Article

How Individual Values and Attitude Influence Consumers' Purchase Intention of Electric Vehicles—Some Insights from Kuala Lumpur, Malaysia

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Abstract

This article observes how the individual values and attitudes of consumers in Kuala Lumpur, Malaysia influence their purchase intention of electric vehicles (EVs) using the well-known theory of reasoned action (TRA). This study analyzed the data collected from 200 respondents from Kuala Lumpur, Malaysia. These respondents were asked about their views concerning their value sets, attitudes and purchase intention of EV using the structural equation modelling (SEM) technique. Findings of this study indicate that individual consequences relating to cost and convenience of consumers is negatively related to intention to purchase EVs. Environmental consequences are not a significant predictor of purchase intention. Conservation value was found to be positively related to the attitude of the respondents on environmental consequences but less intensely with individual consequences, while both self-transcendence value and self-enhancement value were positively related to individual consequences. Individual consequences and self-enhancement values were negatively related to environmentally responsible purchase intention. This article shows that the extended TRA might be applicable to the Malaysian context. The results of the study also suggest that domestic and foreign manufacturers of EVs should also take into consideration the perceptible easiness and convenience of users to recycle and reuse battery by using special materials that are recyclable and not harmful to the users.

Keywords

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Introduction

The transportation sector is the second most energy consuming sector after the industrial sector and accounts for about 40 per cent of the total energy consumption in Malaysia (Ministry of Transport, Malaysia, 2010). The rising energy demand compounded with fuel subsidies and a volatility of oil prices has set the transport sector on an unsustainable course and has posed a threat to national energy security. Moreover, since the transport sector in Malaysia is heavily reliant on petroleum, it contributes significantly to the greenhouse gas emissions. A transformation of the transportation sector is essential to decrease greenhouse gas emissions, air pollution and dependence on fossil fuel. Environmentally friendly vehicles (EFVs) are a feasible transportation technology capable of setting the transportation sector in a sustainable course. Since late 2011, the Malaysian government has been trying to accelerate the move of the transport sector towards zero emission mobility. Their goal is to increase the number of EVs on Malaysian roads by 10 per cent by 2020 (Ministry of Transport, 2010). The government is also encouraging private firms to put in place the necessary infrastructure for efficient operation of these vehicles. The government is also developing regulations and standards for firms that plan on setting up charging stations for EVs. Such measures were needed to create an environment that would generate an interest for the use of EVs. However, Malaysia-based vehicle producer Proton and Japan-based Nissan and Mitsubishi are all running trials of EVs in Malaysia to raise public awareness of the vehicle's plug-in option and to test the cars' viability. If Malaysia is to achieve its ambitious target of zero emission mobility, it will need to move quickly to generate industry interest and acceptance of the new product among the public. In Malaysia, no study so far has focused on the consumers' level of intention, major influencing factors and obstacles to the purchase of EFVs. This has created an information gap between transportation policymakers and the researchers in Malaysia. This issue has inspired the current study. Hence, this research tries to investigate, from the perspective of the theory of reasoned action (TRA), how values influence attitudes towards an environmentally responsible purchase intention (PIN) of EFVs in Malaysia. The remainder of the article is organized as follows. The second section presents the literature review followed by the statement of the research objectives and hypotheses in the third section. The fourth section describes the research methodology, sampling technique adopted for this study and the validity and reliability of the instruments used in this research. The fourth and fifth sections analyze and discuss the results. The last section summarizes findings of this study and highlights implications arising from the findings. Therefore, the results from this study can be used to provide important insights for policymakers in developing programs or projects to increase consumers' awareness, motivate them to purchase EVs and focus on major influential factors for having sustainable transportation system in Malaysia.

Literature Review

EFVs are vehicles designed to operate on at least one alternative to petroleum and diesel and include electric vehicles (EVs), hybrid electric vehicles (HEV) and battery electric vehicles (BEV). EVs are vehicles in which partial or entire propulsion power is provided from electricity. The HEV combines the ICE along with an electric motor to achieve a higher fuel economy compared to similar-sized vehicles using conventional fuel. Some commercially available HEVs include the Toyota Prius, Ford Escape Hybrid and Honda Civic Hybrid. The EV has a smaller internal combustion engine than the HEV and has a larger battery capable of powering the vehicle for distances between 20 and 60 miles (Sovacool & Hirsh, 2009). In developed countries, EVs are becoming more attractive for the households, partly because of various measures implemented to promote their use, such as, tax breaks and access to carpool

