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Customers' reflections on the intention to purchase hybrid cars: an empirical study from Malaysia

Abstract

Global warming due to the impact of carbon dioxide (CO_2) has reached an alarming level. Road transport is primarily the most notable source of pollution in the world. With the sophistication in environmental technology, a variety of environmentally friendly products have been introduced in the market. One of them is the hybrid car; it is powered using a combination of an engine and battery. It is a promising product to control global warming. The present article attempts to identify the factors leading to hybrid car purchase intentions among Malaysian nationals. A quantitative research approach was employed and the data were collected from 121 Malaysian respondents, aged 17 years and above, and having a valid driving license. Interestingly, 116 (96%) out of 121 respondents showed intention to purchase hybrid cars provided the government waives the import and excise duty. The Theory of Planned Behaviour (TPB) and Norm Activation Theory (NAT) support the proposed conceptual research framework. The findings of this study indicate that environmental attitude and awareness of responsibility are highly correlated, found to be positively and significantly influencing on the purchase intentions of hybrid cars. In addition, social influences have a positive relationship with the purchase intention. The past experience in driving non-hybrid cars does not really moderate the relationship between independent variables and the purchase intention of hybrid cars. These findings would definitely help customers on the purchase of hybrid cars and manufactures to decide on the marketing strategies for the increased production of hybrid cars. Some of the recommendations based on the findings of the study are also discussed.

Keywords: hybrid cars, theory of planned behavior, norm activation theory, social influence, environmental attitude, awareness of responsibility, purchase intention.
JEL Classification: M31.

Introduction

Environmental pollution is a commonly discussed topic in today's business world. The inten-sification of global warming and its irreversible effects on climatic changes have drawn concerns from the world's population (Michael Beliveau & James, 2010). Changes in Earth's climate are evident through the polar ice caps which are drastically shrinking and flooding in coastal areas. Only in the past few decades, the society started to realize the changes caused by global warming and its effects. The most notable pollutants are automobiles (see Figure 1). Automobiles are powered by internal combustion engines and release harmful emissions, such as carbon dioxide.
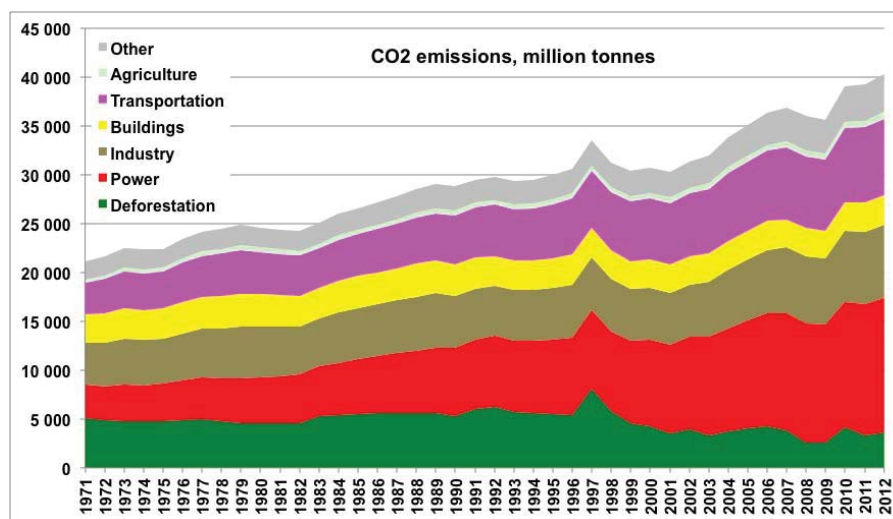
Source: BP Statistical Review 2013.

Fig. 1. CO_2 emissions by activity since 1971

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An increase in automobile traffic has precipitated severe environmental problems with fuel consumption and gas emissions (Cerovsky & Mindl, 2008). The growth in the volume of automobiles is expected to surpass the planet's population. A study stated that the population may grow from 6 to 10 milliards, meaning 1.7 times from 2000 to 2050, the number of vehicles may increase from 0.7 to 2.5 milliards, which is 3.6 times during the corresponding period (Cerovsky & Mindl, 2008). Malaysian Government is working drastically on the awareness of global warming and reducing CO_2 emissions through highly promoting the adoption of electric or hybrid cars among its citizens. For instance, Malaysian Government introduced exemptions for import and excise duty for hybrid cars in the budget of the year 2011. Sales of hybrid cars in Malaysia are expected to rapidly rise in the next few years, mainly due to their growing popularity. According to the Malaysian Automotive Association (MAA), hybrid cars have enjoyed tremendous sales growth in the past few years after the introduction of duty exemptions. According to data by MAA, 18,967 units of hybrid cars were sold during the year 2013, which recorded a 23.5% increase from the year 2012. Table 1 shows the summary of hybrid cars registered in Malaysia during 2012 and 2013.

