Electric Vehicle Choices in Malaysia: A Conceptual Model Investigating Switching Intentions through the Push-Pull-Mooring Model

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Abstract

The electric vehicle (EV) sector is seeing significant worldwide expansion and acceptance, however the evident indicates that the adoption rate of EVs in Malaysia remains relatively low. The past studies identified the intention and motivation towards the adoption of EVs in Malaysia, are with limited studies are provided. Prior research has highlighted there is a scarcity of comprehensive studies on the intention and motivation towards the adoption of EVs in Malaysia. Therefore, this research examines individuals' intention to transition from motorized vehicles to EVs by using a Push-Pull-Mooring (PPM) model that incorporates institutional theory. By integrating the push factors such as perceived environmental threat, regulative environment, and pull factors recognized as alternative attractiveness, normative environment, as well as mooring factors, which is willingness to pay into a single framework. A total of nine hypotheses are formulated to evaluate the study framework. This research will use a quantitative cross-sectional approach for data collection. An online survey questionnaire, using Google Forms, will be disseminated to a total of 255 respondents in the Klang Valley using judgmental sampling.

Keyword: Theory of Planned Behavior (TPB), Electric Vehicles (EVs), Switching Intention, Push-Pull Mooring Model

Introduction

Electric Vehicles (hereinafter EVs) in Malaysia are increasingly capturing the attention and interest of the public, especially with the tax incentive exemption announced by the Malaysian government in 2023. As a developing country, traffic congestion in Malaysia has persistently been a significant concern since the early 90s (Anuar et al., 2022; Yazid et al., 2022). The studies of Ibrahim et al (2020) indicated that 80% of Malaysian are using motorized vehicle in their daily life which resulted to several significant environmental problems, such as the emission of greenhouse gases (GHG), climate change, and air pollution. However, apart from the past studies such as Wu (2019); Jian et al (2018) have identified EVs as one of the

most effective approaches of reducing carbon emissions and air pollution as well as the increasing variety of EVs available in Malaysia, the customer intention to use and adoption level are still relatively low. The Malaysian Automotive Association (MAA) research states that car registrations in 2023 reached 799,731 units, showing a 4% increase compared to the 721,177 units registered in 2022, nevertheless, EVs only accounted for an insignificant amount of 10,159 units, or equivalence to 1.27% of total car registrations (MAA, 2024). Comparatively, in 2019, EVs made up 2.6% of total worldwide car sales (International Energy Agency, 2019). Unlike in Malaysia, the rise in the popularity of EVs is evident from the fact that EVs accounted for about 54% of all car sales in Norway in 2020 (Klesty, 2021). Similarly, in 2018, China accounted for around 39% of all EVs sold globally, while Europe and the United States contributed 24% and 22%, respectively, according to the report from International Energy Agency (2019).

Transportation is the second largest contributor to global greenhouse gas (GHG) emissions and is becoming more prominent in developed countries (Sundram et al., 2021; Luderer et al., 2018). Air pollution is linked to and has a substantial role in health issues in densely populated places worldwide (Hoek et al., 2013; Reşitoğlu et al., 2015; Yang et al., 2014). Despite the achievements of several developed nations in reducing their greenhouse gas (GHG) emissions, Malaysia's emissions have continued to increase. Kuala Lumpur's transportation emitted a substantial amount of 7.6 tonnes of carbon dioxide (CO_2) in 2018, according to (The World Bank, 2022). The increasing number of motorized vehicles has led to notable rises in travel time, congestion, and fuel consumption, all of which have resulted in negative environmental consequences (Suhaimi et al., 2022)

The adoption of EVs would undeniably decrease greenhouse gas (GHG) emissions. However, the low acceptance of EVs in Malaysia can be attributed to several factors, including the high purchase prices (Huang & Qian, 2018) , limited driving Pevec et al (2020), lengthy charging times Xiong et al (2021) and inadequate charging infrastructure (Globisch et al., 2019; Wang et al., 2021). More importantly, the past studies of Abbasi et al (2021); Asadi et al (2021) identified the intention and motivation towards the adoption of EVs in Malaysia, but it has not been successful, and limited studies are provided.

Ultimately, the objective of this study is to provide noteworthy insights for related EV stakeholders, policymakers, scholars, and future studies. The results will enlighten the determinant factors that may be extracted from the push-pull mooring variables, with the main objective of increasing the switching intention among potential car buyers. With the increasing of EVs adoption, it not only contributes to the improvement of the quality of environment in Malaysia by lowering carbon emissions and air pollution, but also supports in achieving Environmental, Social, and Governance (ESG) goals. Lastly, this study will establish the groundwork for future investigations, which can further explore and improve upon this topic, ultimately assisting to increase the adoption rate of EV in Malaysia.

Literature Review
Push-Pull-Mooring model (PPM) migration theory
The Push-Pull-Mooring model (PPM) was introduced in 1885 with the publication of "Laws of Migration" (Lee, 1966; Ravenstein, 1885). This model was developed to study population migrations, as explained by Lewis (1982). Furthermore, Moon (1995) included the concept of

the mooring effect into the PPM framework, suggesting that elements such as push, pull, and mooring effects together impact an individual's decision to change from their present viewpoint to another.

In other words, PPM is a comprehensive model to identify the switching intentions of consumers among products and services. Originally, PPM consists of variables that represent repel (push), attract (pull), and restrict or encourage movement (mooring) (Sun et al., 2017). In cases where the PPM model is applied to this study on EVs, the push factors refer to the factors that motivate consumers to stop using motorized cars, the pull factors refer to the factors that motivate consumers to choose EVs, and the mooring factors refer to the factors that hinder consumers from selecting EVs. Therefore, the expected results would include the identification of variables that have a substantial impact on the desire of switching intention of EVs, using the PPM model.

Theory of Planned Behavior (TPB)
Theory of Planned Behavior (TPB) has been widely applied to understand and examine the influence of attitude, subjective norms, and perceived behavioral control on an individual's intention, which eventually manifests in their behavior (Ajzen, 1991). Ajzen (1991) defined attitude as "the level of desirable or undesirable personal assessment or judgement of a specific behavior", and subjective norm is understood as "perceived social pressure regarding carrying out or not performing a special behavior". Also, perceived behavioral control shows the perceived ease or difficulty of carrying out a certain behavior, and so reflects both previous experiences and anticipated constraints (Ajzen, 1991).

In view of sustainability literature, the past studies have applied the TPB with the integration of other models or contribution of various constructs to investigate green intention behavior in terms of green products Yadav & Pathak (2016), remanufactured products Hazen et al (2017); Perez-Castillo & Vera-Martinez (2021); Wang et al (2018), green hotels Chen & Tung (2014); Han et al (2009, 2011); Han & Kim (2010); Kim & Han (2010) green transportation Bamberg (2007); Bamberg & Schmidt (2001); Wang et al (2020) as well as green vehicles (Anwar et al., 2022; Sajjad, Asmi, et al., 2020; Sajjad, Chu, et al., 2020).

Push Factor
The push effect is created from the factors "that motivate people to leave an origin" (Stimson & Minnery, 1998). In the context of EVs, these factors relate to the functions and benefits of EVs that persuade potential consumers to abandon motorized vehicles. Therefore, the push factors in this study consist of perceived environmental threats and regulative environment.