lanes. In a recent survey of Californians, 74 per cent of the respondents stated that they would 'seriously consider getting a more fuel-efficient car' in their next vehicle purchase (Mark et al., 2008). The PIN of the households towards a car involves a social identity and status, and it gives a great deal of importance in a social context. It also depends on time, preferences for the attributes of the car, such as, cost, design, environmental issues and convenience of the consumer. Table 1 summarizes some recent research on PIN of consumers from various geographical domains (Luca and Zani, 2012; Nayam et al., 2010; Ramayah, Lee & Mohamad, 2010; Smith et al., 2010; van Rijnsoever, Farla & Dijst, 2009; Zhang and Kim, 2013). It is interesting to note that these studies are more context specific in nature as they examined specific products. In this sense, it may be quite difficult to generalize the findings of each study for other settings. Ropke's (1999) work provided an intuitive perspective on global environmental problems by investigating some of the powerful forces behind the growth in consumption, that is, (i) the economic clarification, (ii) the socio-psychological clarification, which is a focal point on consumption from the side of the human being surrounded in specific social associations and (iii) the historical and socio-technological clarification focusing on different phases of daily life. The importance of Ropke's (2009) study is that it argued for a practical theoretical approach, which tries to investigate ecological economics issues and other fields related to the environmental aspects of sustainable consumption. Ropke's (2009) paper tries to provide an interesting alternative viewpoint that helps to examine environmentally responsible behaviour.

Table 1. Some Recent Studies Purchase Intention of the Consumers

Authors	Location	Product	Sample	Findings
Ramayah et al. (2010)	Malaysia	Cloth diapers	Working respondents	The results of this study indicated that self-transcendence value and self-enhancement value were positively related to individual consequences while individual consequences and self-enhancement value were negatively related to environmentally responsible purchase intention.
Christian, Alim and Mehmet (2013)	Norway	Green car	Norwegian households who purchased a new car	The results of this study show that car-type class is the strongest determinant of the car's level of CO_2 emissions. Socio-demographic factors have little impact on choice of car-type class when psychological factors are controlled for intention to purchase an environmentally friendly car.
Bopeng and Jung-Hwan (2013)	China	Luxury goods	Population from Beijing, Shanghai and Guangzhou	Brand consciousness, social comparison and fashion innovativeness have a significant impact on attitude towards purchasing luxury fashion goods among Chinese consumers. In addition, Chinese consumers' purchasing intention for luxury fashion goods was affected by their attitude towards buying luxury fashion goods.

(Table 1 Continued)

(Table 1 Continued)

Authors	Location	Product	Sample	Findings
Frank, Jacco and Martin (2009)	Netherlands	Green car	Household respondent	People with a positive environmental attitude show environmentally friendly behaviour and are more involved with cars than people who do not translate their environmental attitude into the corresponding behaviour. This leads to the idea that not only environmental knowledge but also involvement with cars is a prerequisite for buying an environmentally friendly car.
Gabriele, Luca and Bruna (2012)	Italy	Genetically modified (GM) food	Italian households	Results demonstrated that, among the components of the theory of planned behaviour, attitude was the most important predictor of intention. Attitude, in turn, was predicted by perceived risks and benefits. Perceived benefits independently and strongly predicted intention. Perceived risks were not related to intention after controlling for the other predictors but did predict strongly perceived benefits. Perceived risks and benefits were significantly influenced by government institutions trust.
Joanne, Shuang, Peter, Cindy, and Ren and Stephanie (2010)	China	Australian goods and services	Chinese consumers	The multivariate analysis revealed a significant difference in beliefs of people who intended to purchase Australian products and/or services compared to people who did not intend to purchase them.

Source: Review of literature.

Attitude, PIN and Behaviour

Since the 1970s, many researchers have conducted their studies on the subject of attitude (Ajzen & Fishbein, 1980; Sheppard, Hartwick & Warshaw, 1988) and these studies are known as behavioural research. Behavioural research actually discusses the theoretical concept of attitude of human beings, for example, what product preferences a person has, what causes a person to purchase the product and how we act in response to others (Solomon et al., 2007). PIN a specific product has been found to be a good predictor of actual behaviour in purchasing the product. On the other hand, intention is influenced by the level of effort needed to exercise the behaviour (Bagozzi, Yi & Baumgartner, 1990). Ajzen and Fishbein (1980) state that, actually, intension creates the balance between behaviour and the attitude towards the behaviour. Follows and Jobber (2000) conducted a literature review on environmentally responsible purchase behaviour, and in the review they illustrated that green attitudinal measure is

influenced by several environmental issues. It was also recognized by other researchers that the strength of the correlation between attitude and behaviour was greater when attitude was considered as an explicit environmental behaviour rather than as a general attitude towards the environment (Hines, Hungerford & Tomera, 1987). Delang and Cheng (2012) conducted a survey in Hong Kong to investigate people's attitudes towards the environmental aspects of EVs. The respondents of the survey believed that EVs have a positive environmental benefit but environmental costs of EVs, such as, battery waste and increased airborne pollutants emitted by power plants when electricity is produced, were also their concern.

Environmental Consequences

Environmental values are powerful predictors of certain consumer actions and positively influence willingness to engage in actions that protect the environment (Oliver & Rosen, 2010). It is generally established that some consumers consider social and environmental issues when they make their purchase decisions because they want to appraise the consequences of their consumption on the society and want to improve the environmental quality (Follows & Jobber, 2000). Therefore, the marketplace can expect to see an increase in the purchase of environmentally friendly products (Follows & Jobber, 2000). For example, some researchers have found that consumers who show high levels of environmental awareness during their purchase are more likely to purchase EVs compared to those consumers who are less concerned about the environment (Heffner, Kurani & Turrentine, 2007; Kahn, 2007). Similarly, Gallagher and Muehlegger (2011) found that social preferences for environmental quality and energy security were a major determinant for consumer adoption of EVs. Gallagher and Muehlegger (2011) concluded that social preferences increased the sales of EVs more than rising gas prices or tax incentives.