Table 1. Summary of hybrid cars registered in Malaysia in the years 2012 and 2013

Data on hybrid cars sold in Malaysia YTD Dec 2013					
No.	Make	Jan-Dec		Variance		Remarks
		2013	2012	unit	%	
1	Audi	1907	0	1907	0.0%	started since Feb 2013
2	BMW	4	0	4	0.0%	started since Feb 2013
3	Honda	8550	8712	-162	-1.9%	
4	Lexus	709	979	-270	-27.6%	
5	Porsche	0	11	-11	-100.0%	
6	Nissan	2008	0	2008	0.0%	
7	Toyota	5789	5653	136	2.4%	
	Total	18967	15355	3612	23.5%	

Source: Malaysian Automotive Association (MAA).

However, the total sales in Malaysia are still considered low compared to the non-hybrid cars. According to the MAA, a hybrid car sale in 2013 was just 2.85% of the total car sales in Malaysia. The sluggish growth in sales may discourage automobile manufacturing from prospective growth in the market. Earlier in the year 2014, the National Automotive Policy (NAP) was unveiled to introduce a new policy for tax exemption on energy-efficient vehicles (EEVs) and electric vehicles (EVs). The duty exemption introduced earlier in 2011 was removed and it was decided to be given only to

locally assembled or completely-knocked-down (CKD) hybrid and electric cars. As a result, hybrid car sales fell 11.7% in the first six months of 2014 to 6,007 units from 6,803 units in the corresponding previous period. As such, this study aims to derive implications that can help car manufacturers to promote hybrid cars in the Malaysian market. In this regard, the predictors influencing the purchase intention of hybrid cars have been tested empirically in the current study.

1. Literature review

Based on the work of Beliveau (2010), cars contribute to almost 25% of global CO_2 emissions. With the growing Malaysian population and more than half of them living in urban areas, many are relying on motor vehicle transportation daily. The significant volume of cars has contributed to urban pollution in the bigger picture of global warming. In order to stop or slow down the global warming due to emissions of CO_2, a hybrid car is considered the most innovative product in the automotive industry (Yon, Nasreen Khan & Muhammad, 2012). It is timely that Malaysian government announced the usage of hybrid cars as a national priority and included in the national key research areas related to environmental concerns and to creation of innovative strategies to save environment (Seyedeh Khadijeh Taghizadeh et al., 2014). Malaysia is emphasizing greener and cleaner concepts. Hybrid cars are believed to be promising products with respect to the issue of global warming. However, Malaysia has retracted the exemption of hybrid cars' import and excise duty as of 2013. Hence, the prices of hybrid cars are much higher than conventional cars, making affordability a main concern. Hybrid cars are only affordable to those high-income consumer groups, precluding other consumers from purchasing hybrid cars. Awareness of responsibility has become an ever significant criterion in today's society in order to facilitate the transition to the greener and cleaner Malaysia. According to Beliveau (2010), hybrid cars have the capacity to protect environment in a variety of ways. Most research in the field supports the fact that hybrid cars cause significantly less pollution to the environment than conventional cars. In addition, there is insufficient motivation for customers to choose hybrid cars over conventional vehicles due to lack of information about hybrid cars, causing static sales to remain unchanged over the years. In fact, hybrid cars not only support environmental protection, they also reduce fuel consumption and provide better mileage. In order to address global warming, energy-harvesting technologies, such as solar energy, non-petrol-consuming automobiles such as bicycles and hybrid cars must be championed to mitigate pollution free environment. Hybrid cars have