Perceived Environmental Threat
"Perceived environmental threat" refers to the extend "which an individual views environmental issues that have a detrimental effect on the environment" (Kim et al., 2003). In addition, protection motivation theory proposes that incentives to engage in preventive actions arise from the evaluation of threats and an awareness of particular risks (Rogers, 1983). In other words, once an individual detects a perceived threat to the environment, they will take proactive measures to mitigate it, as stated by (Wang et al., 2020). Therefore, people are more likely to engage in environmentally helpful behaviors when they have an unfavorable perception of environmental issues, such as buying an EV. According to Horng

et al (2014), an individual's desire to protect the environment is closely connected to their perception of environmental threats. For instance, Kim et al (2013) argued that the tendency of individuals to behave positively towards the environment is influenced by the potential outcomes of climate change.

Prior research conducted by Shi et al (2019); Xiong et al (2021); Zeng et al (2021) has shown that EVs are considered as environmentally friendly vehicles that can effectively reduce CO2 emissions while reducing their negative impact on the environment. Therefore, the air pollution generated by traffic congestion in Malaysia, perhaps motorized car users become aware of the environmental hazards posed by these vehicles and therefore decide to switch from motorized cars to EVs. This view is supported by Krupa et al (2014) which he argued that environmentally conscious consumers are more inclined to acquire EVs.

Regulative Environment

"Regulative environment" explains the inclusiveness of both formal and informal norms and incentives that serve to control and regulate individual behavior (Seelos et al., 2011). The formal and informal regulatory system is responsible for set norms and providing incentives or punishments (Valdez & Richardson, 2013). Emerging markets are experiencing substantial institutional changes due to the rapidly changing global economy and shifts in levels of government participation, ownership patterns, and implementation of business laws, which could impact decision-making (Peng et al., 2009). Furthermore, previous studies have examined consumer behavior in relation to existing policy incentives, such as sales subsidies and tax exemption (Huang & Qian, 2018; Zhang & Qin, 2018). These incentives might potentially lower the expenses associated with EVs adoption (Li et al., 2018).

Policy incentives often promote the adoption of EVs by either reducing costs or enhancing convenience (Zhang & Qin, 2018; Zhang & Bai, 2017). Costantini et al (2017) classified the policy incentives offered by governments to encourage consumers to adopt EVs into two categories: financial incentives and non-financial incentives. Wee et al (2018) demonstrated that monetary incentives, such as sales subsidies and tax exemptions, have a positive impact on the ownership of EVs in the United States, where the research indicated that for every $1000 increase in the value of the subsidy, EV registrations in a state were 5 to 11 % higher than the global average.

Pull Factor

The pull factor refers as "the positive factors attracting people to a destination" (Bogue, 1969). In the context of EVs, these considerations relate to the features and benefits that entice consumers to make a switch to EVs. Therefore, this research applies a pull effect to integrate alternative attractiveness with the normative environment.

Alternative Attractiveness

Alternative attractiveness refers to "customers' perceptions of the extent to which viable competing alternatives are available in the marketplace" (Jones et al., 2000). According to Zengyan et al (2009), if individuals perceive the key qualities of an alternative product to be better, they are more likely to switch to that alternative product. Nevertheless, if a customer perceives that alternative conditions are similar to their present position or not more attractive than the current one, they are likely to prefer sticking in their current environment

(Patterson & Smith, 2003). On the other hand, Aaker & Mascarenhas (2017) argued that the primary reason consumers are not adopting EVs is due to the unavailability of alternate versions of EVs. In order to evaluate a vehicle's likelihood of being purchased in relation to new technology, it is necessary to assess the degree to which the adoption of EVs will enhance its benefits compared to motorized vehicles (Wang and Shih, 2009). Additionally, Tran et al. (2019) explained that the enhancement of EVs performance technology has the potential to impact customer purchase intention.

Normative Environment

"Normative environment" refers as "a normative pressure exerted by a combination of injunctive and descriptive norms that are based on an individual's judgement of reasonable behavior (Singh et al., 2018). An individual's intentions and actions are greatly impacted by the social environment and pressure they face from many stakeholders such as family, friends, neighbors, coworkers, and mass media (Chen et al., 2019). In countries where collectivist culture is dominant, people' behavior is easily influenced by others (Furnham et al., 2012; Shi et al., 2017). The normative environment encompasses the set of behavioral rules that restrict the actions of people, hence reflecting the societal significance of a particular culture (Bruton et al., 2010). On a societal level, knowledge may motivate individuals to change their attitudes and ideas in order to engage in environmental-friendly behavior (Goldsmith & Goldsmith, 2011). Social influence refers to the process of accidentally or indirectly altering attitudes and behaviors, when the majority has the power to impact the minority (Rashotte, 2007). The statement suggests that people's choice to buy EVs is influenced by socialization, as supported by (Bartikowski & Walsh, 2014).

Prior research of Wang et al (2019) has shown that the individual's buying choice may be impacted by the significance of the normative environment. Biswas & Roy (2015) found that the primary factors influencing consumer choice preferences are monetary and social significance. Lim et al (2015) discovered that the "neighbor effect" pattern has an impact on customers' decision-making when it comes to adopting EVs in Canada. In addition, the impact of social influence on customer intents to buy EVs in Malaysia is a noteworthy element, as highlighted by (Sang & Bekhet, 2015). In addition, Madigan et al (2016) discovered a favorable association between societal effect and purchase intentions for autonomous transport systems in Europe. In countries with a collectivistic culture, such as Malaysia, there is a greater willingness to allocate resources towards items that are considered beneficial to the community as a whole, as compared to individualistic cultures (Sreen et al., 2018). The influence of social values on customers' purchase of EVs is significant and influential, but functional, emotional, and conditional values seem to be inconsequential (Suki, 2016).

Mooring Factor

Mooring factors refer to all existential, cultural, and physical factors that assist or hinder migration decisions (Moon, 1995). Switching cannot be fully explained by just considering push and pull effects, since there may be additional elements that might hinder or disrupt the process (Bansal et al., 2005). Therefore, this research will focus on the willingness to pay as the primary barrier that hinders individuals from switching to EVs.

Willingness to Pay

Willingness to Pay (WTP) is recognized as "the amount that consumers are willing to pay for a certain number of consumer goods or services"(Huhtala, 1999). The study of Zorić &

Hrovatin (2012) argued that an individual's WTP is positively affected by their income. For instance, individuals with a better quality of life are more inclined to purchase EVs and are less price sensitive (Langbroek et al., 2016). Moreover, prior studies of Goh & Balaji (2016) and Hartmann & Apaolaza-Ibáñez (2012) has shown that customers expect green products to have an additional beneficial environmental effect when they make a purchase. Nevertheless, Larson et al. (2014) found that most buyers are reluctant to spend an additional amount for environmentally friendly automobiles, especially when provided with future-oriented details concerning fuel preservation. Similarly, the research from Dong et al (2020); Geske & Schumann (2018) have shown that enhancing the limited range and battery capacity are the primary determinants of an individual's WTP for EVs.

