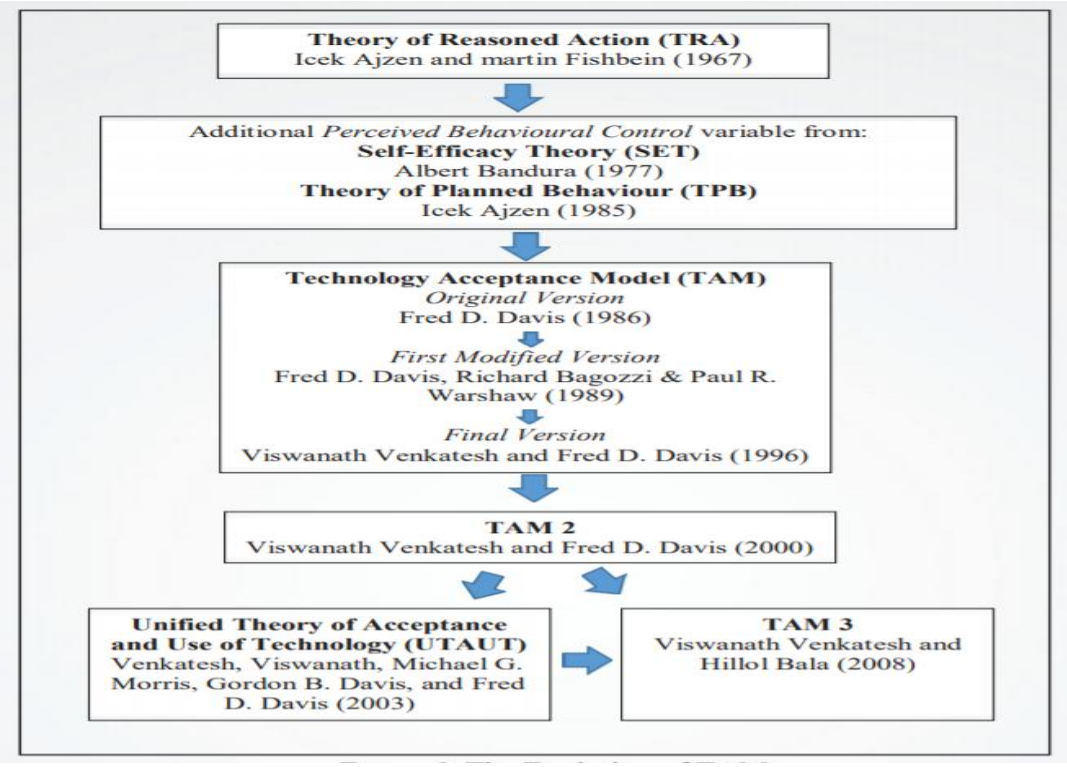

Figure 2.2: The Revisions of Technology Acceptance Model
Source: Habidin et al. (2020)

This project adopts the TAM2 model because the identified problems justified the need to examine the original variables: PU and PEOU; and scholars suggest removing the mediating effect created by the attitude variable so that the dispute of the intentional behavior's outcome can be minimized.

2.2 Electric Vehicles Studies

The diffusion of EV acceptance across various geographical areas has become a hot discussion topic among scholars. Coined on the principle of a cleaner environment with lower air pollution, EVs are endorsed as one of the

key elements in attaining the goal of carbon neutrality (Huang et al., 2022). A comprehensive study was conducted by the World Bank in 2022 to investigate the diffusion of EV uptake across the world and a set of data across many countries was collected (The World Bank, 2022). Three major factors were highlighted for further investigation; discrepancies in performance among EV models, charging infrastructure, and financial incentives. In forecasting the demand for EVs, Sierzchula et al. (2014) examined EV adoption across 30 countries and concluded that similar factors: financial incentives and electrical charging infrastructure together with environmental protection factors are the major influences that impede consumer EV usage intention.

The EV user's behavioral variables were examined in countries that have huge EV markets such as China, Norway, and Korea (see Table 2.1). However, behavioral studies in countries that have small EV markets like Malaysia are only a few. Malaysia is a potential market for EVs as the standard of living is higher than in many other developing countries, traveling using private cars is a norm practice, and the government is supporting the residents to use EVs. Hence, it is justifiable to understand the barrier and motivational variables that have been influencing Malaysian potential EV users' behavior (Khazaei, 2019; Khazaei & Tareq, 2021).

In Vafaei-Zadah et al.'s (2022) study, the Gen-Y population in the emerging market was targeted. As Malaysians can become a legitimate drivers as young as 17 years old (Nair, 2021) and many senior citizens residing in cities

and rural areas are driving, this study does not aim to focus on a specific generation population.

Many behavioral theories or models were used to examine the EV consumers' behavior, including Model Based Study (Shepherd & Harrison, 2012); Theory of Reasoned Action (TRA) (Afroz et al., 2015); TPB (Adnan et al., 2017; Asadi et al., 2021); TAM (Cocks et al., 2022; Thilina & Gunawardane, 2019; PALA& MOLA, 2022). The adoption of a specific theory or model depends on whether the chosen theoretical framework can solve the problems experienced by studied respondents.

Table 2.1: Summary of Electric Vehicle Studies

Author	Remark	Basic theory	Findings
Shepherd et al. (2012)	Examining the relationship between EV acceptance and subsidies in the United Kingdom.	System Dynamics Model	• Subsidies have little impact on EV uptake under traditional business conditions. • Subsidies play an important role under a conditional marketing scenario.
Wang et al. (2014)	Predicting consumers' intention to adopt hybrid EVs in China using an extended version of TPB.	Extended Theory of Planned Behavior	• Attitude towards hybrid EVs, subjective norm, perceived behavioral control, and personal moral norm as a mediator for environmental concerns and intentional behavior are significant variables in encouraging respondents to use HEVs.
Choi and Ji (2015)	Examining the relationship between TAM and trust variables on the adoption of autonomous EVs in South Korea.	Technology Acceptance Model (TAM)	• PU and trust are core determinants of the intent to use autonomous vehicles
She et al. (2017)	Exploring the barriers factors in adopting EVs in Tianjin, China.	Infrastructure Barrier	• Consumer interest in EVs remains comparatively small • Consumers are unsure of the performance and safety issues of EVs, and the driving range per charge.
Beldad and Hegner (2018)	Examining the determinants of Fair Trade product purchase intention among Dutch consumers and the moderating effect created by the gender variable.	Extended Theory of Planned Behavior	• The intention of both male and female customers to buy fair trade products is focused on moral obligation as well as self-identity

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Author	Remark	Basic theory	Findings
Wang et al. (2018)	Measuring the effects of consumer's knowledge about EVs, perceived risk, PU, and current financial incentive policies on consumers' intention to adopt EVs in China	Technology Acceptance Model (TAM)	• Consumers' knowledge of EVs linked positively and significantly to PU, attitude, and intention to adopt EVs. However, the perceived risk is a negative and significant way.
Mohamed et al. (2018)	Evaluating the variations in people's attitudes about EVs among seven vehicle body styles in Canada	Theory of Planned Behavior (TPB)	• Attitude and perceived behavioral control are the most powerful factors influencing individual intentions to acquire EVs
Wu et al. (2019)	Examining the TAM and environmental concerns influence on the public acceptance of autonomous EVs in China	Technology Acceptance Model (TAM)	• The green PU, PEOU, and environmental concerns have a favorable association with people's plans to use AEV
Semenjin et al. (2019)	Examining the determinants of purchasing environmentally friendly cars by disabled consumers in the Netherlands	Theory of Planned Behavior (TPB)	• Attitude and social norms are significant determinants of environmentally friendly buying intentions
Shahlender and Sharma (2020)	Examining the behavioral factors that have been influencing consumers' willingness to purchase EVs in India	Extended Theory of Planned Behavior	• Attitude, subjective norms, perceived behavioral control, moral norm, and environmental concerns have a positive relationship with the adoption intention of buyers.

Continue next page

Author	Remark	Basic theory	Findings
Asadi et al. (2021)	Examining determinants that influence consumers' intention towards adoption of EVs in Malaysia	Norm Activation Model and the TPB	• Perceived value, attitude, the aspiration of responsibility, subjective norms, persona norms, perceived consumer effectiveness, and awareness of consequences influenced consumers' intention to purchase EVs.
Irfan and Ahmad (2021)	Examining the correlation between consumers' information and willingness to buy EVs in India	Big Five Personality Traits	OPEN, CONS, EXTR, and AGRE positively moderate the relationship between consumers' information and willingness to buy EVs.
Schroder et al. (2021)	Exploring the current situation of the EV market in ASEAN	N/A. This is an exploratory study	• Thailand surpasses other ASEAN countries in EV adoption due to a comprehensive policy of electromobility
Ju et al. (2021)	Examining factors that prohibit consumer awareness of EVs and the purchase of eco-friendly vehicles in Korea	Text Mining Techniques	• Consumers thought EVs were fuel-efficient and quiet, but poor battery performance and complaints on battery replacement become a major concern • Lack of charging facilities and expenses have lowered the drivers' intention

2.3 Safety Concerns, Environmental Concerns, and Pricing Strategies Studies

Safety issue impedes EV usage intention (Varga & Mariasiu, 2019). For example, respondents worry about battery fire accidents, overcharged, and electrical short circuits (Feng et al., 2018). Interestingly, the low noise produced by EVs which was considered as an advantage previously is now being questioned and could become a new safety risk for road users (Del et al., 2020). People walking on the road may not be aware an EV is near them when EV has a low level of noise and accidents may occur.

Concern about environmental change is an attribute that shapes consumers' purchase decisions against EVs. For example, World Bank views EVs as eco-innovators to mitigate pollution complications caused by the transportation sector. In China, Wang (2013) proclaimed that EVs allow the country to improve its air quality via hazardous emission reduction. Current and potential users who have the intention to safeguard the environment or reduce the deterioration of the current living environment react positively toward the purchase of EVs (Jian & Wei, 2019). However, as compared with other variables, studies that examine people's engagement in protecting the living environment are still limited.

The effect of pricing strategies is conceptualized in EV studies (Degirmenci & Breitner, 2017; Gomez Vilchez et al. 2019; Jian & Wei, 2019; Turrentine & Kurani, 2007). Figure 2.3 shows the conceptualization of the pricing strategies developed by Jian and Wei, (2019). Degirmenci and Breitner (2017); Gomez

Vilchez et al. (2019); Green (2002) and Turrentine and Kurani (2007) suggested the EV selling price was the paramount concern of consumers in making car purchases which the study's respondents chose fossil fuel vehicle over EV because EV was more expensive. Due to budget constraints, consumers need to evaluate short-term and long-term perceived costs and benefits when making any purchase decision. Furthermore, EVs has higher maintenance cost that is reflected by pricy charges battery, and long charging period post a negative impact on EV sales in South Korea.

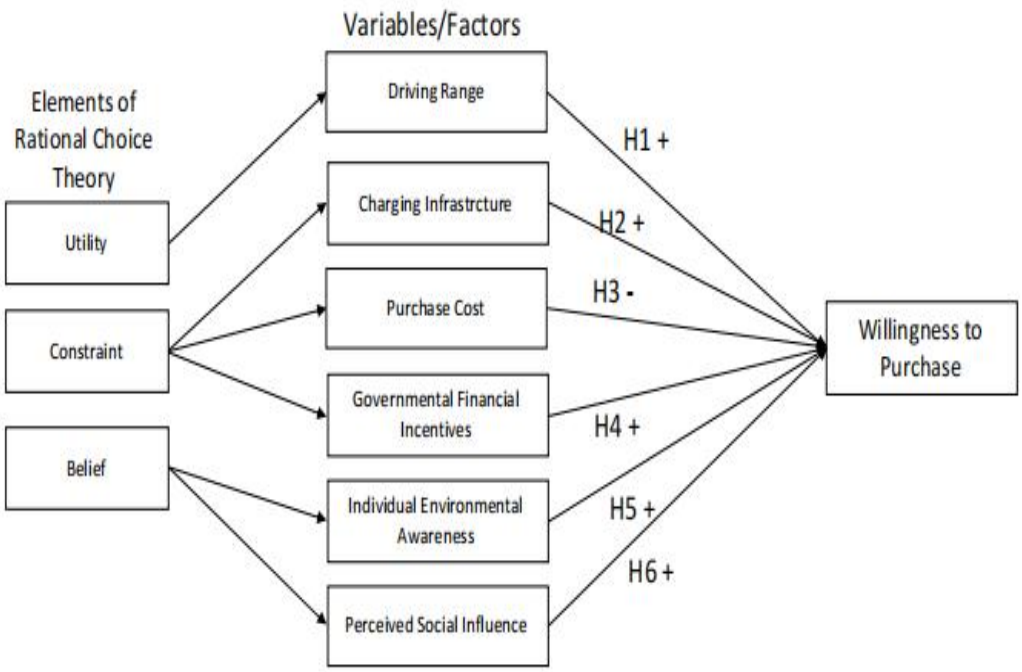

Figure 2.3: Former Study's Framework on Pricing, Environment Factors, and Intentional Behavior
Source: Jian and Wei (2019)

2.4 Development of Current Hypotheses

The following sub-topics explain the development of two hypotheses for each research objective. Hypotheses, H1 and H2 are for the first research objective, while H3 and H4 are for the second research objective.

2.4.1 Perceived Usefulness and Electric Vehicle Usage Intention (H1)

As reported in the problem statement sub-topic, the current researcher predicts that PU and EV usage intention is positively related because many followers of the MyEVOC website agreed that their purchasing intention increases if EVs provide similar driving range performance or travel distance as fossil fuel vehicles. Such a response is supported by Bech-Larsen (1996); and Sriram and Forman's (1993) study results. Also, to MyEVOC followers, energy refilling cost is a motivational factor that encourages their intentional usage intention. In other words, if electricity recharging cost is lower than fuel filling cost, potential users' PU increases which in turn increases their EV usage intention. The website follower's concern is supported by Lim (2022) and Sato's (2013) study results. Hence, the following hypothesis is formed,

> H1: The perceived usefulness of electric vehicles relates to the usage intention positively.

2.4.2 Perceived Ease-of-Use and Electric Vehicle Usage Intention (H2)

The MyEVOC website followers also discussed EV's PEOU. According to them, if EV is not easy to maintain such as a higher probability of experiencing engine breakdown and lengthy time needed to re-charge the EV's battery, their EV usage intention drops. In other words, when EV is easy

to maintain, the consumer's PEOU level increases, and as a result, the EV usage intention increases too. The problem reported above is supported by Amir (2021); Asadi, et al. (2021); Dixon et al, (2020); and Tham's (2022) EV studies. Therefore, the author predicts that,

> H2: The perceived ease-of-use of electric vehicles relates to the usage intention positively.