been regarded as environmentally friendly due to their fuel-saving attribute (Hefffner, 2007). There are many factors influencing the purchase intention of hybrid cars. Studies by Jason, Oliver Seung & Hee Lee (2010) on hybrid car purchase intentions with a cross-cultural analysis found that the propensity to seek information and self-image congruence about green products have a positive relationship with intentions to purchase hybrid cars among consumers from the US and Korea. Moreover, there are studies by Ozaki and Sevastyanova (2010) which highlight customers' willingness and social norm adherence influence on their purchase decision. Nevertheless, a study by Liebe et al. (2010) concluded that the awareness of responsibility has no significant impact on the willingness to pay for pro-environmental products. The results of analyzing the purchase of hybrid cars, both from the technical and customers' points of views, leads to numerous questions regarding the significance of the latest hybrid technology. This major research gap allows relevant associations to investigate and determine a better approach to future development for the sales of hybrid cars.

1.1. Relationship between environmental attitude and purchase intention of hybrid cars. Environmental attitude (EA) is considered to be highly correlated with customers' intention, which, in turn, is a reasonable predictor for behavior (Ajzen & Fishbein, 1980). Furthermore, attitudes are beliefs and feelings on a particular object that force customers to behave consistently towards the object (Fishbein & Ajzen, 1974). Athiyaman (2002) highlighted that attitude refers to individual evaluation on the outcome of performing a behavior. Specifically, attitude refers to the behavior of a person questioning himself to find out the degree of the favourable and unfavourable aspects of that behavior (Ajzen, 1991). From several studies, it is clear that there is a relationship between environmental attitudes and product purchase tendency. If we engage customers more with the environment, they will likely to increase their purchase of green products (Schuhwerk & Lefkokk-Hagius, 1995). As cited in the work by Gopi and Ramayah (2007), numerous studies have indicated the notable effect of attitude towards intention (Shih & Fang, 2004; Ramayah & Mohd Suki, 2006). According to Tsen (2006), there is an extreme relationship between customers, attitudes and willingness to purchase environmentally friendly products. The decision to purchase a product is always based on environmental attitude, as stated by Irland (1993) and Jayaraman et al. (2011). According to Walsh (2009), a customer's attitude would directly lead to an ecologically conscious purchase. It indicates that customers who are engaged in buying environmental products do so

because they believe that their actions can help protect the environment from further deterioration. Beckford (2010) and Cornelissen (2008) have also proved that environmental attitude has a significant impact on customers' purchase intention. Kahn (2007) concluded that environmentalists are more likely to drive hybrid cars in future. Hence, this study hypothesizes:

H1: Environmental attitude has positive influence on the purchase intention of hybrid cars.

1.2. Relationship of social influence and purchase intention of hybrid car. Social groups are formed by those with the same habits, similar thinking and desires to have the power to cultivate an eco-friendly culture and belief. People always use others' behavior to decide the suitable course of views and actions when the decision taken is uncertain. Hence, social environment is believed to influence the purchase intention of hybrid cars. Moreover, social influence (SI) could impact an individual's choices (Ajzen, 1991). According to social impact theory, the more important a group to which one belongs, the closer the distance is between the group and oneself. Thus, one is affected by his group's opinion and his willingness to confirm to the group's normative pressures (Latane, 1981). This kind of social pressure is regarded as normative social influence. The normative social influence reflects an individual's approaches to comply with the expectations of others, and it operates through the process of compliance (Bearden, 1989). This has been proven in a study of curb-side recycling. Oskamp et al. (1991) found that recycling by others, such as neighbours and friends, may influence personal recycling behavior. Numerous studies have conveyed the significant relationship between subjective norms and intention (Maruf et al., 2003). Also, it was noted by Ramayah et al. (2006) that elements of subjective norms have a greater influence on intention to purchase than with the attitude towards intention. Lee and Green (1991) found social structure as a significant factor influencing the formation of behaviour intention. Hence, this study proposes the following hypothesis:

H2: Social influence has a positive influence on the purchase intention of hybrid cars.