Switching Intention
Switching intention describes to the extent to which customers tend to shift to alternative goods or services and discontinue the use of their present products or services (Zhang et al., 2012). Switching may be categorized as either partial or total (Ye & Potter, 2011). Complete switching is the act of totally leaving existing goods or services (Wu et al., 2017). On the other hand, partial switching refers to the usage of alternative products or services without completely abandoning the previous ones (Mu & Lee, 2021). According to Ye et al (2008), it is required and feasible to utilize both existing and alternative products or services at the same time. Also, Jun & Arendt (2016); Pomery et al (2009) have argued that people are more likely to trigger their switching intention when they encounter beneficial settings that prompt them to respond to a certain activity or behavior. In the field of green sustainability, previous research has utilized the concept of switching intention to assess individuals' attitudes and actions towards environmentally-friendly products, specifically remanufactured products Hazen et al (2017); Perez-Castillo & Vera-Martinez (2021), transportation Bazrbachi et al (2017); Wang et al (2020) and electric vehicles (Anwar et al., 2022; Sajjad, Asmi, et al., 2020)

Relationship Between Push-Pull-Mooring Factors and Switching Intention
The relationship between Push-Pull-Mooring (PPM) factors and the intention to switch from motorized vehicles to electric vehicles (EVs) is multifaceted and significant for understanding consumer behavior in this transition is crucial for promoting electric vehicles (EVs). The Push-Pull-Mooring (PPM) framework provides a valuable lens for analyzing the switch from motorized vehicles to EVs. External forces, such as environmental concerns, may operate as substantial push factors that driving consumers to seek eco-friendly alternatives (Bazrbachi et al., 2017; Sun et al., 2017). Similarly, the past studies from Anwar et al. (2022) and Rietmann & Lieven (2019) had identified the significant and positive relationship between the regulative environment. For instance, the government subsidies, tax exemption and related discounted fee charges are encouraging the individual's intention in switching to the EVs (Helveston et al., 2015; Huang et al., 2017; Lieven, 2015; Wang et al., 2017).
Pull factors, on the other hand, consumers are more likely to switch if they perceive EVs as a superior alternative (Patterson & Smith, 2003; Zengyan et al., 2009). Also, Anwar et al (2022); Sajjad et al (2020) had identified the strong relationship between alternative attractiveness and switching intention in EVs context. Also, the individual's normative environment will be influenced by the society when the individuals view these kinds of behaviors are appropriate and necessary, such as purchasing an EV for the value creation towards the society, especially in collectivist country like Malaysia (Anwar et al., 2022; Nayak et al., 2021; Sreen et al., 2018). Additionally, the past studies Anwar et al (2022); Nayak et al (2021); Sajjad et al (2020) had

identified the significant relationship between the normative environment and switching intention. In the context of EVs, a consumer's willingness to pay a premium for eco-friendly products can be a mooring factor that facilitates the switch (Al Mamun et al., 2018). Therefore, the factors that from Push-Pull-Mooring (PPM) are recognized as influences for an individual when comes to the switching intention from motorized vehicles to EVs.

Research Objectives
The objective of this study aims to identify the variables of the push-pull-mooring model to influence the consumer switching intention towards EV in Malaysia. Hence, the research objectives of this study are:
1. To investigate the relationship between perceived environmental threat and switching intention of Malaysian consumers towards EV
2. To investigate the relationship between regulative environment and switching intention of Malaysian consumers towards EV
3. To investigate the relationship between alternative attractiveness and switching intention of Malaysian consumers towards EV
4. To investigate the relationship between normative environment and switching intention of Malaysian consumers towards EV
5. To investigate the relationship between willingness to pay and switching intention of Malaysian consumers towards EV

Research Questions
In the view of above Research Objectives, this study is to answer the following Research Questions：
1. Does the perceived environmental threat influence the switching intention of Malaysian consumer towards EV?
2. Does the regulation environment influence the switching intention of Malaysian consumer towards EV?
3. Does the alternative attractiveness influence the switching intention of Malaysian consumer towards EV?
4. Does the normative environment influence the switching intention of Malaysian consumer towards EV?
5. Does the willingness to pay influence the switching intention of Malaysian consumer towards EV?

Research Framework
The research framework in Figure 1 incorporates the theories of Push-Pull-Mooring (PPM) and Theory of Planned Behaviour (TPB) as the underpinning theories. Figure 1 demonstrates that the Push-Pull-Mooring concept and its variables have a direct impact on an individual's switching intention to purchasing EVs.
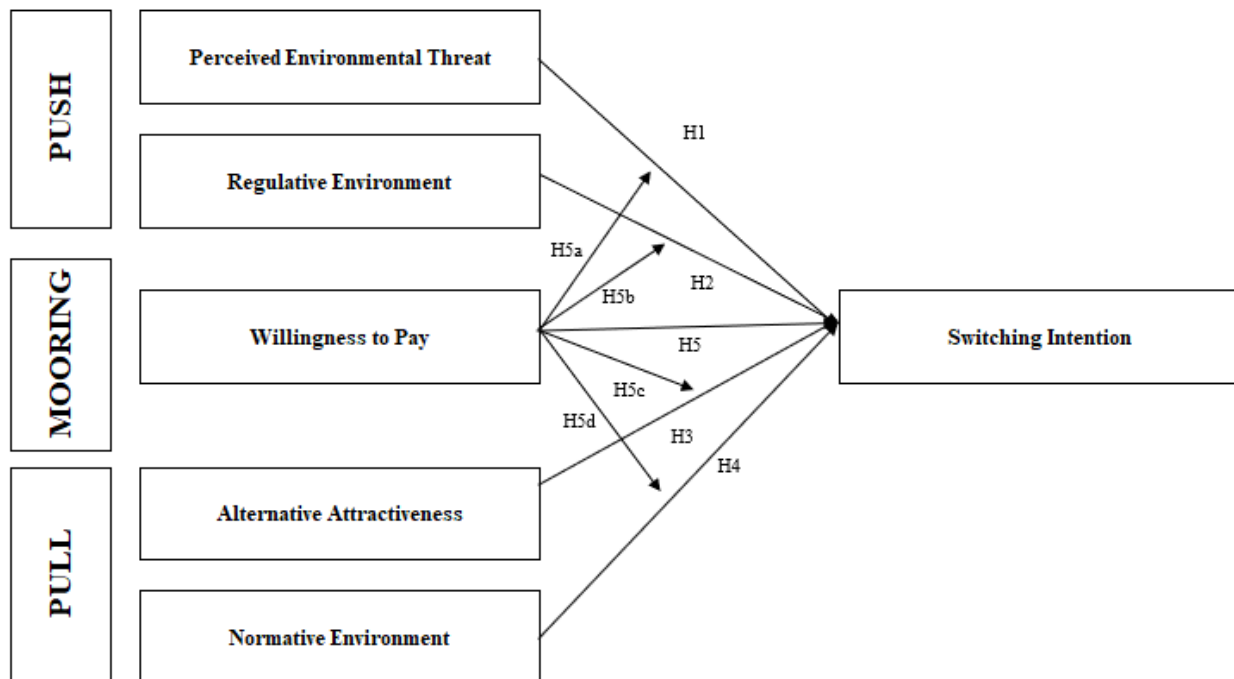
Figure 1

The theoretical underpinning for the framework is built with the application of the Push-Pull-Mooring (PPM) model. PPM is a comprehensive model to identify the switching intentions of consumers among products and services. TPB has been widely applied to understand and examine how attitude, subjective norms, and perceived behavioral control influence towards individual's intention, which is ultimately leads to their behavior (Ajzen, 1991). The significance of TPB is commonly used to determine the decision of consumers intention and behavior, especially in the context of green behavior Yazdanpanah & Forouzani (2015)

This research formulates the following hypotheses after conducting a comprehensive analysis of current academic literature and development of the theoretical framework.