On the other hand, a study by Ramayah et al. (2010) found that environmental consequences (ECNs) show non-statistically significant effects on green PIN among Malaysians consumers who buy baby diapers. This contradicts the previous findings. Ramayah et al. (2010) believed that the contradictions could be due to the fact that although Malaysians may be ethically aware of ECNs, they may not feel morally obligated to exhibit environmentally responsible PINs or behaviours. Still, according to him, PIN a specific product is found to be a good predictor of the actual behaviour in purchasing the product. However, Paco and Raposo (2009) also discussed a contradictory finding. In their survey, although their respondents were concerned about the environment, they did not turn their concerns into action and rarely took part in environmental events. Their concerns were more related to economic factors rather than environmental issues.

Individual Consequences

Individual consequences (ICNs) include measures of convenience, range of product sizes and perceived usefulness in relation to PIN, such as, when individuals want to buy a product, they will choose those options that maximize their utility based on their convenience, preference, usefulness of the product and their budget (Roche et al., 2010). Domina and Koch (2002) concluded that convenience is an important factor affecting recycling behaviour of textile (Domina & Koch, 2002). Van Bree, Verbong and Kramer (2010) found that an increase in gas prices influences consumer behaviour. In a study on

consumer adoption of HEV, Gallagher and Muehlegger (2011) found that consumers usually make the decision to buy HEVs in response to increase in gas prices and government incentives. Other factors that influence their purchasing behaviour are limited battery longevity, battery range, long recharging time and environmental impacts from increased fossil fuel use at power plants to generate electricity for charging HEVs. Follows and Jobber (2000) indicated that there are also some other factors, such as, returning for refilling, charging and changing car battery, and any other perceived increase of effort required that would influence consumer intention or behaviour negatively. They also stated that ICNs are negatively related to PIN a green product, supporting many other studies that concluded that inconvenience and additional effort on the part of the consumer are deterrents for their adoption of green practices.

Values

Values are defined as one's judgement about what is important in life. Values indicate to people what is good, beneficial, important, useful, beautiful, desirable or appropriate for their culture. They also help to find out the answer to the question of why people do what they do. Many behavioural researches have considered value as the predominant guide when they concentrate on attitudinal measures in environmentally friendly behaviour (Corraliza & Berenguer, 2000; Follows & Jobber, 2000; Laroche, Bergeron & Barbaro-Forleo, 2001; Schwartz, 1994; Schwartz & Bilsky, 1987). Follows and Jobber (2000) considered a value system that reflects self-transcendence, conservation and self-enhancement to measure an individual's attitudes towards the environment, which in turn drive environmentally responsible purchase behaviour. Self-transcendence values engender an active concern for others and the desire to work for the good of the society. Self-transcendence is considered as a personal journey of self-discovery, where one struggles for greater precision, higher outlook and moves beyond prior concepts of behavioural limitations, which go beyond ego (Follows & Jobber, 2000). Individuals who have high self-transcendence values in their mind view others as an extension of the self and, therefore, they try to equate concerns of self with concerns for society. Thus, these individuals give a greater importance on pro-environmental behaviour if they find that it will be able to provide an overall benefit to the society. Conservation values consider the restraint of actions that could upset or harm others and violate social norms (Grunert & Juhl, 1995). These considerations serve to secure relationships and traditions by preserving the status quo. Follows and Jobber (2000) argued that individuals who place a high level of importance on conservation values avoid complicating their lives by not wanting to be involved with something that is not considered a social norm and suggested that subjects who report high levels of conservation values will be consistently less likely to pay more for environmental characteristics. Self-enhancement values reflect the extent to which individuals are motivated to enhance their own personal interests and often are seen as a sort of self-serving bias as individuals wish to see themselves. These self-concepts are believed to develop in response to social experiences with the goal to adapt behaviour in order to achieve a positive reaction from their close significant references (Grubb & Grathwohl, 1967). An individual's evaluation of self will greatly influence behaviour. Thus, the more valued the self, the more organized and consistent becomes the behaviour. This is exemplified through consumers' propensity to purchase items that reflect a positive self-image (Banister & Hogg, 2004; Dunning, 2007; Sedikides, Gregg, Cisek & Hart, 2007). Consumers with high self-enhancement values place a greater importance on the satisfaction a product provides and product image associated with its ownership. Therefore, individuals who place a high importance on self-enhancement values will be more concerned about how a product will directly affect them regardless of ECNs.