1.3. Relationship between awareness responsibility and purchase intention of hybrid cars. Awareness is defined as knowing the consequences of human behavior on the environment. Kollmuss & Agyeman (2002) suggested that environmental awareness consists of both cognitive and affective perception-based component. Also, according to Stern (2000), personal norms act to mitigate environmental problems and are activated when a person is aware that a valued object is threatened by environmental problems and feels responsibility for causing the

reduction in the threat to the valued object. There are numerous research studies supporting the notion that the intention to purchase environmentally friendly products is influenced by the customer's awareness. Previous findings demonstrate that there is a positive relationship between awareness of responsibility (AW) and customer's decisions. According to Mourad (2012), environmental awareness is the main key factor for environmental purchase intentions. Hence, rising awareness ultimately increases their sustainable consumption behaviour, which will enhance the sales of hybrid cars (Fraj, 2006). Purchase intention is influenced by different factors, one of which is awareness. The younger generation believes that consuming environmentally friendly products reflects environmental consciousness, and studies have presented evidence of social awareness of this generation's progressive thoughts (Johri & Sahasakmontri, 1998). Car buyers with an awareness of responsibility will tend to study the performance of the vehicle to make sure that it is environmentally friendly and produces less pollution to stop further damages to Earth. According to Jin Soo Lee (2010), product features are some of the main indicators to determine purchase intention of environmentally friendly products. In this scenario, awareness of responsibility may change the perceptions and purchase views of customers. Hence, the study proposes the following hypothesis:

H3: Awareness of responsibility has a positive influence on the purchase intention of hybrid cars.

1.4. Moderating effect of past experience of driving non-hybrid cars. It is believed that the past experience of driving non-hybrid cars (PE) might influence the purchase intention of hybrid cars. This was supported by Shim and Drake (1990), who highlighted the previous non-stored experiences of intentions to use the Internet leads to usage. Brucks (1985), in addition, elaborated that product-related experience is extremely important to the judgment of subjective product knowledge compared to product classification information. The sharing experience or product reviews from the close relatives, friends or colleagues may moderate the effect of social influence towards the purchase intentions of hybrid cars. Customers always have a tendency to seek some useful comments on the products from people with whom they are close for comparisons. Thus, the past experiences together with strong awareness of responsibility towards the environment tend to have a positive influence on the purchase of green products. Kollmuss and Agyeman (2002) stated that environmental awareness consists of both cognitive and affective perceptions. Past experience accounts for a cognitive base component. Thus, the past experience of driving non-hybrid cars is taken as a moderator variable in the present study. Therefore, the study hypothesizes that:

H4: Past experiences in driving non-hybrid cars moderates the relationship between environmental attitude, social influence, awareness of responsibility and purchase intention of hybrid cars.

2. Research methodology

Based on the literature review and the constructed hypotheses in Section 2, the following conceptual research framework has been developed and depicted in Figure 2.
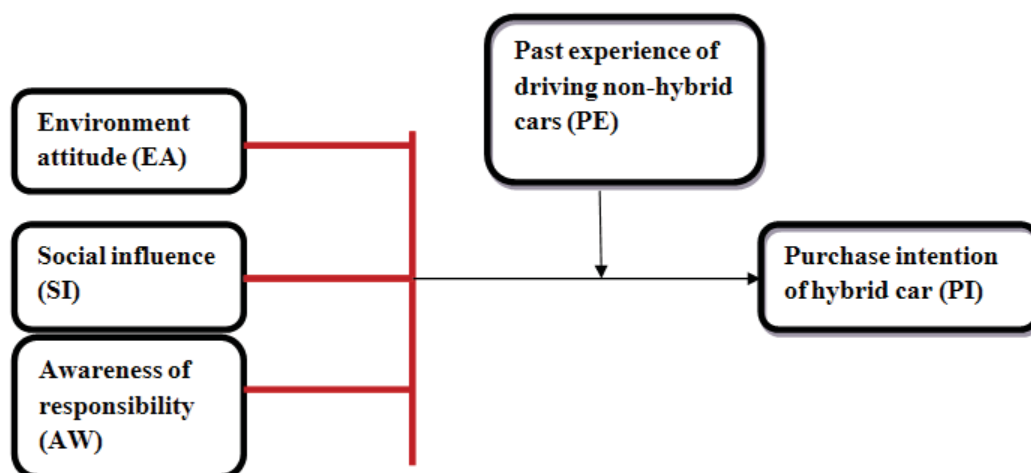