H1: There is a positive relationship between Perceived Environmental Threat and Switching Intention.
H2: There is a positive relationship between Regulative Environment and Switching Intention.
H3: There is a positive relationship between Alternative Attractiveness and Switching Intention.
H4: There is a positive relationship between Normative Environment and Switching Intention.
H5: There is a positive relationship between Willingness to Pay and Switching Intention.
H5a: Willingness to pay moderated the relationship between perceived environmental threat and switching intentions
H5b: Willingness to pay moderated the relationship between regulative environment and switching intentions
H5c: Willingness to pay moderated the relationship between alternative attractiveness and switching intentions

H5d: Willingness to pay moderated the relationship between normative environment and switching intentions

Research Methodology
Research Design
The research design for this study on the relationship between Push-Pull-Mooring (PPM) factors and the intention to switch from motorized vehicles to EVs follows a positivist paradigm with a deductive approach. Employing a quantitative research method, the study aims to develop and validate the proposed conceptual framework within the EV context. This study will employ causal study to examine how the relationship between the variables from the PPM model influences consumer switching behavior towards EVs. The research design includes defining study settings, selecting a non-contrived setting for cross-sectional studies, and using a structured questionnaire for data collection. Data analysis is performed using Structural Equation Modeling (SEM) to test the hypotheses and draw conclusions based on empirical evidence.

Population and Samples
Population defined as the group of individuals deemed by the researcher to be interested in generalizing the results of the study (Ruel et al., 2016). The population of this study is the respondents are registered motorized car owners in Malaysia. According to Department of Statistics Malaysia (DOSM) DOSM (2022), the current number of population in year 2022 estimated at 32.7 million while Ministry of Transport Malaysia (2021) reported the registered number of motorized cars around 15 million units and above.

Based on World Air quality report in year 2021 IQAir (2021), Kuala Lumpur was ranked as 49th out of 100th most polluted regional city as well as the Klang Valley area and Petaling Jaya area deemed as the most polluted city area in Malaysia. Hence, the respondents of this study mainly will be selected from Wilayah Persekutuan Kuala Lumpur state area and Selangor state area and this study will employ the non-probability sampling technique, where the sampling frame is not possible to be established. However, there will have the fundamental criteria need to be followed:

- Must be the Malaysia citizen
- Must be aged 18 years old and above and owns the car license
- Must be possessed the motorized car/cars which is/are under respondent name
- Must be living Klang Valley or Kuala Lumpur or Selangor area

According to past studies of Baruch & Holtom (2008); Krishnan & Poulose (2016); Turrell et al (2009), the average response rate of survey conducting in individual level are 64.2%, 52.7%, and 64.6%, respectively. Therefore, this study response rate will be taking 52.7% as a benchmark. Hence, the minimum sample size is required 133 units, and the total of 255 questionnaires will be distributed to the individual in Kuala Lumpur and Selangor area by using the judgmental sampling.

Instrumentation Development
This research involves the investigation of single independent variable and single dependent variable. This research examines the relationship between the independent variable of Push-Pull-Mooring model (PPM) and the dependent variable of switching intention within the

context of EVs in Malaysia. The measurement scales applied in this study are adapted from previous literatures (Anwar et al., 2022; Sajjad et al., 2020; Wang et al., 2020).

Section	Variables	Number of items	Scale	Sources
A	**Demographic profiles**	10 items	Nominal with order	
B	**Independent Variable**		1.Does not apply at all	(Anwar et al., 2022; Sajjad et al., 2020; Wang et al., 2020)
	1. Perceived Environmental Threat	4 items	2.Slightly applies	
	2. Regulative environment	4 items	3.Moderately applies	
	3. Alternative Attractiveness	3 items	4.Largely applies	
	4. Normative Environment	3 items	5.Fully applies	
	5. Willingness to Pay	3 items		
C	**Dependent Variable** Switching Intention	3 items	1.Strongly disagree 2.Disagree 3.Neither agree nor disagree 4.Agree 5.Strongly agree	(Anwar et al., 2022)

Pilot Test & Plan for Data Collection

Pilot study is a preliminary examination that assesses the suitability and understandability of the survey questions, by using a small sample of respondents that will be included in the formal study (Sekaran, 2016). It is important to carry out a pilot study with a sufficiently substantial sample of answers to facilitate calculations pertaining to internal consistency reliability or discriminant validity (Hair et al., 2020). In fact, a pilot test is necessary to collect a sufficient sample of answers for assessments such as internal consistency reliability and discriminant validity (Hair et al., 2020). As a rule of thumb, a minimum of 30 to 100 respondents will be required for the pilot test (Nelson, 2016). Hence, the pilot test will mainly collect data via Google Form, in total 30 respondents for pilot testing purpose.

Since this study does not have any name list to verify the respondents as motorized car users or owner, the questionnaire will be distributed the survey via the online survey platform, Google Form, in total 255 respondents. The purpose of choosing Google Form as the preferred method had the following reasons need to be concerned:

I. Reduce the response bias as the researcher possible can find the right respondents in the consistency manner.

II. Shorten the duration of data collection.

This study will adopt the physical structured questionnaires, formatted with English language for the objective of data collection. Finally, questionnaire responses will be gathered using a statistical tool such as SPSS and SmartPLS 4.0 for data analysis.

Plan for Data Analysis

The process of data analysis is examining data using conceptual frameworks and developing connections between them. Various approaches will be used to analyse the data acquired from the conducted surveys. Once the data has been edited, coded, and categorised, it will be transmitted to the IBM SPSS statistical programme. Afterwards, the SmartPLS 4.0 software will be used to evaluate the prediction capacities of the structural model and analyse the connections between components.

Furthermore, as a component of the data analysis process, additional steps will be taken to ensure the precision of the data. The stages involved in data cleaning such as identifying missing values, analysing response patterns for suspicious, eliminating outliers, and evaluating the normality of data distribution and common method variance.

Expected Findings & Conclusion

The purpose of this research is to determine a direct relationship between the PPM model and the switching intention of EVs in Malaysia. The main aim of this study is to provide significant insights for EV stakeholders, policymakers, researchers, and future research. The findings will provide valuable insights for improving switching intention among future car buyers.

This study enhances existing theories by identifying crucial components of the factors that are critical to EVs industry. It also demonstrates the correlations between these factors and switching intentions, while incorporating existing theories on Theory Planned Behavior (TPB) into a single framework. Moving forward, this study will build the foundation for future research, which can further explore and improve upon this topic, ultimately assisting to boost the adoption rate of EV in Malaysia.

References

Aaker, D. A., & Mascarenhas, B. (2017). The Need for Charging. *EEE Electrification Magazine*, *5*(1), 59–67. http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7873371&isnumber=7873366

Abbasi, H., Johl, S., Shaari, Z., Moughal, W., Mazhar, M., Musarat, M., Rafiq, W., Farooqi, A., & Borovkov, A. (2021). Consumer Motivation by Using Unified Theory of Acceptance and Use of Technology towards Electric Vehicles. *Sustainability*, *13*(21), 12177. https://doi.org/10.3390/su132112177

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Al Mamun, A., Fazal, S., Ahmad, G., Yaacob, M., & Mohamad, M. (2018). Willingness to Pay for Environmentally Friendly Products among Low-Income Households along Coastal Peninsular Malaysia. *Sustainability*, *10*(5), 1316. https://doi.org/10.3390/su10051316

Anuar, A., Hamidun, S., Azman, S. I., Mazalan, F., & Shafie, F. A. (2022). LIFE IN PANDEMIC ERA : Movement Control Order Impact on Air Pollution in Malaysia. *MAEH Journal of Environmental Health*, *4*(1), 6–11.