Research Objectives and Hypotheses

In this study, Follows and Jobber's (2000) consumer test model on environmentally responsible behaviour was modified to observe how attitudes, as measured by environmental and ICNs, are related to environmentally responsible PIN of an EV. The above literature has recognized that general attitudes towards environmental issues and green behaviour are less correlated at the multi-product level in comparison to a specific product level (Ramlah et al., 2010). Based on the findings and conjectures discussed in the literature review in the second section, the following hypotheses are proposed:

H_{1a}: Attitude towards ECNs is positively related to PIN of an EV.
H_{1b}: Attitude towards ICNs is negatively related to PIN of an EV.
H_{2a}: Self-transcendence values (SVN) are positively related to attitude towards the ECNs of an EV.
H_{2b}: Self-transcendence values (SVN) are negatively related to attitude towards the ICNs of an EV.
H_{3a}: Conservation values (CVN) are negatively related to attitude towards the ECNs of an EV.
H_{3b}: Conservation values (CVN) are positively related to attitude towards the ICNs of an EV.
H_{4a}: Self-enhancement values (SEVN) are negatively related to attitude towards the ECNs of an EV.
H_{4b}: Self-enhancement values (SEVN) are positively related to attitude towards the ICNs of an EV.
H_{4c}: Self-enhancement values (SEVN) are negatively related to PIN of an EV.

This section presents the model that is an adaptation of Follows and Jobber's (2000) TRA model (Figure 1). In this model, the variables are set in a 'values–attitude–purchase intention' format. Values are represented by self-transcendence (SVN), conservation (CVN) and self-enhancement values (SEVN) while attitudes consist of two dimensions, namely, attitude towards ECNs and attitude towards ICNs of purchasing an EV that is represented by PIN. The relationships between the variables as hypothesized above are illustrated in Figure 1.

Research Methods

Survey Design and Sampling Method

Data were gathered using a structured questionnaire from users of private vehicles. Since there is no available list to use a probability sampling technique, a non-probability sampling method of purposive sampling was used where the respondent must be the owner of the private vehicle at the time of
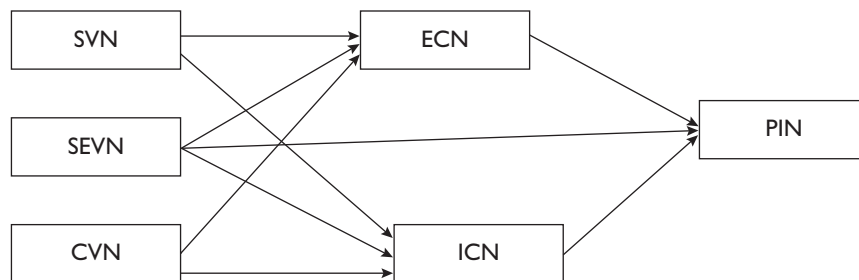
Figure 1. The Research Model
Source: Author's own computation.

responding. Before the questionnaire was given to the respondent to be filled up, they were asked if they have any car in their house. If they said no, then they will not be asked to answer the questionnaire. We employed direct face-to-face interviews in this study because this has been shown to be the most reliable approach (Carson et al., 1992). The survey was conducted in August 2012. A random sample of 200 was taken in the residential areas in Kuala Lumpur, such as, Selayang, Cheras, Ampang, Taman Jaya and Kuala Lumpur. Schreiber, Nora, Stage, Barlow and King (2006) acknowledged that the sample size of a survey is dependent on the normality of data and the proposed statistical estimation methods. The generally agreed practice is to get 10 participants for every free parameter or item in the questionnaire. Further, Garver and Mentzer (1999) and Hoelter (1983) have suggested a sample size of 200 for structural equation modelling (SEM) to provide sufficient power of analysis (London, 2009). Stevens (1996) suggested a sample size of at least 15 times the number of observed variables (Golob, 2003). The sample size of 200 in this survey confirms all these suggestions and practices as there were 20 items and five observed variables. The measurement items were adopted from a study of Follows and Jobber (2000).

Questionnaire Development

The questionnaire was developed following the literatures on environmental behaviour and the previous applications of TPB, such as, Ajzen (1991) and Tonglet, Philips and Read (2004). As recommended by Ajzen (1991), a seven-point scale was used for the measurement. Krosnick and Presser (2010) have expressed that bipolar scales perform best with seven points, whereas unipolar scales performed best with five. For all measures, a seven-point Likert type scale was used with the anchors ranging from strongly disagree (1) to strongly disagree (7). The definitions of the variables used in the study are as follows.

Variables Used in This Study

The definitions of the variables used in the study are as follows.

Self-transcendence

This term is composed of values that reflect the extent to which these values motivate people to transcend selfish concerns and promote the welfare of others, close and distant, and of nature (Follows & Jobber, 2000). It also includes values representing benevolence, a concern for the welfare of people, with whom one is in frequent personal contact, including a wider concern for people and the environment, which is social-altruistic in nature (Stern, Dietz & Guagnano, 1995). Examples of items measuring self-transcendence are universalism (equality—brotherhood, equal opportunity) and benevolence (helpful—working for the welfare of others).