2.4.3 Safety Concern and Electric Vehicle Usage Intention (H3)

The need to equip EVs with a high-voltage electrical system is inevitable because the functionality of EV's driving and other gadgets depends on electricity as energy supply. Besides, unprecedented accidents may occur when passers-by on the road don't realize an EV is located near them because EVs generate low noise. Such safety issues are supported by studies carried out by Chen et al., 2021; Diza et al., 2020; Slattery and Kendall, 2021; and Zhang et al., 2022.

In contrast, Andrew (2022) found that safety features are not significantly affecting the study respondent's EV usage intention. As EV is not widely used by people in the USA it is challenging for non-EV drivers to evaluate EV safety features compared to EV drivers cohesively. Furthermore, although EV is a silent vehicle, EVs are equipped with multiple mechanisms that prevent fires and protect passengers from flames in the event of an accident. Respondents that aware of such a mechanism responded positively compare to non-aware respondents.

Nevertheless, this study predicts that safety concerns and EV usage intention is positively related because the MyEVOC, a Malaysian website that consists of 30,000 followers did concern about their safety – what will happen when the EV is overcharged and will an electrical short circuit happen at any time? In line with the follower's worry, this study anticipates that,

H3: Safety concern while using an electric vehicle relates to the usage intention positively.

2.4.4 Environmental Concerns and Electric Vehicle Usage Intention (H4)

Past study results support H4 or the respondent's EV purchase intention increases when they perceive the usage of EV reduces the emission of hazardous gas and noise pollution (Asadi et al. 2021, Choi & Ji, 2015, Dominic, 2021, Irfan & Ahmad, 2021; Joshi, 2018). In other words, respondents' awareness about the use of EVs in deteriorating or protecting their living environment is one of the major elements that motivate their EV purchasing behavior (Hansla, 2011). Also, the EV usage intention increases when the respondents are concerned about global warming and resource depletion issues (Hartmann & Apaolaza-Ibanez, 2012).

However, in He et al.'s (2018) study result, environmental concern is not a significant variable that encourage or discourage the EVs purchasing intention. Plausibly, this is because a group of respondents recognizes the environmental attributes of EVs, while another group of respondents the usage of EVs has only little impact on protecting the environment. This is consistent with

Bamberg's (2003) study; the influence of environmental concern on green purchase intention is not significant.

Nevertheless, this study projects that environmental concern behavior and EV usage intention is positively related because the negative effect as a result of the global warming issue is experienced in worldwide countries, including Malaysia. The flooding issue is becoming serious and unpredictable, and geographical experts denote that low land-level places are going to be submerged by water in the future. In an attempt to reduce the global warming issue, the current researcher believes Malaysia will adopt environmental protection practices and use EVs instead of fossil fuel vehicles. Hence, H4 is formed.

H4: The respondent's concern about environmental well-being relates to the electric vehicle usage intention positively.

2.4.5 Pricing Strategies and Electric Vehicle Usage Intention (H5)

The high selling price of EVs drives potential EV users especially the mid and lower-income group earners to have less intention to purchase EVs (Chan, 2023; Hidrue et al., 2011; Levay et al. 2017; Kelecsenyi & Safari, 2022; Vafaei-Zadeh et al., 2022). In brief, constrain of the financial budget is a significant variable in determining a potential user's purchasing intention (Green, 2002). However, according to Vafaei-Zadeh et al. (2022), if the potential users are aware that the electricity charging cost is actually lower and appreciate the government incentives like tax relief for EV purchases, their purchasing intention increases.

The current researchers hypothesize a positive relationship between pricing strategies and EV usage intention because the EV pricing strategies is not favorable to potential users. Or the selling price of an EV is too high and thus potential users may feel it is risky to invest in purchasing EVs, even though they can afford to pay the price. Furthermore, Malaysia is exporting oil and the usage of petrol in gasoline vehicles is subsidized by the government. In encouraging potential users to use EVs, the EV pricing strategies needs to be attractive. Potential user's usage intention increases when potential users favor the EV pricing strategies and such a behavior is shown in H5.

H5: The pricing strategies of the electric vehicle relates to the usage intention positively.

2.5 Current Research Model

The project's research model is developed based on the TAM2 framework, which explains the direct relationship between each predictor: PU and PEOU and the intentional behavior. As the hypotheses for additional variables: safety concerns, environmental concerns, and pricing strategies are discussed in detail in the previous subchapter, the author therefore modify the TAM2 framework with another three predictors (see figure 2.4).

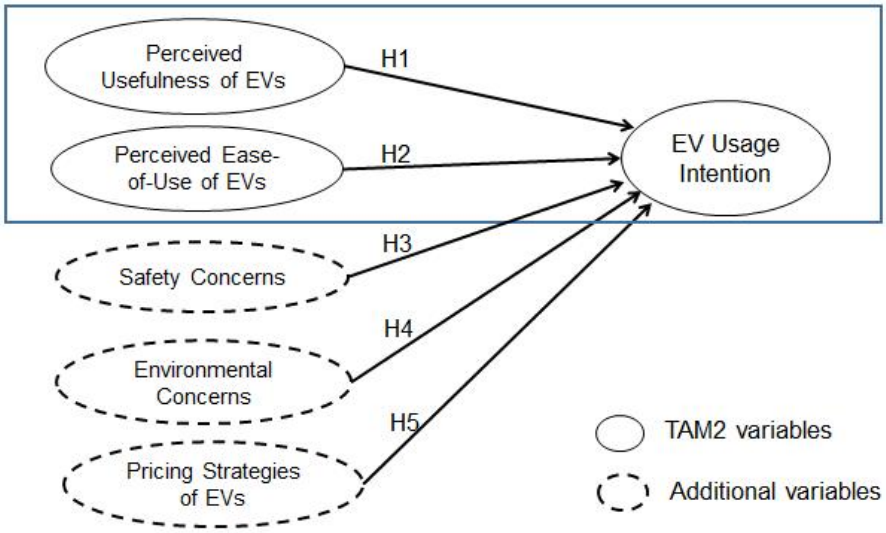

Figure 2.4: The Proposed Conceptual Framework
Source: Developed for current project

CHAPTER 3

RESEARCH METHODOLOGY

This chapter presents the research approach of this project, how the finalized questionnaire is developed through the pre-test and pilot study for the main study, and how the main data was collected and analyzed.

3.1 Research Design

This project uses a quantitative approach to confirm current hypotheses because qualitative data to identify the items of each variable is not necessary as the items especially that aim to measure the original TAM variable: PU and PEOUs have been tested in many studies (Alfadda & Mahdi, 2021; Kamal & Kakria, 2020; Mailizar et al., 2021). A structured questionnaire, therefore, is used to collect quantitative data.

As suggested by Bryman (2001) and Lichtman (2013), quantitative data enable a comprehensive series of statistical analyses to be undertaken in determining the direct effects created by the independent variables (IVs) or predictors: PU, PEOU, safety concerns, environmental concerns, and pricing strategies on EV usage intention among the current and potential drivers in Malaysia.

In this study, cross-sectional data were collected for the purpose of comparing different samples at a single point in time. Cross-sectional studies also enable researchers to compare each studied variable result with other studies that are

carried out currently or previously (Loh & Venkatraman, 1992). A longitudinal study or collecting data from the same sample repeatedly over a prolonged period of time is necessary when the control variables such as respondents' product knowledge and EV's safety element and pricing structure change (Caruana et al., 2015).

3.2 Sampling Design

In discussing the sampling design of the current project, it is necessary to know the identity of target population in detail, only then the sample size can be determined and appropriate sampling method can be undertaken.

3.2.1 Target Population

This project targets the current and potential drivers residing in Malaysian city, suburban, and rural areas (irrespective of the person's income level and citizenship). Driving own vehicle is a normed practice in Malaysia because the public transport infrastructure is not well provided in suburban and rural areas. Also, the target age is 17 years old and above as this is the threshold age for driving license application. Possessing a valid driving license is not a requirement in this study because we are also targeting the potential users of EVs and their EV intentional usage behavior. Furthermore, the Malaysian government targets 15% of the nation to use EVs by 2030 and according to MIDA (2023), this figure is expected to reach 38 percent by 2040. EV usage is also a public measure to reduce greenhouse gas emissions.

3.2.2 Sample Size

Figure 3.1 shows that the number of registered vehicles increases yearly, from 2010 to 2021 and the total count in 2021 is 17.7 million. However, according to the former Transport Minister, Wee Ka Siong, the total count of licensed drivers was reported at 15.8 million as of 2020 (NST, 2021). This shows that the number of drivers increases and legitimate licensed drivers owe more than one vehicle, probably one vehicle for office use and another vehicle for personal use.

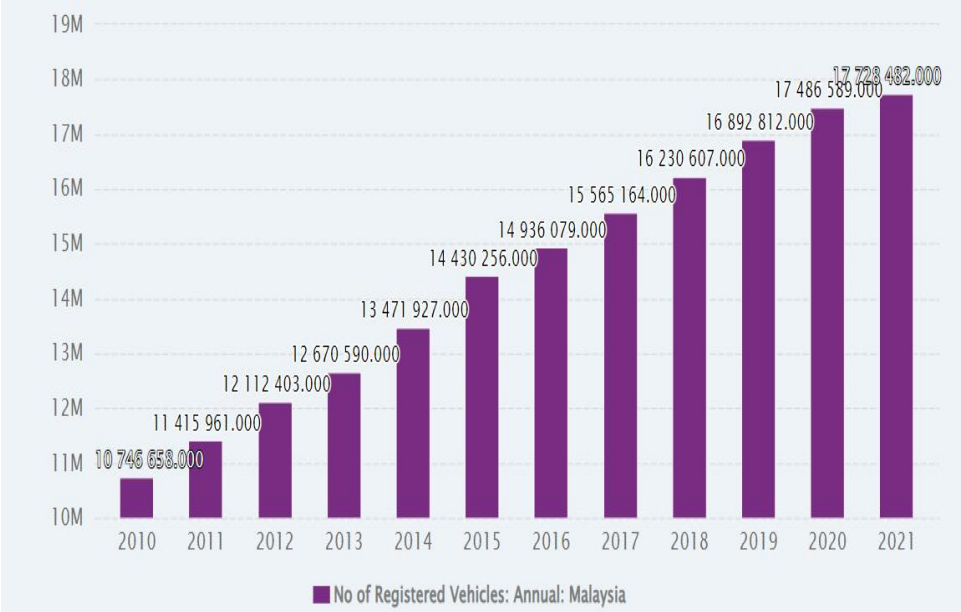

Figure 3.1: Number of Registered Vehicles 2010-2021
Source: ceicdate.com (2022)

Based on the estimated population count of 15.8 million, the project uses Solvin's Sample Size Formula to estimate the ideal sample size for this project.

$$n = N / (1 + Ne^2) \qquad (1)$$

where,

n represents the sample size;

N represents the population size;

e represents the margin of error

Taking a 95% confidence level and 5% of margin of error, the ideal sample size is 400.

3.2.3 Sampling Method

In order to minimize sampling bias, the quota sampling technique is implemented concurrently. In the first phase of the sampling method, the population is segregated into two major zones according to their residency area: East Malaysia and West Malaysia. This is essential to ensure the finding would reflect the actual disposition of each stratum, and also to assure that each stratum is not over-represented. According to DOSM (2022), the proportion of the total population between East and West Malaysia is approximately 4.5:1, so the author will collect 80 questionnaires out of 400 from East Malaysia respondents and 320 from West Malaysia.

In the subsequent stage, the snowballing method is adopted in selecting the respondents from each stratum. The method allows the author to reach a 'hidden' target who resides far away from the author's residing area. Also, the absence of a sampling frame that shows the identity of current and potential drivers, with or without a driving license that age above 17; is not published for public view as such personal data is considered highly private and confidential. The use of probability sampling in selecting the respondents, therefore, is not feasible in this project.

With the assistance of facilitators residing in West Malaysia, the snowball sampling process was initiated by disseminating questionnaires to respondents within their social circle, such as friends and family members, through e-social platforms like WhatsApp and WeChat. Subsequently, these individuals were requested to aid the researcher in distributing the e-questionnaire among their own social network or family members who met the study's population criteria. The same process was repeated for the second phase, during which respondents were requested to forward the e-survey to their family or social networks within the defined population of the current study. After collecting 320 completed questionnaires, the researchers instructed the last batch in West Malaysia to stop distributing them.

A similar sampling procedure is applied for the collection of data from respondents residing in East Malaysia using e-social platforms like WhatsApp and WeChat. The fieldwork stops when a total of 400 responses were collected.

3.3 Main Data Collection Method

3.3.1 Development of Questionnaire

First, the current researchers checked the item statements that have been used by past researchers is measuring specific IVs and dependent variable (DV) of this study. Then, the statements of item are modified to suit the current study context. Next, the modified statements were given to the pre-test expert or the current researcher’s academic supervisor for checking. The following sub-topics discuss the subsequent processes: pre-test and pilot study.

3.3.1.1 Pre-test and Pilot Study

Both pre-test and pilot study were implemented in order to ensure the items retain their original meaning or to collect what aims to be collected in the context of this project. In mitigating the non-sampling errors, the questionnaire's item statements had undergone rounds of tedious review by an academic expert and selected pilot study participants from the targeted population. This process is imminent before distributing the finalized questionnaire to the targeted respondents. In this way, the probability of understanding and comprehending each item statement among main study respondents increase.

A pre-test was implemented prior to the pilot study. The original and drafted item statements were given to the pre-test expert or the researcher's academic supervisor for checking. The expert facilitates the current researcher in ensuring the prepared questionnaire's statements of each item denote clearly what the item originally aim to measure, wording of the statements are aligned with the current study context, two statements are not measuring the same output, or not more than one behavioral action is measured in one item statement.

After viewing the first modified questionnaire item statement, the pre-test expert requested the current researcher to let her view the problems faced by potential EV users. After reading the statements of the problem, the expert suggested the current researcher to include items that are measuring the respondent's problems and have yet been measured in past studies (see PU1

and PU2 shown in Table 3.1). Also, the expert re-phrased the PU3, PU4, and PU5 item statements so that the statements reflect the current context better. Item PU6 is removed because measuring the speed limit is very subjective and the expert doubt not many respondents can answer this question. Other item statements' wordings are modified so that the measuring element can be more clearly shown. The pre-test result is comprehensively shown in Table 3.1. As per the expert's recommendation, the questionnaire item statements were modified accordingly.