Fig. 2. Conceptual research framework

The Theory of Planned Behavior (Ajzen, 1991) and Norm Activation Theory (Schwartz, 1977) support the framework in Figure 2. The current study is a cross-sectional study and the unit of analysis is individual citizens in Malaysians who are aged above 17 years and holding valid driving license. The samples exclude those who do not own a hybrid car. In order to have homogeneous data, the questionnaire was distributed within two weeks from 15 September 2014 to 30 September 2014. The questionnaire has

four sections: Section A includes respondents' demographic features like age, gender, ethnicity, annual income and academic qualification, Section B is related to the data on the influence of environmental attitude (5 questions), social influence (4 questions) and awareness of responsibility (4 questions) toward purchase intention of hybrid car, Section C is on the past experience in driving non-hybrid cars (4 questions) and Section D is on the purchase intention (5 questions) of hybrid car. All the question items were adapted from the existing literature review and modified to suit the context of Malaysia. In this study, the independent variables environmental attitude (EA), social influence (SI), awareness of responsibility (AW), and the moderating variable past experience of driving non-hybrid cars (PE) were measured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) and the dependent variable (intention to purchase hybrid cars-PI) was measured on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). A total of 650 questionnaires were distributed to the public in whole Malaysia through the established contacts in automobile industry and among which 153 (23.5%) obtained a returned questionnaire. In Malaysia, the prevailing response rate is about 19% and the current study satisfies it with the existing literature. However, after careful scrutiny of data, it was found that 32 questionnaires were unusable since they were either

incomplete or inconsistent in nature therefore they were not included in the data analysis. Hence, 121 (79.6%) valid questionnaires were considered for the data analysis. The demographic profile of the 121 respondents includes 60 (49.6%) males and 61 (50.4%) females. With regards to age distribution, 67 (55.4%) respondents belong to 26-35 years age group followed by 40 (33.1%) respondents in the age group of 17-25 years. About 66 (54.6%) respondents receive RM 2000-RM 4000 as their average monthly income (US$ 1 = RM 3.56), and 28 (23.1%) respondents get more than RM 4000. A majority of 67 (55.4%) respondents hold bachelor' degree followed by 25 (20.7%) respondents with master' degree.

3. Findings and results

The descriptive measures and correlation matrix is provided in Table 2. The average score of environmental attitude (AveEA) is maximum 4.063 on a 5-point scale followed by average awareness of responsibility (AveAW) which is 4.05. The intention to purchase hybrid car has the average 4.456 on a 7-point scale but it has a wide variability with a standard deviation (SD) of 1.272. Thus, the intention to purchase hybrid car is not that overwhelming. From the correlation matrix, it should be noted that environmental attitude has a high positive correlation with purchase intention ($r = 0.539$, $P < 0.01$) followed by awareness of responsibility with purchase intention ($r = 0.518$, $P < 0.01$).

Table 2. Descriptive statistics and correlation matrix (n = 121)

Model variables	Mean	SD	Min.	Max.	Correlation Matrix				
					AveEA	AveSI	AveAW	AvePE	AvePI
AveEA	4.063	0.693	1	5	1				
AveSI	2.979	0.959	1	5	0.061	1			
AveAW	4.050	0.721	1	5	0.778**	0.109	1		
AvePE	3.512	0.835	1	5	0.196*	0.282**	0.278**	1	
AvePI	4.767	1.273	1	7	0.539**	0.323**	0.518**	0.312**	1

Note: * $P < 0.05$; ** $P < 0.01$.

The correlation matrix in Table 2 gives the indication that there is a multicollinearity between environmental attitude (EA) and awareness of responsibility (AW) ($r = 0.778$, $P < 0.01$). It was further discovered from factor analysis (construct validity) that EA and AW were clustered in the first component and social influence was clustered in the second component. The KMO for the measure of sampling adequacy was quite high 0.846 and the total variance explained was 65.59% which exceeds the minimum recommended value of 60% (Hair et al., 2009). Hence, the five dimensions in environmental attitude and four dimensions in awareness of responsibility were merged to form a new variable EAAW. The factor analysis was also carried out separately for purchase intention (Dependent variable) and for past expe-

rience of driving non-hybrid cars (Moderating variable) and none of the question items were dropped in establishing the construct validity. The reliability test was then conducted separately for each construct. The two independent variables namely EAAW, and Social Influence (SI) had a Cronbach's alpha of 0.928 and 0.842 respectively satisfying the threshold value of 0.7. The variable Purchase Intention (PI) and Past experience of driving non-hybrid cars (PE) had the Cronbach's alpha of 0.799 and 0.819, respectively. Hence, the data associated with the model variables EAAW, SI, PE and PI are consistent for establishing the authenticity of data.