Conservation

Conservation value reflects 'a need to preserve the status quo and the certainty it provides in relationships with close others, institutions, and traditions' (Follows & Jobber, 2000). According to the authors, conformity refers to restraint on behaviour that can upset others or on behaviour that does not conform to social norms. Other authors refer to conservation as a social influence whereby individuals are concerned about the perception of others, such as, family and neighbours if they do not practice ER purchases (do Valle, Reis, Menezes & Rebelo, 2004). Items measuring conservation include conformity (restrained, self-disciplined and polite) and security (clean, neat and tidy).

Self-enhancement

This value is related to individualistic values that reflect 'the extent to which they motivate people to enhance their own personal interests' (Follows & Jobber, 2000, p. 729). Self-enhancement can be measured by the importance of pleasure or self-gratification and has a predominantly self-centred orientation. Hedonism, achievement and power all have a self-centred orientation (McCarty & Shrum, 1993). Examples of self-enhancement items are achievement (aspiring and hardworking) and power (social recognition, respect and admiration).

Environmental Consequences

This construct is generally measured using items that reflect concern for a variety of environmental issues, such as, recycling, waste prevention, energy use and conservation, and pollution, which damage the environment. Some authors equate environmental damage as the increase in energy use when processing environmentally responsible products using current levels of technology (Gurtoo & Antony, 2007). ECNs have been applied in studies examining the relationships between attitude and multiple- or single-act environmentally responsible behaviours. Examples of measures of ECNs are perceptions of how important a product is in affecting the environment, or the energy usage in the production and marketing of this product.

Individual Consequences

This second type of attitudinal measure reflects the effort that needs to be made by an individual when carrying out an environmentally responsible behaviour (e.g., recycling) (Saphores, Nixon, Ogunseitan & Shapiro, 2006; Thogersen & Grunert-Beckmann, 1997). Besides effort, some other measures of ICNs are convenience (Domina & Koch, 2002), cost incurred (Vining & Ebreo, 2002) and proximity.

Purchase Intention

Intention has been defined as the subjective probability to perform a specific behaviour (Fishbein & Ajzen, 1975). The role of intentions in an attitude–behaviour relation is a function of the level of effort required to execute a behaviour, such as, purchasing a product or service (Bagozzi, Yi & Baumgartner, 1990).

Results and Discussion

The Socio-economic Characteristics of the Respondents

Table 2 reports the descriptive statistics for the main socio-economic characteristics of the respondents. The gender distribution of the samples was 51 per cent male and 49 per cent female. Malaysia's population (2001 Census) growth is at 1.72 and the sex ratio is 1.06 male to 1 female (CIA, 2010). The average age was just 44, with the lowest being 19 and the highest 66 years. In this survey, 12 per cent of the respondents were Malays, 26 per cent were Indians, 61 per cent were Chinese and 1.5 per cent were others. The percentage of Malay population in Kuala Lumpur alone was around 38 per cent in 2000 while the Chinese population comprised 43 per cent and Indians 10 per cent (Wikipedia, 2010). The highest percentage of the respondents had diplomas (22.5 per cent), 26.36 per cent had bachelor degrees, 19 per cent had reached higher secondary levels, 5.5 per cent had reached postgraduate levels and 21.5 per cent had lower secondary levels. Malaysia's literacy rate is 88.7 per cent, but it is slightly higher in Kuala Lumpur at 97.5 per cent (Wikipedia, 2010). Only 9 per cent of the respondents had income of RM 2,000 and less.

Table 2. Socio-economic Characteristics of the Respondents (*N* = 200)

Demographics	Frequency	Percentage
Gender		
Male	102	51
Female	98	49
Education Level		
No formal education	10	5
Primary education	10	5
Lower secondary school	43	21.5
Higher secondary school	38	19
Diploma	45	22.5
Graduate	43	21.5
Postgraduate	11	5.5
Age		
18–30 years	79	39.5
31–45 years	94	47
46–60 years	27	13.5
60 years and above		
Income		
Less than RM 2,000	18	9
RM 2,001–RM 4,000	80	40
RM 4,001–RM 6,000	78	39
RM 6,001 and RM 8,000	15	7.5
RM 8,001 and above	9	4.5

Source: Survey 2014.

The highest percentage of the respondents (47.27 per cent) had an income in the range of RM 2,001 to RM 4,000 per month, while 39 per cent of the respondents had an income range of RM 4,001 to RM 6,000. Only about 7.5 per cent of the respondents had an income in the range of RM 6,001 to RM 8,000 and 4.5 per cent of the respondents had income of more than RM 8,000 per month. According to the Department of Statistics, Malaysia, more than half of the Malaysian respondents earn a monthly income of less than RM 3,000. The remaining respondents earn between RM 3,001 and RM 4,000 (12.9 per cent), RM 4,001 and RM 5,000 (8.6 per cent), RM 5,001 and RM 10,000 (15.8 per cent) and above RM 10,000 (4.9 per cent) (Department of Statistics, 2009).