Table 3.1: Pre-Test Result

Variable	Item's code	Measuring Items
The perceived usefulness of EV (IV1)	PU1	The frequency for charging an electric vehicle should be lesser than the frequency for fuel-filling a vehicle with similar engine capacity (e.g. 1.5cc), age model, and travel distance. *Comment: In response to the problem presented by the preliminary study, you can add this item as an additional item.*
	PU2	I should be able to charge the electric vehicle using a residential/ home electrical charger rather than merely depending on electricity charging stations that are available at specific locations for electrical energy supply. *Comment: In response to the problem presented by the preliminary study, you can add this item as an additional item.*
	PU3	~~The travel distance of electrical vehicles after being fully charged as compared with fossil fuels consumption vehicles can meet my requirement.~~ The maximum travel distance of a fully charged electric vehicle should be comparable or lengthier to the maximum travel distance of a fully fuelled vehicle with similar engine capacity (e.g. 1.5cc) and age model.
	PU4	~~Based on the current price of fuel in Malaysia, the cost of electrical price is lower than fuel by 28.3% and 51.0% at most as compared with RON95 and RON97.~~ ~~*note:RON95=RM2.05/L; RON97=RM3.95/L (19/01/2023)~~ The cost of charging an electric vehicle should be comparable to or lower than the cost for fuel filling a vehicle with similar travel distance, engine capacity (e.g. 1.5cc), age model, and travel distance.
	PU5	~~The functionality that Electric vehicles allow camping enthusiasts to use standard appliances like toaster, induction hotplate or microwave by providing power brings~~. The electrical energy stored in an electric vehicle can be used as an energy source/ supply in heating electrical appliances like toasters, induction hotplates, or microwaves. Such facilitation is useful for outdoor events like camping.
	~~PU6~~	~~EVs accelerate more rapidly than fossil fuels vehicle.~~ *How do you measure the acceleration – pick up power or the maximum speed? If you are referring to maximum speed, it's more appropriate if the target is professional car-racing drivers. In Malaysia, driving about the threshold speed limit is an offence.*

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Variable	Item's code	Measuring Items
The perceived ease-of-use of EV (IV2)	PEOU1	Technically, electric vehicles shouldn't be difficult to drive.
	PEOU2	The likelihood of an EV's engine to get malfunctioning/ breaking down/ failing should be ~~compared equivalently~~ comparable with fuel vehicles of similar engine capacity, aged model, and usage purpose and frequency.
	PEOU3	Technically, I can tolerate the length of electricity charging time which takes about 17 hours to fully charge an electric car using residential/home chargers.
	PEOU4	Commercialized electricity charging stations should be widely available, even in rural areas.
	PEOU5	The repair and maintenance workshops for electric vehicles should be widely available, even in rural areas.
Safety concerns (IV3)	S1	The electricity charging instrument used in charging stations or using home chargers should be able to control the capacity of electricity flow that is needed to maximize the energy storage of an electric vehicle. In this way, incidents of electrical overcharging ~~incident~~ can be prevented.
	S2	Reliable safety measures need to be incorporated into the car's electrical system in order to prevent the happening of electrical short-circuit incidents.
Environmental concerns (IV4)	EC1	I am a person who will protect the environment whenever I can.
	EC2	Driving electric vehicles reduces the emission of hazardous gas.
	EC3	Driving electric vehicles reduces noise pollution.

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Variable	Item's code	Measuring Items
The pricing strategies of EV (IV5)	PS1	The reasonable selling price of an electric vehicle is an incentive that is attractive to me.
	PS2	Not needing to pay import duty for imported electric vehicles is an incentive that is attractive to me.
	PS3	Not needing to pay road tax for driving an electric vehicle is an attractive incentive to me.
	PS4	If the maintenance cost for electric vehicles is lower than gasoline/ fuel vehicles, then this is an attractive incentive to me.
EV usage intention (DV)	~~Int1~~	~~People may admire me for driving an electric vehicle~~. This item is more suitable to measure egoistic behaviour. It's alright to adapt the item statements for intention to do something in studies that are not related to vehicle usage. For example, see how your MBA senior develop the items to measure intentional behaviour & you can use similar sources.
	Int1	I am willing to purchase an electric vehicle in the near future.
	Int2	I will recommend others to consider the purchase of an electric vehicle.

After revising the initial item statements based on expert feedback, a second draft was given to 13 representative pilot study participants for further scrutiny. The pilot study was conducted with the 13 respondents from the author's current company.To prevent the bias caused by intercommunication and discussion, the current author arrange all the respondents to complete the questionnaire independently instead of allowing them to answer in groups. To explain, discussions are inevitable within group members. Also, to eliminate bias in the revised statements, these respondents were selected based on their diverse educational backgrounds, age groups, and genders. The researcher plans to make further amendments based on feedback from participants in order to finalize a questionnaire that will be fully comprehensible for the main study's respondents. In addition, face validity is utilized to enhance the likelihood that primary survey respondents can accurately comprehend what each item measures . The process lasted approximately one hour.

Similar to the functions performed by the pre-test expert, pilot study respondents were engaged to find out how much the potential main study respondents understand what each item wants to measure. Individual feedback was analyzed and incorporated in revising the questionnaire in order to increase the face validity, which eventually enhances the likelihood the main survey participants interpreting each item being measured accurately.

Three of the participants suggested shifting PU2 (I should be able to charge the electric vehicle using a residential/ home electrical charger rather than merely depending on electricity charging stations that are available at specific

locations for electricity energy supply) to PEOU of EV. They explained that the aforementioned item pertains to consumers' ease-of-use requirements, and if EVs can be charged using a residential/home electrical charger, it would greatly enhance convenience. However, since the remaining 9 respondents did not view this as an issue, the author decided to retain the statement as PU.

In addition, one participant suggested the word 'lengthier' in PU3 is not used very often in practice, in contrast, the word 'longer' is a common used word and easy to be understood. After consulting with other participants and referring to a dictionary, the term "lengthier" is more appropriate especially in relation to time in this context. Hence, the author remained unchanged.

Subsequently, a few selected participants identified a typographical error in the second statement of the environmental concerns variable. The accurate term for 'electrical' should be 'electric'. The spelling mistake occurred prior to the printing process. Therefore, the current author has rectified this error.

After rectifying all errors, a revised questionnaire is prepared. Upon getting consent from all pilot study participants regarding the revision, the representatives were requested by the current researcher to answer the finalized questionnaire item statements. This is to check whether the pilot study participants evaluate all items used to measure each studied variable in a consistent manner. If part of the participants allocate inconsistent agreement scales for one or a few items of a variable (which is shown by a lower reliability score), then re-checking is required. The outlier items may need to

be re-phrased or re-word again. As the pilot study result shows that the reliability score of each variable shown in Table 3.2 is higher than the threshold value, 0.6, the items, therefore, can measure each variable cohesively.

Table 3.2: Pilot Study's Reliability Test Result

Variables	Cronbach's Alpha	Indication of the strength of association
The PU of EVs (IV1)	0.746	Good
The PEOU of EVs (IV2)	0.621	Fair
Safety concerns (IV3)	0.691	Fair
Environmental concerns (IV4)	0.720	Good
The pricing strategies of EVs (IV5)	0.874	Very Good
EV usage intention	0.806	Very Good

3.3.1.2 Questionnaire Design for Main Study

Principally, the questionnaire is designed in two sections. The first section outlines the demographic background of the respondents. The determinants that can affect the respondent's EV usage intention are tested in the second section by expressing their feedback on the statement of items that are meant to measure each variable: PU, PEOU, safety concerns, environmental concerns, pricing strategies, and usage intention of EV.

The main survey questionnaire is the finalized questionnaire copy, in which the item statements had been vetted and agreed upon by the pre-test expert and pilot study participants. The project's questionnaire item statements are a closed-ended or highly structured questionnaire design. The five-point Likert

scale is chosen because each code represents an agreement or disagreement level clearly (Babakus & Mangold 1992; Sachdev & Verma, 2004) and therefore it is easier for respondents to answer the questionnaire and provide a concrete response that can best represent their view or opinion about specific item statement.

Respondents are required to show their level of agreement in ascending order, from code 1 representing strongly disagree to code 5 which symbolizes strongly agree. Respondents are not allowed to provide scales that don't belong to the stipulated 5 points Likert scale; that range from integer 1 to 5. Code 3 of the 5 points Likert scale represents neutralize point when the respondents neither disagree nor agree with a specific item statement. Structuralized data is highly quantifiable and therefore, statistical analyses are used to reach a more decisive conclusion – to support or not support a hypothesis.

At this juncture, the validity of each item statement has been carefully checked by the pre-test and pilot study representative and the current researcher has rectified the statements based on their feedback. Also, the item statements shown in the finalized questionnaire have been reliably answered by the pilot study's representatives. As a result, the finalized item statements were distributed to respondents in the main survey (see Table 3.3).

Table 3.3: The Finalized Questionnaire Item Statements

Code	Item statement	Source of adoption
The perceived usefulness of EV (IV1)		
PU1	The frequency for charging an electric vehicle should be lesser than the frequency for fuel-filling a vehicle with similar engine capacity (e.g. 1.5cc), age model, and travel distance.	Recommended by preliminary, pre-test & pilot study representatives
PU2	I should be able to charge the electric vehicle using a residential/ home electrical charger rather than merely depending on electricity charging stations that are available at specific locations for electrical energy supply.	Recommended by preliminary, pre-test & pilot study representatives
PU3	The maximum travel distance of a fully charged electric vehicle should be comparable or lengthier to the maximum travel distance of a fully fuelled vehicle with similar engine capacity (e.g. 1.5cc) and age model.	Thomas(2009) ; Pearre et al. (2011)
PU4	The cost of charging an electric vehicle should be comparable to or lower than the cost for fuel filling a vehicle with similar travel distance, engine capacity (e.g. 1.5cc), age model, and travel distance.	Parks et al. (2007)
PU5	The electrical energy stored in an electric vehicle can be used as an energy source/ supply in heating up electrical appliances like toasters, induction hotplates, or microwaves. Such facilitation is useful for outdoor events like camping.	Michael (February 17, 2023).
The perceived ease-of-use of EV (IV2)		
PEOU1	Technically, electric vehicles shouldn't be difficult to drive.	Sun et al. (2019)
PEOU2	The likelihood of EV's engine to get malfunctioning/ breaking down/ failing should be comparable with fuel vehicles of similar engine capacity, aged model, and usage purpose and frequency.	Daniel (2013)
PEOU3	Technically, I can tolerate the length of electricity charging time which takes about 17 hours to fully charge an electric car using residential/home chargers.	Tuttle (2015)
PEOU4	Commercialized electricity charging stations should be widely available, even in rural areas.	Burnham et al.(2017)
PEOU5	The repair and maintenance workshops for electric vehicles should be widely available, even in rural areas.	Alotaibi et al.(2022)

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Code	Item statement	Source of adoption
Safety concerns (IV3)		
S1	The electricity charging instrument used in charging stations or using home chargers should be able to control the capacity of electricity flow that is needed to maximize the energy storage of an electric vehicle. In this way, incidents of electrical overcharging can be prevented.	Sbordone et al. (2015)
S2	Reliable safety measures need to be incorporated into the car's electrical system in order to prevent the happening of electrical short-circuit incidents.	Honey et al. (2013);Kjosevski et al. (2017)
Environmental concerns (IV4)		
EC1	I am a person who will protect the environment whenever I can.	Vidhi & Shrivastava (2018); Qiao et al. (2019)
EC2	Driving electric vehicles reduces the emission of hazardous gas.	Cocron & Krems (2013);
EC3	Driving electric vehicles reduces noise pollution.	Misdariis & Pardo (2017)
The pricing strategies of EV (IV5)		
PS1	The reasonable selling price of an electric vehicle is an incentive that is attractive to me.	Haddadian et al. (2015); Li et al. (2017)
PS2	Not needing to pay import duty for imported electric vehicles is an incentive that is attractive to me.	Sperling (2018); Hamzah et al. (2022)
PS3	Not needing to pay road tax for driving an electric vehicle is an attractive incentive to me.	Hardman (2019)
PS4	If the maintenance cost for electric vehicles is lower than gasoline/ fuel vehicles, then this is an attractive incentive to me.	Egbue & Long (2012)
EV usage intention (DV)		
Int1	I am willing to purchase an electric vehicle in the near future.	Irfan & Ahmad(2021)
Int2	I will recommend others to consider the purchase of an electric vehicle.	Recommended by preliminary, pre-test & pilot study representatives

3.3.2 The Field Work of Main Survey

Since the project aims to collect feedback from Malaysian irrespective to their residential locations, utilizing e-surveys is a prudent choice as it provides greater coverage than face-to-face surveys and is also more environmentally friendly. In addition to distributing softcopy questionnaires, hardcopy versions were also disseminated among respondents within the author's proximity, including colleagues and friends in Ipoh, Perak. A face-to-face approach is adopted to encourage participants to carefully read each item statement and provide answers that accurately reflect their opinions. Nevertheless, softcopy is given when respondents request it. As such, both electronic and paper-based surveys were utilized during the data collection process.

The facilitators, who are colleagues and friends of the current author, assist in facilitating the distribution of questionnaires. Prior to questionnaire distribution, they were briefed on the study's main purpose and educated on each item statement's measurement. This enables them to provide clarification if respondents require it.

With the aim of collecting 320 questionnaires from West Malaysia, the questionnaires were exclusively distributed to residents of this region between February 20th and March 10th, 2023. Initially, hardcopies were disseminated among colleagues and acquaintances in Ipoh Perak; however, to minimize disruption to their work schedules, the researcher distributed them during breaks or after working hours. Subsequently, the Google questionnaire form was disseminated to respondents via WhatsApp and WeChat platforms at their

convenience. The form was shared with siblings, relatives or acquaintances who met the criteria of the target respondent. Additionally, facilitators provided hardcopy questionnaires to those who preferred this method. During the first stage conducted in West Malaysia, a total of 320 questionnaires were collected.

The next stage lasted from 11th March to 15th March to obtain the remaining 80 questionnaires from East Malaysia via e-survey because West Malaysia is geographically distant from the author's current location. Additionally, it is more convenient for both researcher and facilitators to distribute the questionnaire among their acquaintances who match the target respondent's characteristics.

The facilitators in this stage were the author's friends who operated businesses there. Prior to distributing questionnaires, they were briefed on the study's main purpose and educated on how to interpret each item statement. This enabled them to answer any questions and pass along clarifications to their siblings or relatives if necessary. The same procedure was applicable to respondents residing in East Malaysia until a total of 400 completed questionnaires are obtained.

3.4 Data Analysis Tool

The collected main data were descriptively analyzed to show the frequency distribution of the respondent's demographic profile like age, gender, income

level, and educational background. Also, this is to ensure the collected data is not biased in representing a specific group of respondents.

Inferential analysis heavily relies on data reliability and validity. To ensure the collected data meet the minimum level of reliability and validity scores, a series of statistical tests were conducted. First, Cronbach's alpha scores were computed to depict whether the main study respondents have been giving consistent responses to all items used to measure a specific variable. Table 3.4 depicts the range of Cronbach's alpha scores and their corresponding reliability indication. The higher score the score of Cronbach's alpha, the higher the reliability of the variable.