Anwar, S., Hussain, B., Usman, M., Naqvi, A. A. S., & Ahmad Shah, A. (2022a). Consumers' switching intentions from conventional to green vehicles in the context of smog risk in Pakistan. *Case Studies on Transport Policy*, *June*. https://doi.org/10.1016/j.cstp.2022.06.008

Anwar, S., Hussain, B., Usman, M., Naqvi, A. A. S., & Ahmad Shah, A. (2022b). Consumers' switching intentions from conventional to green vehicles in the context of smog risk in Pakistan. *Case Studies on Transport Policy*, *June*. https://doi.org/10.1016/j.cstp.2022.06.008

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*, 124474. https://doi.org/10.1016/j.jclepro.2020.124474

Bamberg, S. (2007). Is a Stage Model a Useful Approach to Explain Car Drivers' Willingness to Use Public Transportation? *Journal of Applied Social Psychology*, *37*(8), 1757–1783. https://doi.org/10.1111/j.1559-1816.2007.00236.x

Bamberg, S., & Schmidt, P. (2001). Theory-Driven Subgroup-Specific Evaluation of an Intervention to Reduce Private Car Use1. *Journal of Applied Social Psychology*, *31*(6), 1300–1329. https://doi.org/10.1111/j.1559-1816.2001.tb02675.x

Bansal, H. S., Taylor, S. F., & James, Y. St. (2005). "Migrating" to New Service Providers: Toward a Unifying Framework of Consumers' Switching Behaviors. *Journal of the Academy of Marketing Science*, *33*(1), 96–115. https://doi.org/10.1177/0092070304267928

Bartikowski, B., & Walsh, G. (2014). Attitude contagion in consumer opinion platforms: posters and lurkers. *Electronic Markets*, *24*(3), 207–217. https://doi.org/10.1007/s12525-013-0149-z

Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human Relations*, *61*(8), 1139–1160. https://doi.org/10.1177/0018726708094863

Bazrbachi, A., Sidique, S. F., Shamsudin, M. N., Radam, A., Kaffashi, S., & Adam, S. U. (2017). Willingness to pay to improve air quality: A study of private vehicle owners in Klang Valley, Malaysia. *Journal of Cleaner Production*, *148*, 73–83. https://doi.org/10.1016/j.jclepro.2017.01.035

Biswas, A., & Roy, M. (2015). Leveraging factors for sustained green consumption behavior based on consumption value perceptions: testing the structural model. *Journal of Cleaner Production*, *95*, 332–340. https://doi.org/10.1016/j.jclepro.2015.02.042

Bogue, D. J. (1969). *Principles of demography*. John Wiley & Sons.

Borhan, M. N., Ibrahim, A. N. H., Syamsunur, D., & Rahmat, R. A. (2017). Why Public Bus is a Less Attractive Mode of Transport: A Case Study of Putrajaya, Malaysia. *Periodica Polytechnica Transportation Engineering*, *47*(1), 82–90. https://doi.org/10.3311/PPtr.9228

Bruton, G. D., Ahlstrom, D., & Li, H. (2010). Institutional Theory and Entrepreneurship: Where Are We Now and Where Do We Need to Move in the Future? *Entrepreneurship Theory and Practice*, *34*(3), 421–440. https://doi.org/10.1111/j.1540-6520.2010.00390.x

Chen, G., Wang, X., Li, J., Yan, B., Wang, Y., Wu, X., Velichkova, R., Cheng, Z., & Ma, W. (2019). Environmental, energy, and economic analysis of integrated treatment of municipal solid waste and sewage sludge: A case study in China. *Science of The Total Environment*, *647*, 1433–1443. https://doi.org/10.1016/j.scitotenv.2018.08.104

Chen, M.-F., & Tung, P.-J. (2014). Developing an extended Theory of Planned Behavior model to predict consumers' intention to visit green hotels. *International Journal of Hospitality Management*, *36*, 221–230. https://doi.org/10.1016/j.ijhm.2013.09.006

Costantini, V., Crespi, F., & Palma, A. (2017). Characterizing the policy mix and its impact on eco-innovation: A patent analysis of energy-efficient technologies. *Research Policy*, *46*(4), 799–819. https://doi.org/10.1016/j.respol.2017.02.004

Dong, X., Zhang, B., Wang, B., & Wang, Z. (2020). Urban households' purchase intentions for pure electric vehicles under subsidy contexts in China: Do cost factors matter? *Transportation Research Part A: Policy and Practice*, *135*(November 2018), 183–197. https://doi.org/10.1016/j.tra.2020.03.012

DOSM. (2022). *Prime Minister's Department Department of Statistics Malaysia Press Release*.

Furnham, A., Tu, B. L., & Swami, V. (2012). Cross-cultural differences in self-assessed intelligence: A comparison of british and chinese undergraduates. *Psychologia*, *55*(1), 21–27. https://doi.org/10.2117/psysoc.2012.21

Geske, J., & Schumann, D. (2018). Willing to participate in vehicle-to-grid (V2G)? Why not! *Energy Policy*, *120*(July 2017), 392–401. https://doi.org/10.1016/j.enpol.2018.05.004

Globisch, J., Plötz, P., Dütschke, E., & Wietschel, M. (2019). Consumer preferences for public charging infrastructure for electric vehicles. *Transport Policy*, *81*(May), 54–63. https://doi.org/10.1016/j.tranpol.2019.05.017

Goh, S. K., & Balaji, M. S. (2016). Linking green skepticism to green purchase behavior. *Journal of Cleaner Production*, *131*, 629–638. https://doi.org/10.1016/j.jclepro.2016.04.122

Goldsmith, E. B., & Goldsmith, R. E. (2011). Social influence and sustainability in households. *International Journal of Consumer Studies*, *35*(2), 117–121. https://doi.org/10.1111/j.1470-6431.2010.00965.x

Hair, J. F., Page, M., & Brunsveld, N. (2020a). Essentials of Business Research Methods Fourth Edition. In *Routledge Taylor & Francis Group*. Routledge.

Hair, J. F., Page, M., & Brunsveld, N. (2020b). Essentials of Business Research Methods Fourth Edition. In *Routledge Taylor & Francis Group*. Routledge.