Tests for Confirmatory Factor Analysis

According to Kline (2010), the purpose of a measurement model points to the appropriateness as measurement instrument of the observed indicators representing a latent variable. The objective of the measurement model is to estimate the relationship between the observed and the underlying latent

variables (Hair, Black, Babin & Anderson, 2010). The adequacy of a measurement model is tested by checking the fitness of the model using four fitness indices: chi-square statistic, normed chi-square, root-mean square approximation (RMSEA) and comparative fit index (CFI). For an adequate model fit, general guidelines suggest that the cut-off values for such indices as normed chi-square and RMSEA should be less than 5 and 0.088, respectively, while CFI values are to be above 0.9 (Byrne, 2010; Hair et al., 2010).

Before testing the structural equation model, a confirmatory factor analysis (CFA) was performed on the entire set of measurement items simultaneously. According to Hair et al. (2010), a standardized factor loading should be 0.40 or higher or ideally 0.70 or higher. This measure provides a strong evidence of convergent validity. In this study, all the items had significant factor loadings, most of them greater than 0.60, which indicates adequate convergent validity. Based on the CFA tests, all seven dimensions had adequate model-to-data fit: normed chi-square value was below 2.41; CFI value was above 0.95; and RMSEA value was less than 0.080. These tests also evaluated the reliability and construct validity. Cronbach's alpha measures the reliability coefficient, which indicates the consistency of the entire scale (Hair et al., 2010), or the overall reliability of the questionnaire (Field, 2009). The results from this study showed that all the six dimensions had reliability values above 0.70, which indicated that the questionnaire was reliable and consistent (Table 3).

Table 3. Construct Validity of Confirmatory Factory Analysis

Items	Stand. Loadings	Reliability
Self-transcendence value (SVN) *(Normed χ^2 = 1.818, CFI = 0.996, RMSEA = 0.064)*		
Helpfulness is important to me	77	0.87
Forgiveness is important to me	0.81	
Love and affection is important to me	0.75	
Friendship and generosity is important to me	0.85	
Conservation values (CVN) *(Normed χ^2 = 1.536, CFI =0. 995, RMSEA = 0.052)*		
Respectfulness and politeness is important to me	0.77	0.76
Self-control, such as, restrained and self-disciplined is important to me	0.84	
Clean and tidy environment is important to me	0.82	
Self-enhancement values (SVEN) *(Normed χ^2 = 1.46, CFI = 0.984, RMSEA = 0.046)*		
Success: For the achievement of my life, hardworking and aspiring is important to me	0.56	0.62
Self-satisfaction: Enjoyable and leisurely life is important to me	0.67	
Environmental consequences (ECN) *(Normed χ^2 = 1.19, CFI = 0.999, RMSEA = 0.030)*		
Conventional car can create air pollution	0.77	0.82
Conventional car can create smog in large cities	0.84	
Conventional car produce greenhouse gases such CO_2, N_2O that contribute to global warming and climate change	0.69	
Conventional car affect water quality because oil and particles get washed into lakes and rivers	0.59	

(Table 3 Continued)

Items	Stand. Loadings	Reliability
Individual consequences (ICN) (*Normed χ^2 = 2.246, CFI = 0.991, RMSEA = 0.079*)		
Electric vehicle is fuel-efficient car. So, it can reduce CO_2 emission	0.76	0.81
Electric vehicle can decrease the use of petroleum	0.76	
Electric vehicle can reduce the greenhouse gas emission	0.85	
Electric vehicle is comfortable to use	0.52	
Purchase intention (PIN) (*Normed χ^2 = 1.335, CFI = 0.999, RMSEA = 0.041*)		
I would buy an electric vehicle if the quality is lower than a conventional car	0.77	0.88
I would buy an electric vehicle even if the performance is lower than a conventional car	0.85	
I would buy an electric vehicle even if it has a less appealing design	0.89	
I would buy an electric vehicle even if it is less comfortable	0.87	

Source: Author's own computation.

Table 4. Discriminate Validity Coefficients

	AVE	CVN	SEVN	SVN	ICN	ECN	PIN
CVN	0.56	**0.754**					
SEVN	0.54	0.287	**0.735**				
SVN	0.68	0.527	0.354	**0.827**			
ICN	0.61	0.232	0.305	0.311	**0.782**		
ECN	0.52	0.271	0.419	0.374	0.225	**0.722**	
PIN	0.57	0.135	0.071	0.185	0.533	0.056	**0.761**

Note: Diagonal elements are in bold, which are the square root of the average variance extracted (AVE)
Off-diagonal elements are the correlations among the constructs.
For discriminate validity, diagonal elements should be larger than off-diagonal elements (Chiu & Wang, 2008).

As recommended by Fornell and Larcker (1981), if all indicator loadings exceed 0.7 and the average variance extracted (AVE) for each construct exceeds 0.5, then we can conclude that convergent validity has been established. As shown in Table 4, all item loadings exceeded 0.7 and we can see that the AVE is higher than 0.5 in the same table. It was also recommended that satisfactory discriminant validity is established when the AVE of a particular construct is greater than the correlation shared by that particular construct with other constructs in the model (Fornell & Larcker, 1981). A study by Chiu and Wang (2008) affirmed that convergent discriminant is recognized when the diagonal elements (square root of the variance extracted) are greater than the off-diagonal elements (correlations among the constructs) (see Table 4). In this study, we can conclude that the construct validity of the scales is high.