Table 3.4: Rule of Thumb for Cronbach's Coefficient Alpha

Coefficient Alpha Range (a)	Reliability
0.80 to 0.95	Very good reliability
0.70 to 0.80	Good reliability
0.60 to 0.70	Fair reliability
Below 0.60	Poor reliability

Source: Zikmund et al., (2013)

However, Cronbach's alpha score higher than 0.95 is not desired as such a result may indicate that respondents were giving almost the same scores to all items used to measure the same and other variables (Zikmund et al., 2013). Such a scenario may reflect that the respondents did not read the item statements before answering. Therefore, the following statistical results may not be able to represent the respondent's true behavior.

After affirming the data's reliability, the author plotted the Quantile-Quantile (Q-Q) plot for each variable data in order to ensure the variable's data is normally distributed. In other words, the deviation between the expected value for the variable and the observed value should not be widely apart. When the data is normally and linearly distributed, which is shown by the fixed coefficient figure, multiple linear regression analysis can be carried out later.

Before running the regression analysis, it is useful to check whether each IV is correlated to the DV by computing the Pearson correlation coefficients. A positive correlation coefficient means both variables tend to change in the same direction. A negative correlation coefficient implies that both variables tend to change in a different direction. The tested variables can be weakly, moderately, or strongly correlated, or associated. Table 3.6 depicts the ranges of the correlation coefficient and the corresponding strength between the variables.

Table 3.5: Rule of Thumb for Interpreting the Size of a Correlation Coefficient

Correlation Coefficient Range	Strength
±0.00 to ±0.10	Negligible correlation
±0.10 to ±0.39	Weak correlation
±0.40 to ±0.69	Moderate correlation
±0.70 to ±0.89	Strong correlation
±0.90 to ±1.00	Very strong correlation

Source: Schober & Schwarte (2018)

However, correlated variables do not imply a causal relationship. In determining the causal effect created by each IV and the DV, multiple

regression analysis was carried out. In running the regression analysis, the stepwise method is adopted in this study to analyze the effects generated by multiple IVs. Several rounds of analysis were performed. Technically, the IV that appears in the first round of analysis is the most significant variable associated with the DV. The second most significant IV will be obtained in the second round of analysis. Rounds and rounds of analysis continue until no considerable significant IV is discovered. To explain, the system omits IVs that do not have a significant relationship with the DV.

As shown in the model summary table, the R-squared score is an important indicator to explain the proportion changes in DV caused by all significant IVs. Additionally, T-test is used to identify which IV creates a significant effect on DV. Finally, based on the regression result, a linear regression equation is developed (see Equation 1). The coefficient of regression for each variable ($\beta_1 \ldots \beta_n$) shows the intensity effect created by each variable ($X_1 \ldots X_n$).

$$y = \sigma + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \qquad (1)$$

where;

Y represents EV usage intention;

X_1 & X_2 are TAM2 variables: PU & PEOU;

X_3, X_4 & X_5 are additional variables: safety concerns, environmental concern and pricing strategies respectively;

σ is the interception of the regression line or constant; and

$\beta_1 \ldots \beta_5$ are the coefficient of regression for X1, X2, X3, X4, X5

3.5 Ethical Considerations

Regardless of economic, political, social, or health status, each and every study must be conducted in an ethical manner. According to UTAR's policy, all questionnaires or proposed experiments, irrespective of research discipline, must be reviewed by the University Ethics Committee Board prior to data collection and testing. In accordance with Personal Data Protection Act 2010 (PDPA), the University Ethics Committee Board ensures the collected data in this project are used for the purposes of conducting research and academic publications and respondents' personal information shall not be used for political and commercial purposes.

The committee committed to ensuring appropriate methods are applied in collecting data, the respondent's identity cannot be disclosed when publishing sensitive data, the respondent's participation must be voluntary base, and researchers to provide their personal contact details in the event respondent(s) require clarification.

3.6 Summary of the Project's Research Methodology

If the questionnaire is poorly designed, poor data will be collected and the validity and reliability of data results is disputable. Therefore, the author rectified the questionnaire item statements based on feedback received from the pre-test and pilot studies participants so that the collected main data is able to represent the target population's behavior as closely as possible. Upon collecting the main data, a series of statistical analyses were carried out to confirm the data's reliability and validity. Reliable and valid data then were

used to confirm the hypotheses. To summarize, the methodology of this study has been thoroughly devised before it was implemented. The data result is presented and discussed in the following main topic.

CHAPTER 4

RESULT AND DISCUSSION

4.1 Descriptive Result of Respondent's Demographic Profile

400 anonymous answered questionnaires using snowballing sampling method were collected from the main study respondents. Apparently, no data is voided as all of the respondents have provided their demographic data and stated their choices by referring to the 5-point Likert scales for each measuring item aims to measure specific IV and DV. The demographic data result shows that the male respondents are more than female respondents by 24% (see Table 4.1). Such a demographic bias happened because male respondents that were approached using the snowball sampling method have a higher interest to evaluate car performances as compared to females.

More than half of the respondents are Malay, accounting for 61.8%. Following up with 21% of Chinese (84 respondents), 12.5% of Indians (50 respondents), and 5.2% of others (21 respondents). Such a distribution pattern is quite synonymous with the ethnicity distribution of the Malaysian population.

More than half of the respondents are diploma/degree holders, which accounted for 63.2% or 253 respondents. In contrast, only 4.2% (17 respondents) are below high school. In response to the growth of tertiary education institution counts in Malaysia and the provision of financial support to low-income earners, more and more populations managed to secure an academic or vocational degree.

Table 4.1 Demographic Profile Distribution

	Frequency	Percent	Cumulative Percent
Gender			
• Male	248	62.0	62.0
• Female	152	38.0	100.0
Age			
• 17-30	191	47.8	47.8
• 31-40	130	32.5	80.3
• 41-50	47	11.8	92.0
• 51-60	22	5.5	97.5
• > 61	10	2.5	100.0
Ethnicity			
• Chinese	88	22.0	22.0
• Malay	247	61.8	83.8
• Indian	49	12.3	96.0
• Others	16	4.0	100.0
Average monthly income/ allowance (RM)			
• < 2,000	158	39.5	39.5
• 2,001-3,000	106	26.5	66.0
• 3,001-4,000	60	15.0	81.0
• 4,001-5,000	35	8.8	89.8
• 5,001-6,000	17	4.3	94.0
• > 6,001	24	6.0	100.0
Education background			
• Below High school	16	4.0	4.0
• High school/ Certificate	67	16.8	20.8
• Diploma/Degree Holder	256	64.0	84.8
• Postgraduate Holder	61	15.3	100.0

4.2 Inferential Result

4.2.1 Reliability Result

The project respondents give consistent responses towards the measuring items that aim to measure specific variables because the reliability coefficients for all variables are higher than the threshold value of 0.6 (Ursachi et al., 2015) - see Table 4.2. In other words, outlier data is not detected.

Table 4.2: Reliability Test Result

Variable	Cronbach's alpha score	No. of items
The perceived usefulness of EV	0.857	5
The perceived ease-of-use of EV	0.802	5
Safety	0.805	2
Environmental concerns	0.800	3
The pricing strategies of EV	0.860	4
EV usage intention	0.835	2

4.2.2 Normality of Data Distribution

To identify whether the collected data is distributed normally, the Q-Q plots of each variable are plotted. Q-Q plot is a plot that allows researchers to compare the collected data (or observed value) and the expected normal value. If the variance between the observed and expected value is not much different, then it is justifiable to argue that the linearity and normality assumption of the distribution pattern of collected data is not violated. The result also signifies that using a multiple linear regression statistical analysis to confirm current hypotheses is acceptable. Referring to Figure 4.1, all the points in the six diagrams are scattered along the 45-degree reference line, and neither a distinct trend such as a parabola nor an a inverted parabola is detected. To conclude, the data is normally distributed.

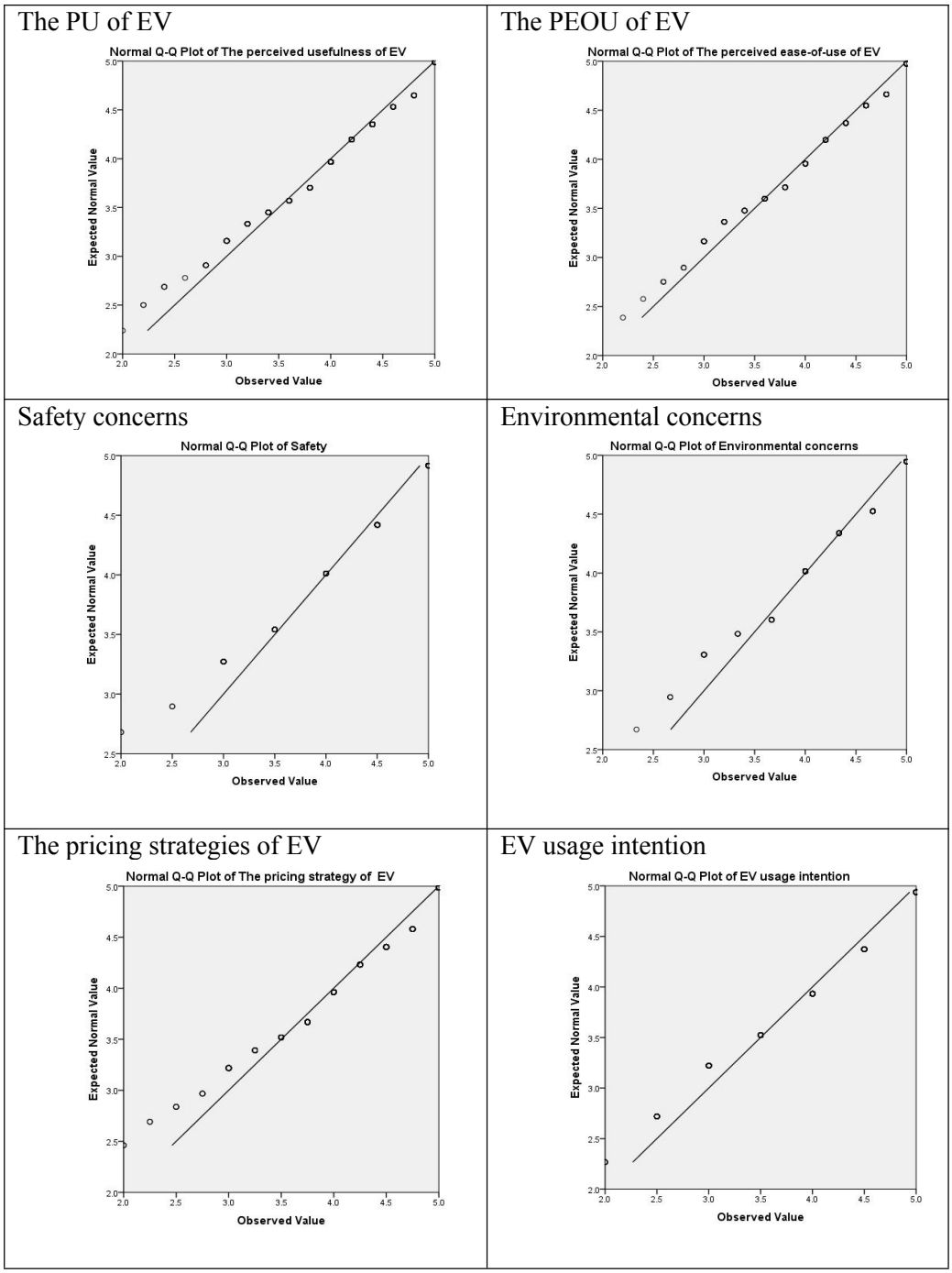


Figure 4.1: Normally Data Distribution of Each Variable

Source: Developed for Current Project

4.2.3 Correlation Result

The Pearson correlation coefficient is computed to measure the degree of association – weak, moderate, or strong - between each IV and the DV. Table 4.3 depicts that the Person's correlation coefficients for each IV and the DV

are within 0.5 and 0.7 (which symbolize a moderate relationship), and positively significant at a precision level of 0.05. The positive relationship shows that the pair of examined variables has a tendency to change consistently in the same direction.

Table 4.3: The Correlation Results

	The perceived usefulness of EV	The perceived ease-of-use of EV	Safety	Environ-mental concerns	The pricing strategy of EV	EV usage intention
The perceived usefulness of EV						
Pearson Correlation	1	.806**	.620**	.664**	.643**	.611**
Sig. (2-tailed)		.000	.000	.000	.000	.000
N	400	400	400	400	400	400
The perceived ease-of-use of EV						
Pearson Correlation	.806**	1	.650**	.736**	.647**	.651**
Sig. (2-tailed)	.000		.000	.000	.000	.000
N	400	400	400	400	400	400
Safety						
Pearson Correlation	.620**	.650**	1	.662**	.592**	.541**
Sig. (2-tailed)	.000	.000		.000	.000	.000
N	400	400	400	400	400	400
Environmental concerns						
Pearson Correlation	.664**	.736**	.662**	1	.681**	.664**
Sig. (2-tailed)	.000	.000	.000		.000	.000
N	400	400	400	400	400	400
The pricing strategies of EV						
Pearson Correlation	.643**	.647**	.592**	.681**	1	.637**
Sig. (2-tailed)	.000	.000	.000	.000		.000
N	400	400	400	400	400	400
EV usage intention						
Pearson Correlation	.611**	.651**	.541**	.664**	.637**	1
Sig. (2-tailed)	.000	.000	.000	.000	.000	
N	400	400	400	400	400	400

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

4.2.4 Multiple Linear Regression Result and Multicolinearity

In analyzing the individual effect created by multiple IVs using the regression method, the "stepwise method" is used. Rounds of analysis are performed based on the significant effect generated by each IV. In round 3 which is

depicted by Model 3 in Table 4.4, the PU and safety concerns variables are omitted for further regression analysis because the variables do not have a significant relationship with the DV. The footnote *d* shown in Table 4.4 denotes that only three IVs: environment concerns, the pricing strategies, and PEOU of EV are retained for further regression analysis.