3.1. Multiple regression analysis. The regression analysis can be used to test the causal relationships

between the independent variables and dependent variables. Two models were tested in this study as shown in Table 3. The first model investigates the relationship between the independent variables (EAAW, SI) on the dependent variables (PI). The second model was the hierarchical regression analysis to test the effect of moderating variable (PE) on the relationship between independent variables and the dependent variable. The first model yields the coefficient of determination R square as 0.391 and is highly statistically significant ($F = 37.864$, $P < 0.01$). The Durbin Watson statistics is 1.925 which is within the range of 1.5 to 2.5 to establish the fact that the error term in the multiple regression model is independent. The Variation Inflation (VIF) value for independent variables is less than 5 which ensures that no multicollinearity

exists in model-1. With regards to the standardized beta values, EAAW has positive influence on purchase intention of hybrid cars and signifies that the hypotheses H1 and H2 are supported ($\beta = 0.537$, $t = 7.449$, $P < 0.000$). Also, the social influence (SI) is positively correlated to purchase intention ($\beta = 0.276$, $t = 3.828$, $P < 0.000$), supporting H3. In model-2, the moderating variable, the past experience of driving non-hybrid car was included and the R square value changes from 0.391 to 0.403 with an increase of just 0.012. Thus, the moderating variable does not significantly influence the relationship between IVs and DV (H4 is not supported). It could be due to the fact that majority of the respondents did not get a chance to drive hybrid cars and therefore they were not in a position to compare the salient features of hybrid cars with that of non-hybrid cars.

Table 3. Summary of multiple regression analysis results

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.	Collinearity statistics
		B	Std. error	Beta			VIF
1	(Constant)	-.494	.612		-.806	.422	
	AVEEAAW	1.028	.138	.537	7.449	.000	1.008
	AveSI	.366	.096	.276	3.828	.000	1.008
2	(Constant)	-.793	.640		-1.239	.218	
	AVEEAAW	.978	.141	.511	6.931	.000	1.065
	AveSI	.326	.099	.246	3.297	.001	1.087
	AvePE	.177	.117	.116	1.518	.132	1.149

Note: a. Dependent Variable: AvePI.

3.2. Moderating effect. Although, PE does not moderate the relationships between EAAW, SI and PI, it is interesting to know the interaction graph between EAAW on PI through past experience of driving non-hybrid cars. Since PE may lead people to realize the urgent need of environmental safety and protection, PE is split into two categories HIGH and LOW based on its average score of 3.512. Figure 3 (see Appendix) depicts the past experience of driving non-hybrid car (PE) and significantly moderates the relationship between the independent variable EAAW and the purchase intention of hybrid car. The HIGH fit line is above the LOW fit line when the environmental attitude and awareness of responsibility (EAAW) is above 3.28 which indicate the importance of environment protection on purchase intention among Malaysian nationals. As such, grand promotion of special discounts and attractive advertisements for the purchase of hybrid cars and more awareness on the environment will definitely make people go for hybrid cars.

Conclusions and recommendations

Although the technology used in producing hybrid cars is promising in addressing the critical issues on rising pollutions, the purchase of hybrid cars is

relatively low, especially in developing countries like Malaysia. Hence, the current study was conducted to identify the root causes for the low penetration of hybrid cars in the market in order to assist vehicle manufacturers to increase the demand for hybrid cars (Jayaraman et al., 2009). A quantitative research approach using survey was employed and the standardized questionnaires were disseminated to a group of 650 respondents in Malaysia. At the outset, 121 (18.6%) valid respondents were analyzed to facilitate reliability test, factor analysis and multiple regression analysis. The conceptualized research framework proposed in this study is supported by the theory of planned behavior and norm activation theory. The pure predictors resulted from the study for the intention to purchase hybrid cars are environmental attitude and awareness of responsibility, and social influence. Originally, environmental attitude and awareness of responsibility were considered as individual constructs but were merged in the process of testing construct validity through factor analysis. Thus, the two independent variables, namely environmental attitude & awareness of responsibility (EAAW), and social influence (SI), positively influence the purchase intentions of hybrid cars. However, the past experience of driving non-