Han, H., Hsu, L.-T. J., Lee, J.-S., & Sheu, C. (2011). Are lodging customers ready to go green? An examination of attitudes, demographics, and eco-friendly intentions. *International Journal of Hospitality Management*, *30*(2), 345–355. https://doi.org/10.1016/j.ijhm.2010.07.008

Han, H., Hsu, L.-T. (Jane), & Lee, J.-S. (2009). Empirical investigation of the roles of attitudes toward green behaviors, overall image, gender, and age in hotel customers' eco-friendly decision-making process. *International Journal of Hospitality Management*, *28*(4), 519–528. https://doi.org/10.1016/j.ijhm.2009.02.004

Han, H., & Kim, Y. (2010). An investigation of green hotel customers' decision formation: Developing an extended model of the theory of planned behavior. *International Journal of Hospitality Management*, *29*(4), 659–668. https://doi.org/10.1016/j.ijhm.2010.01.001

Hartmann, P., & Apaolaza-Ibáñez, V. (2012). Consumer attitude and purchase intention toward green energy brands: The roles of psychological benefits and environmental concern. *Journal of Business Research*, *65*(9), 1254–1263. https://doi.org/10.1016/j.jbusres.2011.11.001

Hazen, B. T., Mollenkopf, D. A., & Wang, Y. (2017a). Remanufacturing for the Circular Economy: An Examination of Consumer Switching Behavior. *Business Strategy and the Environment*, *26*(4), 451–464. https://doi.org/10.1002/bse.1929

Hazen, B. T., Mollenkopf, D. A., & Wang, Y. (2017b). Remanufacturing for the Circular Economy: An Examination of Consumer Switching Behavior. *Business Strategy and the Environment*, *26*(4), 451–464. https://doi.org/10.1002/bse.1929

Helveston, J. P., Liu, Y., Feit, E. M., Fuchs, E., Klampfl, E., & Michalek, J. J. (2015). Will subsidies drive electric vehicle adoption? Measuring consumer preferences in the U.S. and China. *Transportation Research Part A: Policy and Practice*, *73*, 96–112. https://doi.org/10.1016/j.tra.2015.01.002

Hoek, G., Krishnan, R. M., Beelen, R., Peters, A., Ostro, B., Brunekreef, B., & Kaufman, J. D. (2013). Long-term air pollution exposure and cardio- respiratory mortality: a review. *Environmental Health*, *12*(1), 43. https://doi.org/10.1186/1476-069X-12-43

Horng, J., Hu, M.-L. M., Teng, C.-C. C., & Lin, L. (2014). Energy Saving and Carbon Reduction Behaviors in Tourism – A Perception Study of Asian Visitors from a Protection Motivation Theory Perspective. *Asia Pacific Journal of Tourism Research*, *19*(6), 721–735. https://doi.org/10.1080/10941665.2013.797002

Huang, H., Fu, D., & Qi, W. (2017). Effect of driving restrictions on air quality in Lanzhou, China: Analysis integrated with internet data source. *Journal of Cleaner Production*, *142*, 1013–1020. https://doi.org/10.1016/j.jclepro.2016.09.082

Huang, Y., & Qian, L. (2018). Consumer preferences for electric vehicles in lower tier cities of China: Evidences from south Jiangsu region. *Transportation Research Part D: Transport and Environment*, *63*, 482–497. https://doi.org/10.1016/j.trd.2018.06.017

Huhtala, A. (1999). How much do money, inconvenience and pollution matter? Analysing households' demand for large scale recycling and incineration. *Journal of Environmental Management*, *55*(1), 27–38. https://doi.org/10.1006/jema.1998.0245

Ibrahim, A. N. H., Borhan, M. N., & Rahmat, R. A. O. K. (2020). Understanding users' intention to use park-and-ride facilities in malaysia: The role of trust as a novel construct in the theory of planned behaviour. *Sustainability (Switzerland)*, *12*(6). https://doi.org/10.3390/su12062484

International Energy Agency. (2019). *Global EV Outlook 2019: Scaling-up the transition to electic mobility*. www.iea.org/publications/reports/globalevoutlook2019/

IQAir. (2021). *World air quality report 2021*.

Jian, L., Yongqiang, Z., & Hyoungmi, K. (2018). The potential and economics of EV smart charging: A case study in Shanghai. *Energy Policy*, *119*(January), 206–214. https://doi.org/10.1016/j.enpol.2018.04.037

Jones, M. A., Mothersbaugh, D. L., & Beatty, S. E. (2000). Switching barriers and repurchase intentions in services. *Journal of Retailing*, *76*(2), 259–274. https://doi.org/10.1016/S0022-4359(00)00024-5

Jun, J., & Arendt, S. W. (2016). Understanding healthy eating behaviors at casual dining restaurants using the extended theory of planned behavior. *International Journal of Hospitality Management*, *53*, 106–115. https://doi.org/10.1016/j.ijhm.2015.12.002

Sundram, K. V. P., Hashim, N., Shariff, S. H., Pujiati, A., & Ardiansari, A. (2021). Sustainable Transportation on University Campus: A Case at UiTM Selangor, Puncak Alam Campus, Malaysia and Universitas Negeri Semarang, Indonesia. *Asian Journal of University Education*, *17*(2), 262. https://doi.org/10.24191/ajue.v17i2.13407

Kim, S., Jeong, S., & Hwang, Y. (2013). Predictors of Pro-Environmental Behaviors of American and Korean Students. *Science Communication*, *35*(2), 168–188. https://doi.org/10.1177/1075547012441692

Kim, S. S., Lee, C., & Klenosky, D. B. (2003). The influence of push and pull factors at Korean national parks. *Tourism Management*, *24*(2), 169–180. https://doi.org/10.1016/S0261-5177(02)00059-6

Kim, Y., & Han, H. (2010). Intention to pay conventional-hotel prices at a green hotel – a modification of the theory of planned behavior. *Journal of Sustainable Tourism*, *18*(8), 997–1014. https://doi.org/10.1080/09669582.2010.490300

Klesty, V. (2021). Electric cars rise to record 54% market share in Norway in 2020. *Reuters*. https://www.reuters.com/article/us-autos-electric-norway-idUKKBN29A0ZT

Krishnan, T. N., & Poulose, S. (2016). Response rate in industrial surveys conducted in India: Trends and implications. *IIMB Management Review*, *28*(2), 58. https://doi.org/10.1016/j.iimb.2016.05.006

Krupa, J. S., Rizzo, D. M., Eppstein, M. J., Lanute, D. B., Gaalema, D. E., Lakkaraju, K., & Warrender, C. E. (2014). Analysis of a consumer survey on plug-in hybrid electric vehicles. *Transportation Research Part A*, *64*, 14–31. https://doi.org/10.1016/j.tra.2014.02.019

Langbroek, J. H. M., Franklin, J. P., & Susilo, Y. O. (2016). The effect of policy incentives on electric vehicle adoption. *Energy Policy*, *94*, 94–103. https://doi.org/10.1016/j.enpol.2016.03.050

Larson, P. D., Viáfara, J., Parsons, R. V, & Elias, A. (2014). Consumer attitudes about electric cars: Pricing analysis and policy implications. *Transportation Research Part A: Policy and Practice*, *69*, 299–314. https://doi.org/10.1016/j.tra.2014.09.002

Lee, E. S. (1966). A theory of migration. *Demography*, *3*(1), 47–57. https://doi.org/10.2307/2060063

Lewis, G. J. (1982). *Human Migration: A Geographical Perspective*.

Li, L., Ye, F., Li, Y., & Tan, K. H. (2018). A bi-objective programming model for carbon emission quota allocation: Evidence from the Pearl River Delta region. *Journal of Cleaner Production*, *205*, 163–178. https://doi.org/10.1016/j.jclepro.2018.09.069

Lieven, T. (2015). Policy measures to promote electric mobility – A global perspective. *Transportation Research Part A: Policy and Practice*, *82*, 78–93. https://doi.org/10.1016/j.tra.2015.09.008

Lim, M. K., Mak, H.-Y., & Rong, Y. (2015). Toward Mass Adoption of Electric Vehicles: Impact of the Range and Resale Anxieties. *Manufacturing & Service Operations Management*, *17*(1), 101–119. https://doi.org/10.1287/msom.2014.0504

Luderer, G., Vrontisi, Z., Bertram, C., Edelenbosch, O. Y., Pietzcker, R. C., Rogelj, J., De Boer, H. S., Drouet, L., Emmerling, J., Fricko, O., Fujimori, S., Havlík, P., Iyer, G., Keramidas, K., Kitous, A., Pehl, M., Krey, V., Riahi, K., Saveyn, B., … Kriegler, E. (2018). Residual fossil CO2 emissions in 1.5-2 °c pathways. *Nature Climate Change*, *8*(7), 626–633. https://doi.org/10.1038/s41558-018-0198-6

Madigan, R., Louw, T., Dziennus, M., Graindorge, T., Ortega, E., Graindorge, M., & Merat, N. (2016). Acceptance of Automated Road Transport Systems (ARTS): An Adaptation of the UTAUT Model. *Transportation Research Procedia*, *14*(0), 2217–2226. https://doi.org/10.1016/j.trpro.2016.05.237

Ministry of Transport Malaysia. (2021). Malaysia Transportation Statistics 2020. In *Ministry of Transport,*.