Table 4.4: Excluded Variables

	Beta In	t	Sig.	Partial Correlation	Collinearity Statistics		
					Tolerance	VIF	Minimum Tolerance
Model 1							
• The PU of EV	.304[b]	6.350	.000	.304	.559	1.789	.559
• The PEOU of EV	.353[b]	6.733	.000	.320	.458	2.182	.458
• Safety	.180[b]	3.660	.000	.181	.562	1.779	.562
• The pricing strategies of EV	.344[b]	7.127	.000	.337	.536	1.865	.536
Model 2							
• The PU of EV	.212[c]	4.300	.000	.211	.491	2.036	.449
• The PEOU of EV	.267[c]	5.047	.000	.246	.419	2.388	.386
• Safety	.100[c]	2.060	.040	.103	.525	1.906	.433
Model 3							
• The PU of EV	.103[d]	1.714	.087	.086	.324	3.090	.276
• Safety	.039[d]	.799	.425	.040	.487	2.052	.358

a. Dependent Variable: EV usage intention

b. Predictors in the Model: (Constant), Environmental concerns

c. Predictors in the Model: (Constant), Environmental concerns, The pricing strategies of EV

d. Predictors in the Model: (Constant), Environmental concerns, The pricing strategies of EV, The PEOU of EV

As shown in Table 4.5, the R-Squared value of 0.538 depicts that 53.8% of the EV usage intention's variation is explained by the three IVs (environment concerns, the pricing strategies, and EV's PEOU). The balance of 46.2%,

which is the variation, is explained by other variables that are not tested in this project.

Table 4.5: Regression's Model Summary Result

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.664[a]	.441	.440	.56402
2	.710[b]	.505	.502	.53174
3	.731[c]	.535	.531	.51607

a. Predictors: (Constant), Environmental concerns
b. Predictors: (Constant), Environmental concerns, The pricing strategies of EV
c. Predictors: (Constant), Environmental concerns, The pricing strategies of EV, The PEOU of EV
d. Dependent Variable: EV usage intention

The ANOVA test result in Table 4.6 depicts that at least one of the three significant IVs: environment concerns, the pricing strategies, and EV's PEOU is related to the EV usage intention at a significant level of 0.05.

Table 4.6: ANOVA of the Regression Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	100.065	1	100.065	314.549	.000[a]
	Residual	126.613	398	.318		
	Total	226.677	399			
2	Regression	114.429	2	57.214	202.354	.000[b]
	Residual	112.249	397	.283		
	Total	226.677	399			
3	Regression	121.211	3	40.404	151.706	.000[c]
	Residual	105.466	396	.266		
	Total	226.677	399			
4	Regression	121.990	4	30.497	115.070	.000[d]
	Residual	104.688	395	.265		
	Total	226.677	399			

a. Predictors: (Constant), Environmental concerns
b. Predictors: (Constant), Environmental concerns, The pricing strategies of EV
c. Predictors: (Constant), Environmental concerns, The pricing strategies of EV, The PEOU of EV
d. Dependent Variable: EV usage intention

From Table 4.7, the VIF scores results for all the IVs are less than the threshold value of 10 or the result shows that the significant IVs are not highly correlated with each other (Hair et al., 2006).

Table 4.7: Regression Coefficients for the Significant Variables

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
Model 1							
(Constant)	.403	.216		1.868	.062		
• Environmental concerns	.865	.049	.664	17.736	.000	1.000	1.000
Model 2							
(Constant)	.051	.209		.246	.806		
• Environmental concerns	.560	.063	.430	8.922	.000	.536	1.865
• The pricing strategies of EV	.394	.055	.344	7.127	.000	.536	1.865
Model 3							
(Constant)	-.128	.206		-.622	.535		
• Environmental concerns	.368	.072	.283	5.128	.000	.386	2.591
• The PEOU of EV	.327	.065	.267	5.047	.000	.419	2.388
• The pricing strategies of EV	.311	.056	.271	5.539	.000	.490	2.041

a. Dependent Variable: Intention to Use EV).

From the t-statistics result (Table 4.7), the regression equation for this study is shown as below.

$$Y = -0.128 + 0.368X_4 + 0.327X_2 + 0.311X_5 \quad (2)$$

Where;

Y: EV usage intention;

X_2: The PEOU of EV;

X_4: Environmental concerns;

X_5: The pricing strategies of EV

From equation (2), generally, the need to protect the environment is the most important IV that motivates the project respondent's EV usage intention. Since gaining independence, Malaysia experiences rapid economic and social

development. However, the development of economic sectors including transportation cause environmental damage. As more residents are educated, concern about the living environment is intensifying. The government is taking action in reducing the environmental issue in Malaysia too. The regression result supports the above argument.

The second most significant motivator variable that intensifies the EV usage intention is the PEOU of EV. Perceived ease of use, including factors such as battery charging stations, recharging time, ease of driving, and the likelihood of EV breakdowns, directly determines customers' actual experiences, especially those that travel frequently. In summary, convenience is one of the prime factors that the respondents consider in evaluating their EV usage intention.

Although the nation's income increases, the inflation rate increases as well. As the selling price of EV models is relatively much higher than comparable fossil fuel vehicles, the pricing strategies of EVs – in terms of selling price and maintenance cost – therefore becomes the third most important variable that intensifies the intention to use EVs.

To ensure the cumulative direct effect created by all significant variables is linearly related to the EV usage intention, the cumulative probability plots of residuals (P-P Plot) is plotted (see Figure 4.2). Clearly noted that the standardized residuals are scattered along the normal distribution line, this

implies that the data of all significant predictor variables is normally distributed.

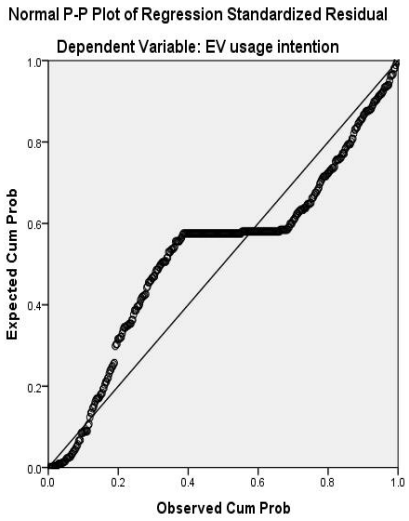


Figure 4.2: The Normal P-P Plot of Regression Standardized Residual for EV Usage Intention

4.3 Current Developed Research Model

Based on the results, the final research model of this project is shown in Figure 4.3.

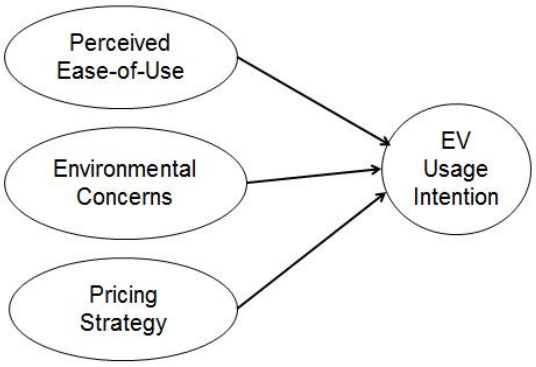


Figure 4.3 Current Developed Research Model

4.4 Conclusion of the Statistical Result

The statistical results show that the hypothetical relationships between one TAM variable: PU (H1) and another additional variable: safety concerns (H3); and the DV: EV usage intention are not supported respectively. Table 4.8 also shows that the remaining hypotheses (H2, H4, and H5) are supported. The following main topic contents discuss the main result and appropriate implications to policymakers and academia are deliberated. In order to know why H1 and H3 are not supported, follow-up interviews were carried out. The feedback from the follow-up respondents is discussed in chapter 5.

Table 4.8: The Summary of the Confirmation of Current Hypotheses

	Details of the Hypothesis	Remarks
H1	The perceived usefulness of the electric vehicle relates to the usage intention positively.	Not Supported
H2	The perceived ease of use of the electric vehicle relates to the usage intention positively.	Supported
H3	Safety concerns while using electric vehicle relates to the usage intention positively.	Not Supported
H4	The respondent's concern of environmental well-being relates to the electric vehicle usage intention positively.	Supported
H5	The pricing strategies of the electric vehicle relates to the usage intention positively.	Supported

CHAPTER 5

CONCLUSION AND IMPLICATION

5.1 Accomplishment of Research Objective and Discussion

To examine how behavioral factors influence Malaysian current and future drivers' EV usage intention, this project has established two specific objectives.The accomplishment of the objectives relates to the confirmation of the objective's hypotheses. The result shows that three hypotheses are supported and two hypotheses are not supported. Follow-up research interviews were carried out with selected respondents so that the author can deliberate why certain hypotheses are supported and not supported.

To achieve the first objective, the project develops two hypotheses (H1 & H2) in examining how the TAM variables: PU and PEOU of EVs relate to the target's EV usage intention. The main data result shows that H2 (relates to PEOU) is supported and H1 (relates to PU) is not supported. The support of H2 shows that the respondents behave consistently in evaluating the effects of PEOU's items on their EV usage intention. Basically, most respondents tolerate the length of electricity charging time which takes about 17 hours to fully charge an EV using residential or home chargers. Alternatively, the wide availability of electricity charging stations especially in rural areas is important to most respondents. This is part of the reasons that explain why PEOU is significantly related to their EV usage intention. The result is consistent with studies carried out by Adhikari (2020); Pickering (2023); Mali et al., (2022); and Xu et al. (2020).

The non-support of H1 shows that the respondents behave inconsistently in evaluating the effects of PU's items on their EV usage intention. Such an inconsistent response probably is related to their living environment. The interviewees of follow-up interviews that were carried out after the main study result mentioned that they do not view EVs as a useful transportation mode because the electric charging stations in their residential areas (which are located in suburban and rural areas) are limited. Another group of interviewees, the city dwellers mentioned that installing a home electrical charger for charging purposes is not feasible for EV users who are renting a room or a house compared to respondents who are living at their own premises. Such inconsistent responses contribute to the non-significant effect created by PU. The non-significant effect created by PU on EV usage intention is consistent with studies carried out by Ensslen et al. (2013); Hafriz Shah (2021); and Namdeo, Tiwary, and Dziurla (2014).

In accomplishing the second objective, the project develops three hypotheses related to safety concerns, environmental concerns, pricing strategies, and the target's EV usage intention. The result shows that the environmental concerns (relates to H4) and pricing strategies (relates to H5) variables are significantly related to EV usage intention. Meanwhile, the hypothetical relationship between safety concerns and EV usage intention (relates to H3) is not supported.

The support of H4 shows that most respondents care about their living environment and therefore will protect the environmental well-being. Such favorable response increases the respondent's motivation to use EVs as they believe the use EV reduces the emission of hazardous gas and noise pollution. The response is consistent with a study carried out by Ipsos (2019) which targets the Malaysian.

The support of H5 indicates that most respondents perceive that the selling price of an EV is higher than comparable fossil fuel vehicle models. As a result, the respondents hope the government provides attractive incentives like lower or free import duty for EVs and lower road tax payments. Also, the long-term financial cost of maintaining the purchased EV is another important influence that determines their usage intentional behavior. The result supports the study findings carried out by Asadii et al. (2022); Khazaei (2019); Muzir et al. (2022); and Mustapa et al. (2020).

The non-support of H3 implies that respondents are viewing the EV's safety measures inconsistently. Such behavior could be associated with the respondent's level of knowledge about EVs. As driving fossil fuel vehicles is a conventional practice in Malaysia, not many respondents are well-versed in the safety measures of EV usage. Therefore, fear is observed when they perceive electrical overcharging may happen if the supply of electricity is not monitored precisely and short circuit incidents can occur anytime. Such perceptions are contradicted by those who have good knowledge about EVs.

The result is consistent with studies conducted by Frederiks, Stenner& Hobman (2015); Krishna (2021); Featherman, Califf & Hajli (2021).

5.2 Implication

5.2.1 Implication for Policymakers

In response to the multiple regression statistical result, environmental concern is the most significant variable that motivates EV usage intention. Therefore, in order to encourage Malaysian residents to use EVs instead of using fossil fuel vehicles, the government and EV suppliers are strongly encouraged to collaborate in educating potential EV users on how the usage of EVs can protect their living environment. By eliminating tailpipe emissions and noise, pure EVs generate no carbon dioxide during operation, thereby significantly reducing atmospheric pollution levels. In essence, EVs promote cleaner streets and foster more pedestrian- and cyclist-friendly environments throughout our towns and cities.

The PEOU of EV is the second most significant IV that motivates the use of EV. Therefore, tactical strategies should be planned and implemented by the government and EV suppliers in educating potential users about EV PEOU. For example, arrange special mass and ongoing events for potential buyers to test-drive EVs. Besides, the EV suppliers need to alert potential buyers to what can be done in reducing the breakdown of the EV's electrical motor. In this way, potential buyers know that EVs are not difficult to drive and maintain. Also, potential buyers' fear subsides when more EV repair and maintenance workshops are available. Therefore, EV suppliers need to engage in reliable

car repair workshops so that EV spare parts and EV-trained mechanics are widely available in the market. On top of that, the government needs to be proactive in setting up more electric charging stations, even in rural areas.

Being the third most significant motivator variable on EV usage intention, the government and EV suppliers need to be proactive in revamping the EV pricing strategies. In fact, the Malaysian government provides incentives such as lower import duty for specific imported EV models and income tax relief for the purchase of EVs. Yet, such incentives are not sufficient in driving Malaysian residents to use EVs. Compared to the production of fossil fuel vehicles, the production cost for one unit of EV is much higher because the count of manufactured EVs is low. Therefore, a more tactical business strategy needs to be implemented in reducing EV production costs. The economics of scale in purchasing inputs or raw materials for EV manufacturing can be achieved if mass production is carried out. As many countries' governments including Malaysia are putting serious effort into reducing environmental damage (air pollution and climate change), getting the host government support such as switching the use of fossil fuel vehicles to EVs for public projects or among civil servants, therefore, is not difficult. Alternatively, the EV suppliers can reduce the production cost by setting-up EV assembly factories in Malaysia. Lower production costs can be achieved if manufacturing raw materials are available locally. In this way, the EV selling price reduces. The development of the local supply chain favors the host government as the local community enjoys more employment opportunities and higher income earnings. Also, EV suppliers can collaborate with financial

institutions in providing low-interest loan rates so that more potential buyers can buy EVs.

It's inappropriate for the author to recommend any strategies or policies related to PU and safety concerns measures to the government and EV makers when the hypothetical relationship of the variables and the EV usage intention are not supported.

5.2.2 Implications for Academia

The TAM original and modified models have been applied frequently in studies related to the adoption of new technology such as mobile payment (Saber & Souiden, 2010), online teaching and learning (Liu et al., 2010), and mobile libraries (Rafique et al., 2020). It is a norm that potential users will evaluate the performance of the study's object in terms of the object's PU and PEOU before deciding whether to adopt the object. Therefore, the TAM model is adopted in this project.

As EVs is a relatively new product in developing countries' market, not many TAM studies were carried out in investigating consumers' EV usage intention. The application of the TAM model in the current project fills the literature gap. The non-significant effect created by PU on EV usage intention doesn't mean the TAM framework is not an appropriate referred model for EV. The non-support of H1 implies that the potential buyers react inconsistently in evaluating the effects of PU's items on their EV usage intention.