Structural Model

In the CFA analysis, χ^2/df was 1.380 (χ^2 = 4.139, df = 3), goodness-of-fit index (GFI) = 0.951, adjusted goodness-of-fit index (AGFI) = 0.917, CFI = 0.980, non-normed fit index (NNFI) = 0.971 and RMSEA = 0.048, and also the *p*-value was not significant suggesting an adequate model fit. The significance of the
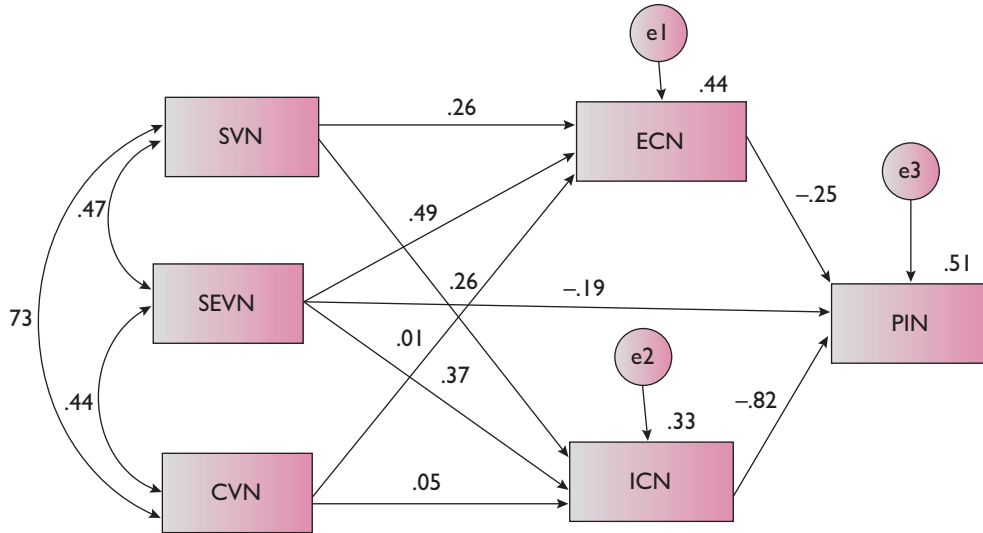
Figure 2. SEM Analysis of the Research Model
Source: Author's own computation.

Table 5. Regression Weights

			Estimate	Std Estimate	SE	CR	P
PIN	←	ECN	−0.355	−0.248	0.091	−3.918	0.000
PIN	←	ICN	−1.339	−.819	0.095	−14.131	0.000
ECN	←	SVN	0.238	0.263	0.072	3.286	0.001
ICN	←	SVN	0.207	0.262	0.069	3.007	0.003
ECN	←	CVN	0.007	0.007	0.081	0.090	0.928
ICN	←	CVN	0.048	0.053	0.077	0.628	0.530
ECN	←	SEVN	0.491	0.491	0.061	8.033	0.000
ICN	←	SEVN	0.321	0.366	0.058	5.504	0.000
PIN	←	SEVN	−.277	−.193	0.098	−2.837	0.005

Source: Author's own computation.

individual paths is shown in Figure 2. Five out of the nine paths were significant with *p*-values less than 0.1 and with R^2 values ranging from 0.44 to 0.33. This indicates that the variance explained ranged from 44 per cent for ECNs to 33 per cent for ICNs, whereas 51 per cent of the variance in intention to use was accounted for.

Table 5 presents the results of the multiple regression analysis using SEM techniques. It has been found that ECNs are negatively and significantly related to PIN of EVs at $p < 0.01$. An $R^2 = 0.56$ in Figure 1 indicates that attitude towards ECNs of purchasing EVs can explain about 56 per cent of the variance in PIN the same car. Hence, H_{1a} is not supported. This finding is not consistent with that of Follows and Jobber (2000), which found that ECNs are positively related to environmentally responsible PIN.

Table 6. Results of Hypothesis Testing

Hypothesis	Std. Estimate	p Value	Remark
H1a: ECN +ve related to PIN	–0.248	0.000	Not Supported
H1b: ICN +ve related to PIN	–0.819	0.000	Supported
H2a: SVN +ve related to ECN	0.263	0.001	Supported
H2b: SVN –ve related to ICN	0.262	0.003	Not Supported
H3a: CVN –ve related to ECN	0.007	0.928	Not Supported
H3b: CVN +ve related to ICN	0.053	0.530	Not supported
H4a: SEVN –ve related to ECN	0.491	0.000	Not Supported
H4b: SEVN +ve related to ICN	0.366	0.000	Supported
H4c: SEVN –ve related to PIN	–0.193	0.005	Supported

Source: Author's own computation.