Suki, M. N. (2016). Consumer environmental concern and green product purchase in Malaysia: structural effects of consumption values. *Journal of Cleaner Production*, *132*, 204–214. https://doi.org/10.1016/j.jclepro.2015.09.087

Moon, B. (1995). Paradigms in migration research: exploring "moorings" as a schema. *Progress in Human Geography*, *19*(4), 504–524. https://doi.org/10.1177/030913259501900404

Mu, H.-L., & Lee, Y.-C. (2021). How Inclusive Digital Financial Services Impact User Behavior: A Case of Proximity Mobile Payment in Korea. *Sustainability*, *13*(17), 9567. https://doi.org/10.3390/su13179567

Nayak, B., Bhattacharyya, S. S., Goswami, S., & Thakre, S. (2021). Adoption of online education channel during the COVID-19 pandemic and associated economic lockdown: an empirical study from push–pull-mooring framework. *Journal of Computers in Education*, *0123456789*. https://doi.org/10.1007/s40692-021-00193-w

Patterson, P. G., & Smith, T. (2003a). A cross-cultural study of switching barriers and propensity to stay with service providers. *Journal of Retailing*, *79*(2), 107–120. https://doi.org/10.1016/S0022-4359(03)00009-5

Patterson, P. G., & Smith, T. (2003b). A cross-cultural study of switching barriers and propensity to stay with service providers. *Journal of Retailing*, *79*(2), 107–120. https://doi.org/10.1016/S0022-4359(03)00009-5

Peng, M. W., Sun, S. L., Pinkham, B., & Chen, H. (2009). The Institution-Based View as a Third Leg for a Strategy Tripod. *Academy of Management Perspectives*, *23*(3), 63–81. https://doi.org/10.5465/amp.2009.43479264

Perez-Castillo, D., & Vera-Martinez, J. (2021). Green behaviour and switching intention towards remanufactured products in sustainable consumers as potential earlier adopters. *Asia Pacific Journal of Marketing and Logistics*, *33*(8), 1776–1797. https://doi.org/10.1108/APJML-10-2019-0611

Pevec, D., Babic, J., Carvalho, A., Ghiassi-Farrokhfal, Y., Ketter, W., & Podobnik, V. (2020). A survey-based assessment of how existing and potential electric vehicle owners perceive range anxiety. *Journal of Cleaner Production*, *276*, 122779. https://doi.org/10.1016/j.jclepro.2020.122779

Pomery, E. A., Gibbons, F. X., Reis-Bergan, M., & Gerrard, M. (2009). From Willingness to Intention: Experience Moderates the Shift From Reactive to Reasoned Behavior. *Personality and Social Psychology Bulletin*, *35*(7), 894–908. https://doi.org/10.1177/0146167209335166

Ravenstein. (1885). The Laws of Migration. *Journal of the Statistical Society of London*, *48*(2), 167–235.

Reşitoğlu, İ. A., Altinişik, K., & Keskin, A. (2015). The pollutant emissions from diesel-engine vehicles and exhaust aftertreatment systems. *Clean Technologies and Environmental Policy*, *17*(1), 15–27. https://doi.org/10.1007/s10098-014-0793-9

Rietmann, N., & Lieven, T. (2019). How policy measures succeeded to promote electric mobility – Worldwide review and outlook. *Journal of Cleaner Production*, *206*, 66–75. https://doi.org/10.1016/j.jclepro.2018.09.121

Rogers, R. W. (1983). Cognitive and Physiological Processes in Fear Appeals and Attitude Change: A Revised Theory of Protection Motivation. In J. Cacioppo & R. Petty (Eds.), *Social Psychophysiology* (pp. 153–177). Guilford Press.

Ruel, E., III, W. E. W., & Gillespie, B. J. (2016). The Practice of Survey Research Theory and Applications: A Review. In *The Qualitative Report*. https://doi.org/10.46743/2160-3715/2016.2421

Sajjad, A., Asmi, F., Chu, J., & Anwar, M. A. (2020). Environmental concerns and switching toward electric vehicles: geographic and institutional perspectives. *Environmental Science and Pollution Research*, *27*(32), 39774–39785. https://doi.org/10.1007/s11356-020-08311-4

Sajjad, A., Chu, J., Anwar, M. A., & Asmi, F. (2020). Between green and gray: Smog risk and rationale behind vehicle switching. *Journal of Cleaner Production*, *244*, 118674. https://doi.org/10.1016/j.jclepro.2019.118674

Sang, Y.-N., & Bekhet, H. A. (2015). Modelling electric vehicle usage intentions: an empirical study in Malaysia. *Journal of Cleaner Production*, *92*, 75–83. https://doi.org/10.1016/j.jclepro.2014.12.045

Seelos, C., Mair, J., Battilana, J., & Dacin, T. (2011). *The embeddedness of social entrepreneurship: Understanding variation across geographic communities* (M. Lounsbury, Ed.). Research in the Sociology of Organizations.

Sekaran, U. (2016). *Research Methods For Business: A Skill-Building Approach*. John Wiley & Sons. https://doi.org/10.1002/9781119111931.ch108

Shi, H., Wang, S., & Zhao, D. (2017). Exploring urban resident's vehicular PM2.5 reduction behavior intention: An application of the extended theory of planned behavior. *Journal of Cleaner Production*, *147*, 603–613. https://doi.org/10.1016/j.jclepro.2017.01.108

Shi, S., Zhang, H., Yang, W., Zhang, Q., & Wang, X. (2019). A life-cycle assessment of battery electric and internal combustion engine vehicles: A case in Hebei Province, China. *Journal of Cleaner Production*, *228*, 606–618. https://doi.org/10.1016/j.jclepro.2019.04.301

Singh, M. P., Chakraborty, A., & Roy, M. (2018). Developing an extended theory of planned behavior model to explore circular economy readiness in manufacturing MSMEs, India. *Resources, Conservation and Recycling*, *135*(June), 313–322. https://doi.org/10.1016/j.resconrec.2017.07.015

Sreen, N., Purbey, S., & Sadarangani, P. (2018). Impact of culture, behavior and gender on green purchase intention. *Journal of Retailing and Consumer Services*, *41*(December 2017), 177–189. https://doi.org/10.1016/j.jretconser.2017.12.002

Stimson, R. J., & Minnery, J. (1998). Why People Move to the "Sun-belt": A Case Study of Long-distance Migration to the Gold Coast, Australia. *Urban Studies*, *35*(2), 193–214. https://doi.org/10.1080/0042098984943