In understanding the inconsistent behavior, follow-up interviews were carried out after the main study. Generally, the feasibility of charging EVs is the main concern that is used by interviewees to judge the usefulness of EVs. As the charging stations are limited in regions outside the city boundary, EVs are not perceived as useful among rural residents and for long-distance traveling. Furthermore, although charging facilities can be carried out at home residents, not all people are living on their own premises.

The result shows that in measuring the PU of EV, future researchers need to be very careful in defining the PU variable and the target respondents. The target respondents need to behave homogenously in measuring the items of PU. Narrowing the scope of the defined target respondents according to their living environment context is encouraged. For example, if the main motive of the research is about ways to decrease air pollution in polluted cities, the target respondents should be those residing in polluted cities. Furthermore, targeting city dwellers is justifiable if the installation of electrical battery chargers to charge EVs can be feasibly done in high-rise accommodation buildings. In summary, the identity of respondents will determine the significant effect created by PU on the DV.

Researchers have been enriching a theoretical model by modifying the model with additional variables or relationship between the examined variables so that the result explains the target respondent's behavior more comprehensively. The current research model modified TAM's theoretical framework by enriching the TAM2 framework with three additional variables – safety

concerns, environmental concerns, and pricing strategies. Future academics are encouraged to test the project's examined variables so that a more conclusive mapping of respondents' characteristics and their EV usage behavior can be made, for example, PU is significant if the target resides in a city area.

5.3 Limitation of Study

The majority of the respondents preferred to answer the e-questionnaire although they can arrange a physical or e-meeting with the author. Under this circumstance, it is difficult for the author to detect the authenticity of the respondents. The e-questionnaire could be answered by another person like the respondent's child. Also, it is possible that the authentic respondents have answered the questionnaire without reading the statements of the item clearly and therefore, the provided answers cannot represent their opinions as truly as possible.

Although the use of probability sampling is advisable in reducing the possibility in collecting data that is biased to a specific respondent's demographic profile, the sampling method cannot be carried out in this project due to the absence of a sampling frame: a list that shows the identity of potential EV users. Therefore, this project uses a non-probability sampling method: snowball sampling. Every non-probability sampling technique has its advantages and disadvantages. The advantages of snowball sampling are the ability to reach respondents that are unknown to researchers, reside in scattered locations, and have higher response rates. The main drawback of

snowball sampling is it is difficult to control and monitor the whole sampling process. Although the researcher has balanced the genders of the first group of respondents, the remaining process of the sampling method cannot be controlled.

Next, EVs are still an emerging market in Malaysia. As a result, the majority of the respondents have not driven EVs nor have much knowledge about EVs. Therefore, their response may differ when they have acquired more knowledge about EVs. In other words, cross-sectional data result is valid if knowledge about EV is not drastically changed. New research needs to be carried out when such an incident happens.

5.4 Recommendations for Future Research

In order to increase the respondent's authenticity and capture the true data, future researchers should try to meet the respondents face-to-face through physical or e-meetings. In this way, the researcher can observe the respondent's characteristics and their behavior; and provide clarifications if needed. The researchers also can communicate what each item statement aims to measure step by step so that the respondents think carefully before answering.

To ensure a more equitable distribution of demographic characteristics among respondents (such as age and income), future researchers should prioritize recruiting participants from diverse backgrounds in the initial phase. This is because it is likely that these early respondents will disseminate the

questionnaire to individuals within their social networks who share similar demographic profiles. Alternatively, in future studies, researchers could employ multi-level sampling to ensure that respondents are selected from diverse groups within the targeted population. By selecting an equal number of participants who possess specific traits and qualities, data collection can be more evenly distributed.

Worldwide countries including Malaysia are in the ICT revolution era now. Therefore, people can access knowledge easily through knowledge-sharing e-platforms like websites, YouTube, TikTok, Facebook, and others. When the target's EV knowledge increases, more longitudinal behavioral studies need to be carried out in the future; as other behavioral variables need to be examined.

References

AAM. (2019). *Summary of new passenger & commercial vehicles registered in Malaysia for the year 2010 to 2019*. Malaysian Automotive Association. Retrieved from http://www.maa.org.my/statistics.html

Abad-Segura, E., González-Zamar, M. D., Infante-Moro, J.C., & Ruipérez García, G. (2020). Sustainable management of digital transformation in higher education: Global research trends. *Sustainability, 12*(5), 2107. Retrieved from https://www.mdpi.com/660600

Abu-Alkeir, N.I., Area, S., & Jordan, A. (2020). Factors influencing consumers buying intentions towards electric cars: the Arab customers'perspective. *International Journal of Marketing Studies, 12*(2), 127-127.

Adhikari, M., Ghimire, L.P., Kim, Y., Aryal, P., & Khadka, S.B. (2020). Identification and analysis of barriers against electric vehicle use. *Sustainability, 12*(12), 4850. Retrieved from https://www.mdpi.com/742432.

Adnan, N., Nordin, S. M., Rahman, I., & Rasli, A.M. (2017). A new era of sustainable transport: An experimental examination on forecasting adoption behavior of EVs among Malaysian consumer. *Transportation Research Part A: Policy and Practice, 103*, 279-295.

Adnan, N., Nordin, S.M., & Rahman, I. (2017). Adoption of PHEV/EV in Malaysia: a critical review on predicting consumer behavior. Renewable and Sustainable *Energy Reviews, 72,* 849-862.

Afroz, R., Rahman, A., Masud, M.M., Akhtar, R., & Duasa, J.B. (2015). How individual values and attitude influence consumers' purchase intention of

electric vehicles - Some insights from Kuala Lumpur, Malaysia. Environment and Urbanization ASIA, 6(2), 193-211.

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179-211.

Alfadda, H. A., & Mahdi, H. S. (2021). Measuring students' use of zoom application in language course based on the technology acceptance model (TAM). Journal of Psycholinguistic Research, 50(4), 883-900. Retrieved from https://link.springer.com/article/10.1007/s10936-020-09752-1

Alotaibi, S., Omer, S., & Su, Y. (2022). Identification of Potential Barriers to Electric Vehicle Adoption in Oil-Producing Nations - The Case of Saudi Arabia. *Electricity, 3*(3), 365-395.

Andrew Koole (2022, May 23). Are Safety Concerns Over Electric Vehicles Valid? Retrieved from https://getjerry.com/electric-vehicles/are-safety-concerns-over-electric-vehicles-valid#is-ther e-a-real-risk-of-fire-with-electric-vehicles.

Asadi, S., Nilashi, M., Iranmanesh, M., Ghobakhloo, M., Samad, S., Alghamdi, A., & Mohd, S. (2022). Drivers and barriers of electric vehicle usage in Malaysia: A DEMATEL approach. *Resources, Conservation and Recycling, 177*, 105-125.

Asadi, S., Nilashi, M., Samad, S., Abdullah, R., Mahmoud, M., Alkinani, M.H., & Yadegaridehkordi, E. (2021). Factors impacting consumers' intention toward adoption of electric vehicles in Malaysia. *Journal of Cleaner Production*, *282*, 124-174.

Bamberg, S. (2003). How does environmental concern influence specific environmentally related behaviors? A new answer to an old question. Journal of environmental psychology, 23(1), 21-32. Retrieved from https://www.sciencedirect.com/science/article/pii/S0272494402000786

Banister (2005). *Unsustainable Transport*. Retrieved from https://www.taylorfrancis.com/books/mono/10.4324/9780203003886/unsustainable-transport-david-banister.

Bernama (n.d) (2022, April 15). Rising Interest in Electric Vehicles in Malaysia.Retrieved from https://www.nst.com.my/news/nation/2022/04/789033/rising-interest-electric-vehicles-malaysia

Bhutada, G. (2022, August 8). *Visualizing 10 Years of Global EV Sales by Country*. Retrieved from https://www.visualcapitalist.com/visualizing-10-years-of-global-ev-sales-by-country/

Bibra, E.M., Connelly, E., Gorner, M., Lowans, C., Paoli, L., Tattini, J., & Teter, J. (2021). Accelerating ambitions despite the pandemic. Global EV outlook, *International Energy Agency*. Retrieved from https://trid.trb.org/view/1925380

Birol, F. (2019). CO2 emissions from fuel combustion (2019 ed). *International Energy Agency.* Retrieved from https://iea.blob.core.windows.net/assets/eb3b2e8d-28e0-47fd-a8ba-160f7ed42bc3/CO2_Emissions_from_Fuel_Combustion_2019_Highlights.pdf

Burnham, A., Dufek, E.J., Stephens, T., Francfort, J., Michelbacher, C., Carlson, R.B. & Tanim, T.R. (2017). Enabling fast charging–Infrastructure and economic considerations. *Journal of Power Sources, 367*, 237-249.

Campbell, D.T. (1963). *Social attitudes and other acquired behavioral dispositions. CarBase. Hybrid and EV.* Retrieved from https://www.carbase.my/body-type/hybrid-and-ev

Caruana, E. J., Roman, M., Hernández-Sánchez, J., & Solli, P. (2015). Longitudinal studies.*Journal of thoracic disease, 7(11), E537*.Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4669300/

Chan, A. (2023, January 5). *What Are The Cheapest Electric Cars You Can Buy In Malaysia Today?* Retrieved from https://shopee.com.my/blog/cheapest-electric-car-malaysia/#1_Ora_Good_Cat

Chen, Y., Kang, Y., Zhao, Y., Wang, L., Liu, J., Li, Y. & Li, B. (2021). A review of lithium-ion battery safety concerns: The issues, strategies, and testing standards. *Journal of Energy Chemistry, 59*, 83-99.

Choi & Ji (2015). *Investigating the Importance of Trust on Adopting an Autonomous Vehicle.* Retrieved from https://www.researchgate.net/publication/281733721_Investigating_the_Importance_of_Trust_on_Adopting_an_Autonomous_Vehicle

Clement-Nyns, K., Haesen, E., & Driesen, J. (2009). The impact of charging plug-in hybrid electric vehicles on a residential distribution grid. *IEEE Transactions on Power Systems, 25*(1), 371-380.

Cocks, A., Del Vecchio, F., Martinez-Rodriguez, V., Schukking, M., & Fabbri, M. (2022, November). Pro-tumoral functions of tumor-associated macrophage EV-miRNA. In Seminars in Cancer Biology (Vol. 86, pp. 58-63). *Academic Press*. Retrieved from https://www.sciencedirect.com/science/article/pii/S2211124719306199

Cocron, P. & Krems, J.F. (2013). Driver perceptions of the safety implications of quiet electric vehicles. *Accident Analysis & Prevention, 58*, 122-131.Retrieved from https://www.sciencedirect.com/science/article/pii/S0001457513001711.

Davis (1989) *Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology*. Retrieved from https://parsmodir.com/wp-content/uploads/2018/11/TAM-Davis- 1989.pdf

Dechanupaprittha, S., & Jamroen, C. (2021). Self-learning PSO based optimal EVs charging power control strategy for frequency stabilization considering frequency deviation and impact on EV owner. *Sustainable Energy, Grids and Networks, 26*, 100-163.

Degirmenci, K.; Breitner, M.H. (2017). Consumer purchase intentions for electric vehicles: Is green more important than price and range? *Transportation Research: Part D Transportation Environment, 51,* 250–260.

Del Carmen Pardo-Ferreira, M., Rubio-Romero, J.C., Galindo-Reyes, F.C., & Lopez-Arquillos, A. (2020). Work-related road safety: The impact of the low noise levels produced by electric vehicles according to experienced drivers. *Safety Science, 121*, 580-588.

Department of Statistics Malaysia Official (DOSM) (2022, July 27). Graduates Statistics 2021. Retrieved from https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=476&bulid=N0w0QU95YklKRDFoQWhSV3F6N3NHQT09&menu_id=Tm8zcnRjdVRNWWlpWjRlbmtlaDk1UT09

Department of Statistics Malaysia (DOSM) (2022, November). Retrieved from https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=430&bul_id=MEN2anptL1pCNUZpOHJWTVVPR1ByZz09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09

Diaz, L.B., He, X., Hu, Z., Restuccia, F., Marinescu, M., Barreras, J.V., & Rein, G. (2020). Meta-review of fire safety of lithium-ion batteries: Industry challenges and research contributions. *Journal of The Electrochemical Society, 167*(9), 090559. Retrieved from https://iopscience.iop.org/article/10.1149/1945-7111/aba8b9/meta

Dominic (2021). How Loop Makes EV Charging Accessible. Retrieved from https://www.kajeet.net/resource/how-loop-makes-ev-charging-accessible/

Dong, J., Liu, C., & Lin, Z. (2014). Charging infrastructure planning for promoting battery electric vehicles: An activity-based approach using multiday travel data. *Transportation Research Part C: Emerging Technologies, 38,* 44-55.

Dutta, B., & Hwang, H.G. (2021). Consumers Purchase Intentions of Green Electric Vehicles: The Influence of Consumers Technological and Environmental Considerations. *Sustainability*, *3*(21), 12-25.

Egbue, O. & Long, S. (2012). Barriers to widespread adoption of electric vehicles: An analysis of consumer attitudes and perceptions. *Energy policy, 48,* 717-729.

Ensslen, A., Jochem, P., Schäuble, J., Babrowski, S., & Fichtner, W. (2013). User acceptance of electric vehicles in the French-German transnational context. *Selected proceedings of the 13th WCTR, Rio de Janeiro, Brazil,* 15-18.

Featherman, M., Jia, S.J., Califf, C.B., & Hajli, N. (2021). The impact of new technologies on consumer's beliefs: Reducing the perceived r isksof electric vehicle adoption. Technological Forecasting and Social Change, 169, 120847. Retrieved from https://www.sciencedirect.com/science/article/pii/S0040162521002791.

Feng, X., Ouyang, M., Liu, X., Lu, L., Xia, Y., & He, X. (2018). Thermal runaway mechanism of lithium ion battery for electric vehicles: A review. *Energy Storage Materials, 10,* 246-267.

Frederiks, E.R., Stenner, K., & Hobman, E.V. (2015). Household energy use: Applying behavioural economics to understand consumer decision-making and behaviour. *Renewable and Sustainable Energy Reviews, 41,* 1385-1394. Retrieved from https://www.sciencedirect.com/science/article/pii/S1364032114007990.

Glerum, A., Stankovikj, L., Thémans, M., & Bierlaire, M. (2014). Forecasting the demand for electric vehicles: accounting for attitudes and perceptions. *Transportation Science, 48*(4), 483-499.

Graham-Rowe, E.; Gardner, B.; Abraham, C.; Skippon, S.; Dittmar, H.; Hutchins, R.; Stannard, J. (2012). Mainstream consumers driving plug-in battery-electric and plug-in hybrid electric cars: A qualitative analysis of responses and evaluations. *Transportation Research: Part D Transportation Environment, 46*, 140–153.