Table 6 summarizes the results of hypothesis testing. It shows that ICNs are negatively and significantly related to PIN of EVs at $p < 0.01$. An $R^2 = 0.67$ in Figure 1 indicates that ICNs can explain about 67 per cent of the variance in PIN the EVs. Therefore, H1b is supported. This finding is consistent with that of Follows and Jobber (2000), which found that ICNs are negatively related to PIN. Self-transcendence values (SVN) were found to have a positive and significant relationship with ECNs of purchasing EVs. The positive relationship between SVN and ECN supported H2a, which hypothesized a positive relationship. This is consistent with an earlier finding (Follows & Jobber, 2000) that was significant at $p < 0.01$. Self-transcendence values (SVN) were found to have a significant and positive relationship with ICNs of purchasing a 'green' car ($p < 0.05$). The positive relationship between SVN and ICN did not support H2b, which hypothesized a negative relationship. This is not consistent with the earlier finding (Follows & Jobber, 2000) that was significant at $p < 0.05$. Conservation values (CVN) have a positive and insignificant relationship with ECN and ICN. H3a is not supported as it was hypothesized to be a negative relationship. H3b is supported as the relationship between CVN and ICN is positive. Self-enhancement values (SEVN) were found to be positively and significantly related to ECN and ICN ($p < 0.01$) and negatively related to PIN ($p < 0.01$); hence, H4b and H4c were supported. H4a was not supported as it was hypothesized to be a negative relationship. Table 5 summarizes the results of the hypothesis testing. This finding is consistent with the findings of Follows and Jobber (2000) and Oliver and Lee (2010).

Conclusion

- The main objective of this study is to examine how attitudes as measured by ECNs and ICNs are related to environmentally responsible PIN of EV. This study has found that ICNs were negatively related to green PIN. This indicates that individuals are more likely to choose options that maximize utility based on their preferences, knowledge of alternatives and budget (Roche et al., 2010). They consider fuel efficiency, fuel consumption and comfort of the vehicle within their limited budget when they take the decision to purchase any vehicle. For the EV, they may consider the convenience of recycling or charging batteries. Therefore, when the vehicle manufacturers design their EVs, they should take this finding into consideration.

- ECNs do not have a statistically significant relationship with PIN. Although Malaysians may be ethically aware of the ECNs, they may not feel morally obligated to exhibit PIN towards the EVs. A similar observation by Ramayah et al. (2003) recommended that consumers usually like to buy the cheap pirated music compact discs (CDs) although they know that it is ethically wrong to purchase such CDs. This type of behaviour is usual for the consumers with a limited income and without the perception that ICNs of participating in recycling override all other considerations. Hence, top priority is not given to environmental concerns in matters concerning their individual households.
- There is a significant, but positive, relationship between self-transcendence value (benevolence, universalism and brotherhood) and ICNs of PIN. This relationship did not support the hypothesis that the relationship should be negative. This inconsistency could be due to benevolent and collectivistic nature of Malaysian vehicle owners. They distinguish their daily lives as tied up by ICNs of inconveniences of battery charging, extra effort of battery recycling and time, which are associated with the PIN of the consumers towards EVs. Self-transcendence value (benevolence, universalism and brotherhood) also shows a significant and positive relationship with ECNs. Malaysians are willing to conform to the norms of politeness and respect; hence, they are more inclined to accept the majority's view concerning the ECNs of their purchase behaviour.
- The results also found that SEVNs are significantly and positively related with environmental and ICNs, but are negatively related to PIN of EVs. It is rational to imagine that consumers who hold self-enhancement values, such as, success and satisfaction about their activity, would reflect self-interest and for this reason, they place greater importance on environmental and ICNs. These findings also suggest that the desire for social appreciation and self-satisfaction may not run parallel with PIN as consumers may try to achieve recognition by other means, such as, through personal achievement in career and status in society. The latter finding is inconsistent with Follows and Jobber's (2000). Similarly, conservation values (conformity, not against the norms) were found to be significantly but positively related to ECNs of PIN.
- Insights gained from the results of this research will shed more light on consumer's PIN. This information will direct policymakers in crafting energy and transportation policy based on the entire EVs' socio-technical system. This research will also provide guidance to EVs engineers' decisions in incorporating consumer preference into EVs engineering design.
- The results of the study also suggest that domestic and foreign manufacturers of EVs should also take into consideration the apparent ease and convenience of recycling and reusing the battery by users. This could be achieved, perhaps, by using special materials that promote recycling and yet are not harmful to the users.
- On a macro-scale, this study hopes to contribute to the government's effort at maintaining a sustainable transportation system in Kuala Lumpur, whereby energy and transportation policies and efforts need to take into consideration an understanding of the motivations of people in purchasing green products.
- This study also suggests the relevance and usefulness of the TRA in examining beliefs, values and attitudes towards green products PIN in a developing country. Extant literature has established that general attitudes towards environmental issues and green behaviour are less correlated at the multi-product level in comparison to a specific product level (Ramlah et al., 2010). When interpreting the results, it becomes clear that there is a distinct demand for EVs amongst consumers.
- We believe that there will be an increase in demand for EVs and the Malaysian automobile manufacturers should utilize this opportunity. Therefore, it would be very interesting to see a study focusing more thoroughly on the consumers' attitudes who do not intend to purchase EVs

in order to see what reasons influence their decisions. Further researches can be done on this issue. This would contribute valuable information concerning why some consumers do not consider purchasing EVs.

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