hybrid cars does not significantly moderate the relationship between the independent variables and the purchase intention of hybrid cars. Thus, except for the hypothesis H4, all the other hypotheses (H1-H3) were supported in this study. Moreover, 98% of the respondents agreed to the fact that environmental safety and environmental protection are highly important and 96% of the respondents showed interest in buying hybrid cars if the Government would waive the import and excise duty. In recent years, the usage of hybrid cars in Malaysia is seen to be popular on roads but it has not gained momentum yet. Although, hybrid car involves promising technology for addressing the issues of global warming and climate change, the respondents reacted sharply on the high price of these cars. Undoubtedly, hybrid cars have the next generation market in Malaysia, despite the fact that the research on the determinants of intention to purchase hybrid cars is limited. The relationship between environmental awareness and purchase intention of hybrid cars has proven to be significant in the current study. Hence, it is suggested that more environmental awareness among the Malaysian citizens need to be instilled to achieve a greener and cleaner Malaysia. Beside environmental concerns, the personal driving satisfaction in terms of the performance of hybrid cars may be taken into consideration since hybrid cars provide many salient features which differ from the conventional cars. The hybrid cars are fast, noise free, and easy to operate. Further, the social influence promotes intention to purchase hybrid cars and it has been found to be statistically significant. Of late, the per capita income in Malaysia is rapidly increasing and the Malaysian Government is working seriously to make Malaysia as a high income group country, the scope for the purchase of hybrid cars is in the positive note.

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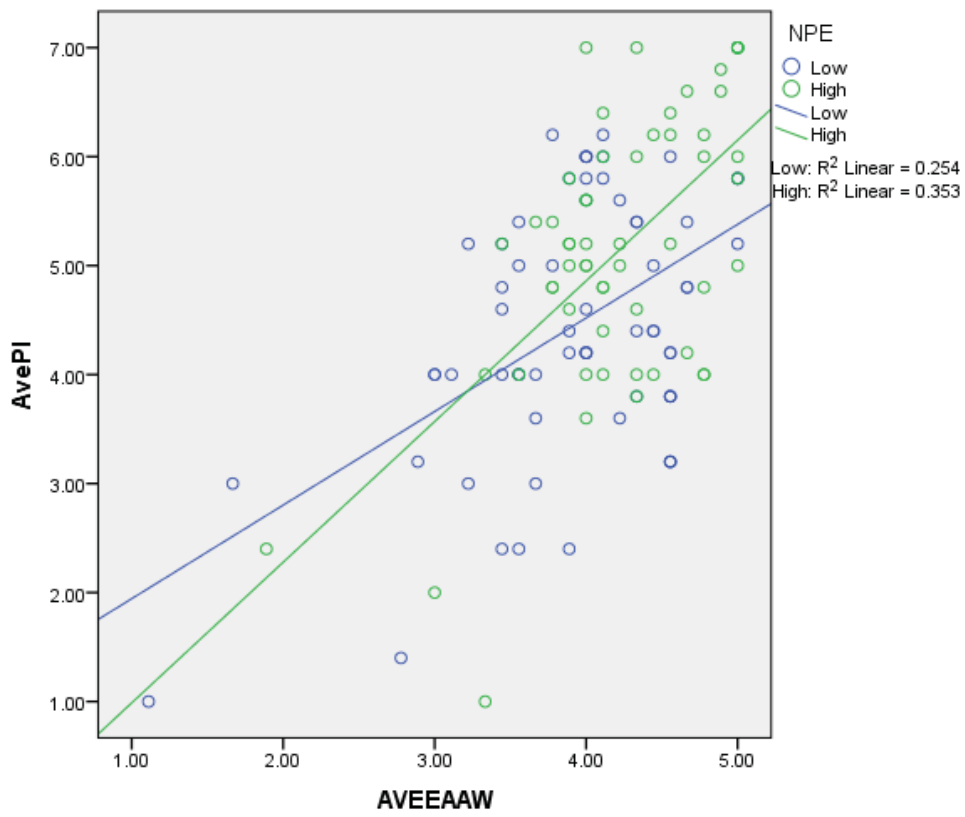
Appendix

Fig. 3. Moderating effect of PE on the relationship between EAAW and PI