Habidin, N.F., Ong, S.Y.Y., Chik, T.W.T., Muhamad, U. A., Fuzi, N.M., & Malim, T. (2020). The Interdisciplinary of Management, Economic, and Social Reearch. Retrieved from https://www.researchgate.net/profile/Normaziah-Che Musa/publication/343786037_Repurchase_Intention

_of_Green_Beauty_Cosmetics_in_The_Interdisciplinary_of_Management_Economic_and_Social_Research_i/links/5f3f2c1e299bf13404d8ce02/Repurchase-Intention-of-Green-Beauty-Cosmetics-in-The-Interdisciplinary-of-Management-Economic-and-Social-Research-i.pdf

Haddadian, G., Khodayar, M., & Shahidehpour, M. (2015). Accelerating the global adoption of electric vehicles: barriers and drivers. *The Electricity Journal, 28(10),* 53-68.

Hafriz Shah (2021). Opinion: Not able to charge an EV if you stay in an apartment in Malaysia? *Time for a 'right to charge' law.* Retrieved from https://paultan.org/2021/11/02/opinion-not-able-to-charge-an-ev-if-you-stay-in-an-apartment-in-malaysia-time-for-a-right-to-charge-law/

Hair, J., Black, W., Babin, B., Anderson, R. & Tatham, R. (2006). *Multivariate Data Analysis*. (6th ed). Pearson Prentice Hall, Upper Saddle River.

Hamzah, M.I., Tanwir, N.S., Wahab, S.N., & Rashid, M.H.A. (2022). Consumer perceptions of hybrid electric vehicle adoption and the green automotive market: the Malaysian evidence. *Environment, Development and Sustainability, 24*(2), 1827-1851.

Hardman, S. (2019). Understanding the impact of reoccurring and non-financial incentives on plug-in electric vehicle adoption–a review. *Transportation Research Part A : Policy and Practice, 119,* 1-14.

He, X., Zhan, W., & Hu, Y. (2018). Consumer purchase intention of electric vehicles in China: The roles of perception and personality. Journal of Cleaner Production, 204, 1060-1069. Retrieved from https://www.sciencedirect.com/science/article/pii/S0959652618326118.

Higueras-Castillo, E., Guillén, A., Herrera, L.J., & Liébana-Cabanillas, F. (2021). Adoption of electric vehicles: Which factors are really important?. International Journal of Sustainable Transportation, 15(10), 799-813.

Honey, E., Suh, I.S., & Ryu, S.R. (2013). Practical considerations on the electrical safety of the high power system in a prototype EV. *In 2013 IEEE Vehicle Power and Propulsion Conference (VPPC) (pp. 1-6). IEEE.* Retrieved from https://ieeexplore.ieee.org/abstract/document/6671699/

Https://www.dosm.gov.my/portal-main/release-content/current-population-estimates-malaysia-2022

Https://www.mida.gov.my/malaysias-shift-towards-green-mobility/

Https://www.wapcar.my

Https://www.zigwheels.my/upcoming-cars/electric

Huang, B., Xing, K., Ness, D., Liao, L., Huang, K., Xie, P., & Huang, J. (2022). Rethinking carbon–neutral built environment: Urban dynamics and scenario analysis. *Energy and Buildings, 255*, 111672. Retrieved from https://www.sciencedirect.com/science/article/pii/S0378778821009567

Irfan, M., & Ahmad, M. (2021). Relating consumers' information and w illingness to buy electric vehicles: Does personality matter?. Transpor tation Research PartD: Transport and Environment, 100, 103049. Retr ieved from https://www.sciencedirect.com/science/article/pii/S13619209 21003461

Jane Marsh (2022, November 14).Electric Vehicles and Their Impact on the Environment. Retrieved from https://biofriendlyplanet.com/electric-vehicles-and-their-impact-on-the-environment/

Joshi, D. (2018, August 25). *Electric cars: Not as green as you think*. Retrieved from https://www.malaysiakini.com/news/440194

Ju, N., Lee, K.H., & Kim, S.H. (2021). Factors Affecting Consumer Awareness and the Purchase of Eco-Friendly Vehicles: Textual Analysis of Korean Market. *Sustainability, 13*(10), 55-66.

Kalayou, M.H., Endehabtu, B.F., & Tilahun, B. (2020). The applicability of the modified technology acceptance model (TAM) on the sustainable adoption of eHealth systems in resource-limited settings. *Journal of Multidisciplinary Healthcare,* 1827-1837. Retrieved from https://www.tandfonline.com/doi/abs/10.2147/JMDH.S284973

Kamal, S. A., Shafiq, M., & Kakria, P. (2020). Investigating acceptance of telemedicine services through an extended technology acceptance model (TAM). *Technology in Society, 60, 101212*. Retrieved from https://www.sciencedirect.com/science/article/pii/S0160791X19300909

Kelecsenyi, M., Nilsson, J., & Safari, H. (2022). *The electric upswing: A quantitative study of electric vehicle attributes and consumer attitudes influence on purchase intent in Sweden*. Retrieved from https://www.diva-portal.org/smash/record.jsf?pid=diva2:1664304.

Khazaei, H. (2019). The influence of personal innovativeness and price value on intention to use of electric vehicles in Malaysia. *European Online Journal of Natural and Social Sciences, 8*(3), 483-496.

Khazaei, H., & Tareq, M.A. (2021). Moderating effects of personal inno vativeness and driving experience on factors influencing adoption of BEVs in Malaysia:An integrated SEM–BSEM approach. Heliyon, 7

(9), e08072. Retrieved from https://www.sciencedirect.com/science/article/pii/S2405844021021757.

Kjosevski, S., Kostikj, A., & Kochov, A. (2017). Risks and safety issues related to use of electric and hybrid vehicles. *Trans Motauto World, 2(1),* 37-40.

Krishna, G. (2021). Understanding and identifying barriers to electric vehicle adoption through thematic analysis. *Transportation Research Interdisciplinary Perspectives, 10,* 100364. Retrieved from https://www.sciencedirect.com/science/article/pii/S2590198221000713

Lim, A (2022, July 27). *Running an EV in Malaysia is between 11.4% to 28.3% cheaper than petrol vehicles using RON 95 – TNB*. Retrieved from https://paultan.org/2022/07/27/running-an-ev-in-malaysia-is-between-11-4-to-28-3-cheaper-than-petrol-vehicles-using-ron-95-tnb/

Liu, H., Sato, H., & Morikawa, T. (2015). Influences of environmental consciousness and attitudes to transportation on electric vehicle purchase intentions. A*sian Transport Studies*, *3*(4), 430-446.

Liu, I. F., Chen, M.C., Sun, Y.S., Wible, D., & Kuo, C.H. (2010). Extending the TAM model to explore the factors that affect intention to use an online learning community. *Computers & Education, 54*(2), 600-610.

Li, W., Long, R., Chen, H., & Geng, J. (2017). A review of factors influencing consumer intentions to adopt battery electric vehicles. *Renewable and Sustainable Energy Reviews, 78,* 318-328.

Loh, L., & Venkatraman, N. (1992). Determinants of information technology outsourcing: A cross-sectional analysis. *Journal of management*

information systems, 9(1), 7-24. Retrieved from https://www.tandfonline.com/doi/abs/10.1080/07421222.1992.11517945

Mailizar, M., Almanthari, A., & Maulina, S.(2021). Examining teachers' behavioral intention to use e-learning in teaching of mathematics: An extended TAM model. Contemporary Educational Technology, 13(2), ep298.Retrieved from https://www.cedtech.net/article/examining-teachers-behavioral-intention-to-use-e-learning-in-teaching-of-mathematics-an-extended-tam-9709

Malaysian Electric Vehicle Owners Club. https://zh-cn.facebook.com/groups/myevoc/?mibextid=6NoCDW

Mali, B., Shrestha, A., Chapagain, A., Bishwokarma, R., Kumar, P., & Gonzalez-Longatt, F. (2022). Challenges in the penetration of electric vehicles in developing countries with a focus on Nepal. *Renewable Energy Focus, 40*, 1-12.

Malik, C., & Yadav, S. (2021). Environmentally Conscious Consumers and Electric Vehicle Adoption Behavior: Moderating Role of Perceived Economic Benefit. *Academy of Marketing Studies Journal*, *25*(1), 1-16.

Ma, S.C., Fan, Y., Guo, J.F., Xu, J.H., & Zhu, J. (2019). Analyzing online behaviour to determine Chinese consumers' preferences for electric vehicles. *Journal of Cleaner Production, 229*, 244-255.

Maximize Market Research. https://www.maximizemarketresearch.com

Michael J. Coren(2023, February 17). Electric vehicles can now power your home for three days. Retrieved from https://www.washingtonpost.com/climate-environment/2023/02/07/ev-battery-power-your-home/

Mike Ruff (2022, August 22). *Electric vehicles more likely to fail MOTs than petrol and hybrid vehicles, study suggests*. Retrieved from https://garagewire.co.uk/news/company/book-my-garage/electric-vehicles-more-likely-to-fail-mots-than-petrol-and-hybrid-vehicles-study-suggests/

Misdariis, N. & Pardo, L.F. (2017). The sound of silence of electric vehicles – issues and answers. *In InterNoise*. Retrieved from https://hal.science/hal-01708883/

Moon, S.J. (2021). Integrating Diffusion of Innovations and Theory of Planned Behavior to Predict Intention to Adopt Electric Vehicles. *International Journal of Business and Management, 15*(11), 18-28.

Motorfinity(2023, January 31).*How Eco-Friendly are Electric Cars?* Retrieved from https://www.motorfinity.uk/blog/how-environmentally-friendly-are-electric-cars/

Mustapa, S.I., Ayodele, B.V., Mohamad Ishak, W.W., & Ayodele, F.O. (2020). Evaluation of cost competitiveness of electric vehicles in Malaysia using life cycle cost analysis approach. *Sustainability, 12*(13), 53-63.

Muzir, N.A.Q., Mojumder, M.R.H., Hasanuzzaman, M., & Selvaraj, J. (2022). Challenges of electric vehicles and their prospects in Malaysia: A comprehensive review. *Sustainability, 14*(14), 8320. Retrieved from https://www.mdpi.com/1715400

Nair, S. (2021, August 1). *Minimum Driving License Age In Malaysia May Be Too Low*. Retrieved from https://www.dsf.my/2021/08/driving-license-minimum-age-too-low/ New Straits Times. (n.d.) (2022, Jan 15). *Timely Jot Needed EV Industry.* Retrieved from

https://www.nst.com.my/business/2022/01/763161/timely-jolt-needed-ev-industry.

Namdeo, A., Tiwary, A., & Dziurla, R. (2014). Spatial planning of public charging points using multi-dimensional analysis of early adopters of electric vehicles for a city region. *Technological Forecasting and Social Change, 89,* 188-200.

New Strait Times (2018, May 26).Are Malaysians collectivistic in nature? Retrieved from https://www.nst.com.my/opinion/columnists/2018/05/373440/are-malaysians-collectivistic-nature

Ng, M., Law, M., & Zhang, S. (2018). Predicting purchase intention of electric vehicles in Hong Kong. *Australasian Marketing Journal (AMJ), 26(3),* 272-280.

Nikkei Asia. (n.d.) (2021, November10).Retrieved from https://asia.nikkei.com/Spotlight/Environment/Climate-Change/COP26/6-automakers-agree-to-phase-out-fossil-fuel-cars-by-2040-UK-says.

Oliver, J.D. & Rosen, D.E. (2010). Applying the environmental propensity framework: A segmented approach to hybrid electric vehicle marketing strategies. *Theory Practice, 18*, 377–393.

Okada, T., Tamaki, T., & Managi, S. (2019). Effect of environmental awareness on purchase intention and satisfaction pertaining to electric vehicles in Japan. *Transportation Research Part D: Transport and Environment*, *67*, 503-513.

Ottesen, A., & Banna, S. (2021). Why so few EVs are in Kuwait and how to amend it. *International Journal of Engineering and Technology, 10*(2), 181-189.

Pala, Ü., & Mola, M. (2022). Perception and technology acceptance of Electric Cars by potential uses in Turkiye. Jo*urnal of Industrial Engineering (Turkish Chamber of Mechanical Engineers), 33(*2). Retrieved from https://www.mmo.org.tr/sites/default/files/1.makale_2.pdf.

Parks, K., Denholm, P., & Markel, T. (2007). Costs and emissions associated with plug-in hybrid electric vehicle charging in the Xcel Energy Colorado service territory (No. NREL/TP-640-41410). *National Renewable Energy Lab.(NREL), Golden, CO (United States).* Retrieved from https://www.osti.gov/biblio/903293

Pearre, N.S., Kempton, W., Guensler, R.L., & Elango, V.V. (2011). Electric vehicles: How much range is required for a day's driving?. *Transportation Research Part C: Emerging Technologies, 19(6),* 1171-1184.

Pettersen, A. (2019). *The Role of Consumers' Knowledge in Battery Electric Vehicle Diffusion: A Study of the Norwegian Battery Electric Vehicle Advancement Through Structural Equation Modelling.* Retrieved fromhttps://repository.tudelft.nl/islandora/object/uuid%3A7ae1c272-eeba-44ab-992c-2bd7c44fe33a.

Pickering, C (2023). *The most common problems with electric cars.* Retrieved from https://www.carsloth.com/advice/common-problems-electric-cars

Qiao, Q., Zhao, F., Liu, Z., He, X., & Hao, H. (2019). Life cycle greenhouse gas emissions of Electric Vehicles in China: Combining the vehicle cycle and fuel cycle. *Energy, 177*, 222-233.

Rafique, H., Almagrabi, A. O., Shamim, A., Anwar, F., & Bashir, A. K. (2020). Investigating the acceptance of mobile library applications with an

extended technology acceptance model (TAM). *Computers & Education, 145,* 103-132.

Rajiv KVij (2022, June 12).Top 5 Reasons Why Electric Vehicles Are The FutureOf Driving In 2022. Retrieved from https://www.outlookindia.com/business/top-5-reasons-why-electric vehicles-are-the-future-of-driving-in-2022-news-201722

Rezvani, Z.; Jansson, J., & Bodin, J. (2015). Advances in consumer electric vehicle adoption research: A review and research agenda. *Transportation Research: Part D Transportation Environment, 34*, 122–136.

Saber Chtourou, M., & Souiden, N. (2010). Rethinking the TAM model: time to consider fun. *Journal of Consumer Marketing, 27*(4), 336-344.

Sang, Y.N., & Bekhet, H.A. (2015). Modeling electric vehicle usage intentions: an empirical study in Malaysia. *Journal of Cleaner Production, 92*, 75-83.