Suhaimi, N. F., Jalaludin, J., & Mohd Juhari, M. A. (2022). The impact of traffic-related air pollution on lung function status and respiratory symptoms among children in Klang Valley, Malaysia. *International Journal of Environmental Health Research*, *32*(3), 535–546. https://doi.org/10.1080/09603123.2020.1784397

Sun, C., Kahn, M. E., & Zheng, S. (2017). Self-protection investment exacerbates air pollution exposure inequality in urban China. *Ecological Economics*, *131*, 468–474. https://doi.org/10.1016/j.ecolecon.2016.06.030

Tran, V., Zhao, S., Diop, E. B., & Song, W. (2019). Travelers' Acceptance of Electric Carsharing Systems in Developing Countries: The Case of China. *Sustainability*, *11*(19), 5348. https://doi.org/10.3390/su11195348

Turrell, G., Bentley, R., Thomas, L. R., Jolley, D., Subramanian, S., & Kavanagh, A. M. (2009). A multilevel study of area socio-economic status and food purchasing behaviour. *Public Health Nutrition*, *12*(11), 2074–2083. https://doi.org/10.1017/S1368980009004911

Valdez, M. E., & Richardson, J. (2013). Institutional Determinants of Macro–Level Entrepreneurship. *Entrepreneurship Theory and Practice*, *37*(5), 1149–1175. https://doi.org/10.1111/etap.12000

Wang, B., Ren, C., Dong, X., Zhang, B., & Wang, Z. (2019). Determinants shaping willingness towards on-line recycling behaviour: An empirical study of household e-waste recycling

in China. *Resources, Conservation and Recycling*, *143*(December 2018), 218–225. https://doi.org/10.1016/j.resconrec.2019.01.005

Wang, S., Wang, J., & Yang, F. (2020). From willingness to action: Do push-pull-mooring factors matter for shifting to green transportation? *Transportation Research Part D: Transport and Environment*, *79*(96), 102242. https://doi.org/10.1016/j.trd.2020.102242

Wang, W., Sui, H., Qu, F., & Li, W. (2021). New Energy Vehicle Charging Performance Test Research. *2021 IEEE 5th Information Technology,Networking,Electronic and Automation Control Conference (ITNEC)*, 376–380. https://doi.org/10.1109/ITNEC52019.2021.9587139

Wang, Y., Shi, J., Wang, R., Liu, Z., & Wang, L. (2018). Siting and sizing of fast charging stations in highway network with budget constraint. *Applied Energy*, *228*(April), 1255–1271. https://doi.org/10.1016/j.apenergy.2018.07.025

Wang, Z., Wang, X., & Guo, D. (2017). Policy implications of the purchasing intentions towards energy-efficient appliances among China's urban residents: Do subsidies work? *Energy Policy*, *102*(December 2016), 430–439. https://doi.org/10.1016/j.enpol.2016.12.049

Wee, S., Coffman, M., & La Croix, S. (2018). Do electric vehicle incentives matter? Evidence from the 50 U.S. states. *Research Policy*, *47*(9), 1601–1610. https://doi.org/10.1016/j.respol.2018.05.003

Wu, K., Vassileva, J., & Zhao, Y. (2017). Understanding users' intention to switch personal cloud storage services: Evidence from the Chinese market. *Computers in Human Behavior*, *68*, 300–314. https://doi.org/10.1016/j.chb.2016.11.039

Wu, P. (2019). Which battery-charging technology and insurance contract is preferred in the electric vehicle sharing business? *Transportation Research Part A: Policy and Practice*, *124*(xxxx), 537–548. https://doi.org/10.1016/j.tra.2018.04.010

Xiong, S., Wang, Y., Bai, B., & Ma, X. (2021). A hybrid life cycle assessment of the large-scale application of electric vehicles. *Energy*, *216*, 119314. https://doi.org/10.1016/j.energy.2020.119314

Yadav, R., & Pathak, G. S. (2016). Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned behavior. *Journal of Cleaner Production*, *135*, 732–739. https://doi.org/10.1016/j.jclepro.2016.06.120

Yang, J., Liu, Y., Qin, P., & Liu, A. A. (2014). A review of Beijing's vehicle registration lottery: Short-term effects on vehicle growth and fuel consumption. *Energy Policy*, *75*, 157–166. https://doi.org/10.1016/j.enpol.2014.05.055

Yazdanpanah, M., & Forouzani, M. (2015). Application of the Theory of Planned Behaviour to predict Iranian students' intention to purchase organic food. *Journal of Cleaner Production*, *107*, 342–352. https://doi.org/10.1016/j.jclepro.2015.02.071

Yazid, M. R. M., Taib, K. A., Fauzi, R. S. M., Rashid, N. A. A., & Bastam, M. N. (2022). Effectiveness of Traffic Management at Kajang SILK Highway. *Journal of Engineering*, *34*(2), 231–238. https://doi.org/https://doi.org/10.17576/jkukm-2022-34(2)-06

Ye, C., & Potter, R. (2011). The Role of Habit in Post-Adoption Switching of Personal Information Technologies: An Empirical Investigation. *Communications of the Association for Information Systems*, *28*(1), 585–610. https://doi.org/10.17705/1CAIS.02835

Ye, C., Seo, D., Desouza, K. C., Sangareddy, S. P., & Jha, S. (2008). Influences of IT Substitutes and User Experience on Post-Adoption User Switching: An Empirical Investigation. *Journal of the American Society for Information Science and Technology*, *59*(13), 2115–2132. https://doi.org/10.1002/asi

Zeng, D., Dong, Y., Cao, H., Li, Y., Wang, J., Li, Z., & Hauschild, M. Z. (2021). Are the electric vehicles more sustainable than the conventional ones? Influences of the assumptions and modeling approaches in the case of typical cars in China. *Resources, Conservation and Recycling*, *167*(June), 105210. https://doi.org/10.1016/j.resconrec.2020.105210

Zengyan, C., Yinping, Y., & Lim, J. (2009a). Cyber Migration: An Empirical Investigation on Factors that Affect Users' Switch Intentions in Social Networking Sites. *2009 42nd Hawaii International Conference on System Sciences*, 1–11. https://doi.org/10.1109/HICSS.2009.140

Zengyan, C., Yinping, Y., & Lim, J. (2009b). Cyber Migration: An Empirical Investigation on Factors that Affect Users' Switch Intentions in Social Networking Sites. *2009 42nd Hawaii International Conference on System Sciences*, 1–11. https://doi.org/10.1109/HICSS.2009.140

Zhang, K. Z. K., Cheung, C. M. K., & Lee, M. K. O. (2012). Online service switching behavior: The case of blog service providers. *Journal of Electronic Commerce Research*, *13*(3), 184–197.

Zhang, L., & Qin, Q. (2018). China's new energy vehicle policies: Evolution, comparison and recommendation. *Transportation Research Part A: Policy and Practice*, *110*(August 2017), 57–72. https://doi.org/10.1016/j.tra.2018.02.012

Zhang, X., & Bai, X. (2017). Incentive policies from 2006 to 2016 and new energy vehicle adoption in 2010–2020 in China. *Renewable and Sustainable Energy Reviews*, *70*(October 2016), 24–43. https://doi.org/10.1016/j.rser.2016.11.211

Zorić, J., & Hrovatin, N. (2012). Household willingness to pay for green electricity in Slovenia. *Energy Policy*, *47*(2012), 180–187. https://doi.org/10.1016/j.enpol.2012.04.055