Sbordone, D., Bertini, I., Di Pietra, B., Falvo, M. C., Genovese, A., & Martirano, L. (2015). EV fast charging stations and energy storage technologies: A real implementation in the smart micro grid paradigm. *Electric Power Systems Research, 120,* 96-108.

Scholarly Community Encyclopedia (2022). Retrieved from https://encyclopedia.pub/entry/22506

Schröder, M., Iwasaki, F., & Kobayashi, H. (2021). *Current Situation of Electric Vehicles in ASEAN. Promotion of Electromobility in ASEAN: States, Carmakers, and International Production Networks.* ERIA Research Project Report FY2021, (03), 1-32.

Shepherd, S., Bonsall, P., & Harrison, G. (2012). Factors affecting future demand for electric vehicles: A model based study. *Transport Policy, 20,* 62-74.

Sherman, S.J., & Fazio, R.H. (1983). Parallals between attitudes and traits as predictors of behavior. *Journal of personality, 51*(3), 308-345.

Sierzchula, W., Bakker, S., Maat, K., & Van Wee, B. (2014). The influence of financial incentives and other socio-economic factors on electric vehicle adoption. *Energy Policy, 68*, 183-194.

Slattery, M., Dunn, J., & Kendall, A. (2021). Transportation of electric vehicle lithium-ion batteries at end-of-life: A literature review. *Resources, Conservation and Recycling, 174*, 105-155.

Sperling, D. (2018). Three revolutions: Steering automated, shared, and electric vehicles to a better future. *Island Press*. Retrieved from https://books.google.com/books?hl=zhCN&lr=&id=f0NEDwAAQBAJ&oi=fnd&pg=PP1&q=Not+needing+to+pay+import+duty+for+imported+electric+vehicles+is+an+incentive+that+is+attractive+to+me.%C2%A0&ots=4QD6Jp81Gp&sig=Gg4EscHtm4iPZ0Z20jexbPxLmjg

Statista.com (2019). Most concerning environmental issues according to citizensacross Malaysia as of March 2019. Retrieved from https://www.statista.com/statistics/1000112/malaysia-leading-environmental-issues/

Sun, X., Li, Z., Wang, X., & Li, C. (2019). Technology development of electric vehicles: A review. *Energies, 13*(1), 90. Retrieved from https://www.mdpi.com/602464.

Tambotoh, J.J., Manuputty, A.D., & Banunaek, F.E. (2015). Socio-economics factors and information technology adoption in rural area. *Procedia Computer Science, 72*, 178-185.

Tham, S.Y (2022, October 5). Electric Vehicles in Malaysia: Moving Uphill from Niche to Mass Market. Retrieved from https://fulcrum.sg/electric-vehicles-in-malaysia-moving-uphill-from-niche-to-mass-market/

The Malaysia Reserve (2020). Retrieved from https://themalaysianreserve.com/2020/02/19/ev-market-slows-on-low-awareness-limited-charging-stations/

The World Bank (2022, November 10). New Research: Economic Viability of Electric Vehicles is Strong and Improving in Many Developing Countries. Retrieved from https://www.worldbank.org/en/news/press-release/2022/11/11/new-research-economic-viability-of-electric-vehicles-is-strong-and-improving-in-many-developing-countries

Thilina, D.K. & Gunawardane, N. (2019). The effect of perceived risk on the purchase intention of electric vehicles: an extension to the technology acceptance model. *International Journal of Electric and Hybrid Vehicles, 11*(1), 73-84.

Thomas, C. E. (2009). Fuel cell and battery electric vehicles compared. International Journal of Hydrogen Energy, 34(15), 6005-6020.

Tu, J.C. & Yang, C. (2019). Key factors influencing consumers' purchase of electric vehicles. *Sustainability, 11*(14), 38-63.

Tuttle, D. P. (2015). Plug-in electric vehicle deployment and integration with theelectric grid (Doctoral dissertation).Retrieved from https://repositories.lib.utexas.edu/handle/2152/32852

Unicef (2020). Change for Climate: National Youth Climate Change Sur-vey reveals knowledge, attitudes and perceptions of youth towards cl-imate change. Retrieved from https://www.unicef.org/malaysia/press-releases/9-out-10-youth-malaysia-are-already-taking-individual-action-address-climate-change

Ursachi, G., Horodnic, I.A., & Zait, A. (2015). How Reliable are Measurement Scales? External Factors with Indirect Influence on Reliability Estimators. *Procedia Economics and Finance, 20*, 679–686.

Vafaei-Zadeh, A., Wong, T.K., Hanifah, H., Teoh, A.P., & Nawaser, K. (2022). Modelling electric vehicle purchase intention among generation Y consumers in Malaysia. Research in Transportation Business & Management, 100784. Retrieved from https://doi.org/10.1016/j.rtbm.2022.100784

Vanduhe, V. Z., Nat, M., & Hasan, H. F. (2020). Continuance intentions to use gamification for training in higher education: Integrating the technology acceptance model (TAM), Social motivation, and task technology fit (TTF). *IEEE Access, 8, 21473-21484.*

Van Haaren, R. (2011). Assessment of electric cars' range requirements and usage patterns based on driving behavior recorded in the National Household Travel Survey of 2009. *Earth and Environmental Engineering Department, Columbia University, Fu Foundation School of Engineering*

*and Applied Science, New York, 51, 53.*Retrieved from http://legacy.veva.ca/papers/HowFarWeDrive_v1.2.pdf

Varga, B.O., Sagoian, A., & Mariasiu, F. (2019). Prediction of electric vehicle range: A comprehensive review of current issues and challenges. *Energies, 12*(5), 946. Retrieved from https://www.mdpi.com/426168.

Veza, I., Abas, M.A., Djamari, D.W., Tamaldin, N., Endrasari, F., Budiman, B.A., & Aziz, M. (2022). Electric Vehicles in Malaysia and Indonesia: Opportunities and Challenges. *Energies, 15*(7), 25-64.

Vidhi, R., & Shrivastava, P. (2018). A review of electric vehicle lifecycle emissions and policy recommendations to increase EV penetration in India. *Energies, 11(3),* 483. Retrieved from https://www.mdpi.com/266432

Wang, S., Fan, J., Zhao, D., Yang, S., & Fu, Y. (2016). Predicting consumers' intention to adopt hybrid electric vehicles: using an extended version of the theory of planned behavior model. *Transportation, 43*(1), 123-143.

Wanner, D. (2013). Faults and their influence on the dynamic behaviour of electric vehicles. Retrieved from http://www.divaportal.org/smash/get/diva2:654994/FULLTEXT01.pdf

Xu, G., Wang, S., Li, J., & Zhao, D. (2020). Moving towards sustainable purchase behavior: examining the determinants of consumers' intentions to adopt electric vehicles. *Environmental Science and Pollution Research, 27,* 535-546.

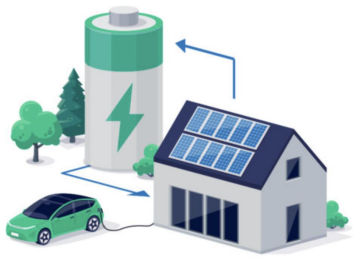
Yi, T., Zhang, C., Lin, T., & Liu, J. (2020). Research on the spatial-temporal distribution of electric vehicle charging load demand: A case study in China. *Journal of Cleaner Production, 242*, 118457. Retrieved from https://www.sciencedirect.com/science/article/pii/S095965261933327X

Yousif, R.O., & Alsamydai, M.J. (2019). Perspective of Technological Acceptance Model toward Electric Vehicle. *International Journal of Mechanical and Production Engineering Research and Development*, *9*, 873-884.

Zhang, L., Gao, T., Cai, G., & Hai, K.L. (2022). Research on electric vehicle charging safety warning model based on back propagation neural network optimized by improved gray wolf algorithm. *Journal of Energy Storage, 49*, 104092. Retrieved from https://doi.org/10.1016/j.est.2022.104092.

Appendix 1： Bidirectional charging

Bidirectional charging is a two ways charging system, in which energy can flow into the car via grid and vice versa. EV owners able to use energy from their car batteries to power their homes or send the energy back to the grid. The premise is sufficient power converted from sun.



Appendix 2: Master Copy of the Finalized Questionnaire

UNIVERSITI TUNKU ABDUL RAHMAN (UTAR)
FACULTY OF BUSINESS AND FINANCE
Master in Business Administration (Corporate Management)

Intention to Use Electric Vehicles in Malaysia, a Modification Theory of Acceptance Study

Survey Questionnaire

Dear Respondents,

I am currently undergoing Master in Business Administration (Corporate Management) programstudying at University Tunku Abdul Rahman (UTAR), Faculty of Business and Finance. This study is undertaken to fulfil my dissertation of the programme.

The main objective of the study is to investigate the underlying factors associated with the purchase of electric vehicles, herein refereed as EV, in Malaysia. I sincerely hope that you can spare a few minutes to complete this questionnaire. Your responses are utterly important for me in completing my study. However, your participation is of voluntary basis.

The information gathered and acquired through this questionnaire will be used solely for academic purposes. I firmly assure that all information provided to this study will be kept PRIVATE AND CONFIDENTIAL. I truthfully appreciate your cooperation in completing this questionnaire. Thank you for your precious time participation in this study.

Yours sincerely,
Name: Liu Yongchuang
Student ID: 2104634
Contact details: yongchuangliu@1utar.my

PERSONAL DATA PROTECTION STATEMENT

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, Universiti Tunku Abdul Rahman ("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

Notice:

1. The purposes for which your personal data may be used are inclusive but not limited to:-
   - For assessment of any application to UTAR
   - For processing any benefits and services
   - For communication purposes
   - For advertorial and news
   - For general administration and record purposes
   - For enhancing the value of education
   - For educational and related purposes consequential to UTAR
   - For the purpose of our corporate governance
   - For consideration as a guarantor for UTAR staff/ student applying for his/her scholarship/ study loan

2. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.
3. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.
4. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:

1. By submitting this form you hereby authorise and consent to us processing (including disclosing) your personal data and any updates of your information, for the purposes and/or for any other purposes related to the purpose.
2. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.
3. You may access and update your personal data by writing to us at yongchuangliu@1utar.my

Acknowledgment of Notice

[ ] I have been notified by you and that I hereby understood, consented and agreed per UTAR above notice.

[ ] I disagree, my personal data will not be processed.

……

Name:

Date:

Section A: Demographic Profile

The following questions refer to the respondent's demographic profile. Please tick the option that can best describe your demographic profile.

Gender:	☐	Male	☐	Female
Age:	☐	17-30	☐	51-60
	☐	31-40	☐	61 and above
	☐	41-50		
Ethnicity:	☐	Malay	☐	Indian
	☐	Chinese	☐	Other
Average Monthly Salary:	☐	Less than RM 2,000	☐	RM 4,001 – RM 5,000
	☐	RM 2,001 – RM 3,000	☐	RM 5,001 – RM 6,000
	☐	RM 3,001 – RM 4,000	☐	RM 6,001 and above
Education Background:	☐	Below High school	☐	Diploma/Degree Holder
	☐	High school	☐	Postgraduate Holder

Section B: Independent Variable

EV is referred to Battery electric vehicles (BEVs), Plug-in Hybrid Electric Vehicles (PHEVs), Fuel Cell Vehicles (FCVs). According to the International Energy Agency (IEA) Global EVs Outlook, a rapid growth of 50% per annum were reported on the sales of EV between 2013 and 2018 (Bibra et. al, 2021). A 10 million global EV stock was recorded in 2020. This spikes in sales can be owed to the increasing number of EV's models, growing from 90 to 370 over the years. Fitch Solutios Country Riskand Industry Research expects EVsales in Malaysia to expand rapidly in 2023. A list of new EV models that had been debuted in 2022: Hyundai IONIQ 5,Nissan, Volvo XC40, Benz-EQS,BMW ix xdrive40, Porsche Taycan, Kia EV6, Mazda MX-30.

Instructions: Below are the statements concerning behavioral factors that influencing Intention to Use Electric Vehicles in Malaysia, Kindly show your (dis)agreement with each statement based on the 5 points scale [1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.]

No.	Statements	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
Perceived Usefulness (IV1)						
1	The frequency for charging an electric vehicle should be lesser than the frequency for fuel-filling a vehicle with similar engine capacity (e.g. 1.5cc), age model, and travel distance.					
2	I should be able to charge the electric vehicle using a residential/ home electrical charger rather than merely depending on electricity charging stations that are available at specific locations for electrical energy supply.					
3	The maximum travel distance of a fully charged electric vehicle should be comparable or lengthier to the maximum travel distance of a fully fuelled vehicle with similar engine capacity (e.g. 1.5cc) and age model.					
4	The cost of charging an electric vehicle should be comparable to or lower than the cost for fuel filling a vehicle with similar travel distance, engine capacity (e.g. 1.5cc), age model, and travel distance.					
5	The electrical energy stored in an electric vehicle can be used as an energy source/ supply in heating up electrical appliances like toasters, induction hotplates, or microwaves. Such facilitation is useful for outdoor events like camping					
Perceived Ease of Use (IV2)						
1	Technically, electric vehicles shouldn't be difficult to drive.					
2	The likelihood of an EV's engine to get malfunctioning/ breaking down/ failing should be comparable with fuel vehicles of similar engine capacity, aged model, and usage purpose and frequency.					
3	Technically, I can tolerate the length of electricity charging time which takes about 17 hours to fully charge an electric car using residential/home chargers.					
4	Commercialized electricity charging stations should be widely available, even in rural areas.					
5	The repair and maintenance workshops for electric vehicles should be widely available, even in rural areas.					

Safety concern (IV3)

1	The electricity charging instrument used in charging stations or using home chargers should be able to control the capacity of electricity flow that is needed to maximize the energy storage of an electric vehicle. In this way, incidents of electrical overcharging can be prevented.					
2	Reliable safety measures need to be incorporated into the car's electrical system in order to prevent the happening of electrical short-circuit incidents.					

Environmental Awareness Concerns (IV4)

1	I am a person who will protect the environment whenever I can.					
2	Driving electric vehicles reduces the emission of hazardous gas.					
3	Driving electric vehicles reduces noise pollution.					

The pricing strategies of EV (IV5)

1	The reasonable selling price of an electric vehicle is an incentive that is attractive to me.					
2	Not needing to pay import duty for imported electric vehicles is an incentive that is attractive to me.					
3	Not needing to pay road tax for driving an electric vehicle is an attractive incentive to me.					
4	If the maintenance cost for electric vehicles is lower than gasoline/ fossil fuel vehicles, then this is an attractive incentive to me.					

Intention to use EV(DV)

1	I am willing to purchase an electric vehicle in the near future.					
2	I will recommend others to consider the purchase of an electric vehicle.					

Thank you very much for your willingness to participate in answering the questionnaire