



## Personal Involvement Modeling to Reduce the Emission of Carbon Dioxide: Theory Planned Behaviour and Personal Involvement

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### Abstract

This research is carried out to identify the impact of predicting factors in influencing Personal Involvement (PI) of an individual in making decision to reduce the release of carbon dioxide. The predictors in Theory Planned Behaviour (TPB) are used as the predictor for the Personal Involvement (PI) to reduce carbon dioxide emission. Data are obtained from 401 pre-service teachers from Institute of Teacher Education (ITE) through questionnaires. The hypothesis model is analysed using SEM-PLS 3.0. The result of this research indicates the intention factors (INT) to reduce the release of carbon dioxide ( $\beta = 0.675$ ,  $p < 0.001$ ,  $f^2 = 0.840$ ) has a significant influence on Personal Involvement (PI) of an individual to reduce the release of carbon dioxide with a substantial effect size. This proves that the intention factor (INT) to reduce the release of carbon dioxide influences the Personal Involvement (PI) of an individual to react in reducing the release of carbon dioxide. The result also confirms the proposition that the intention factor (INT) is the main element that can influence the personal involvement (PI) specifically ( $R^2 = 0.456$ ). Hence, the result of this research has numerous implications to the further research and to the stakeholder besides contributing theoretically to face the climate change issues.

Keyword: SEM-PLS, TPB, Personal Involvement, carbon dioxide, climate change, pre service teachers.

### Introduction

The human behaviour in releasing carbon dioxide without control to the atmosphere promotes disaster which not only destroy the countries surrounded by the ocean but also lead to the extinction of certain species. Global warming occurred through the emission of carbon dioxide which contributed by the gas itself (around 71%) is over the normal level of carbon dioxide cycle of the biosphere (Hansen, Sato, Russell, Kharecha, & A, 2013; IPCC, 2014; Ong, Mahlia, & Masjuki, 2011). The excessive increase of carbon dioxide in the atmosphere is like a thickening blanket for the earth and can raise the average temperature of the earth, thus will cause the change of world's climate. According to the Environment Performance Index (EPI) 2016, 57% of the total global

carbon dioxide emission is prompted by individual behaviour who uses a lot of fossil fuels (Hsu et al., 2016). Human uncontrolled behaviour in releasing carbon dioxide has triggered global warming which can cause many threats to living things on earth such as acid rain, drought, flood, increase the acidity level of the sea water, increase the sea level and so on (IPCC, 2001).

Malaysia is a country that is surrounded by the ocean and other than global warming; Malaysia is one of the countries threatened with the increasing of sea level. (IPCC, 2001b, 2014; Ministry of Natural Resources and Environment, 2009). Being aware of this climate change threat, since 2009 in Copenhagen, Malaysia has aimed to reduce the release of carbon dioxide to support the world's effort to reduce the impact of climate change. Malaysia pursues to reduce the release of carbon dioxide up to 40% of 2005 rate (Ministry of Natural Resources and Environment, 2014). Therefore, in 2009, the Nation's Climate Change Policy had been launched to change the behaviour of the society as the mitigation suggestion and adaptation to this climate change issue (Ministry of Natural Resources and Environment, 2009).

In line with this policy, a lot of efforts were being carried out in Malaysia 10<sup>th</sup> Blueprint (2011 – 2015) in order to achieve visions and hopes such as the reduction in carbon tracing by controlling the release of smoke from vehicles, managing energy demand efficiently, energy saving campaign (SAVE), recycling campaign and many more (Economic Planning Unit, 2015). Nevertheless, according to the the CCPI report (2015), Malaysia is still ranked as one of the ten worst countries and this revealed the personal involvement of Malaysians is still far from the country's expectation (refer to table 1). The failure of the Malaysians to be involved had worsened the quality of world's climate thus inclining the effort to prevent the climate change problem (R. D. Gifford & Chen, 2016). Therefore, the factors regarding the personal involvement in carrying out activities to reduce the release of carbon dioxide should be identified.

Year	Malaysi a	Thailan d	Indonesi a	Singapor e	Total Countr y	Remarks
2006	45	42	36	-	53	53 Countries represent more than 60% of global carbon dioxide emissions.
2007	55	50	43	28	55	
2008	49	26	15	46	56	55 countries represent more than 90% of global carbon dioxide emissions.
2010	50	26	23	40	60	
2011	53	19	21	32	60	
2012	49	24	26	51	61	
2013	55	32	36	53	61	
2014	51	38	34	48	61	
2015	52	47	23	50	61	
2016	39	49	24	55	61	

*Table 1: Malaysia's rank compares to neighboring country in CCPI evaluation*

## **Theory of Planned Behaviour**

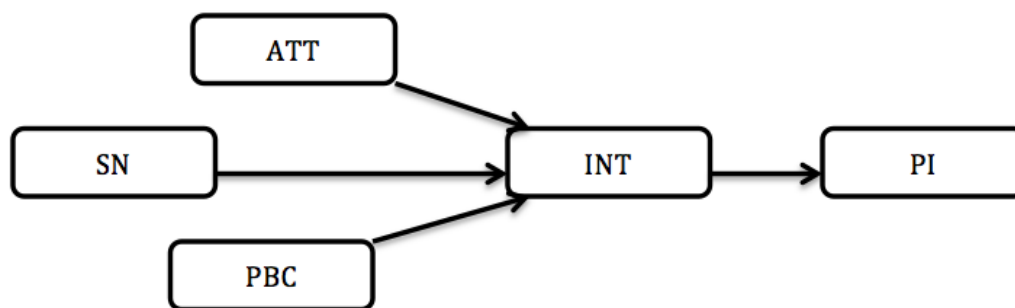
The Theory of Planned Behaviour (TPB) is based on the perception of human who will not conduct a behaviour without any reason (Ajzen, 1991). Whereas, the intention is the mediator of the reasoning factors and the behaviour (Ajzen, 1991; Bamberg & Möser, 2007; de Leeuw, Valois,

Ajzen, & Schmidt, 2015; Hines, Hungerford, & Tomera, 1987; Klöckner, 2013, 2015; Stern, 2000). According to Ajzen (1991) the individual's intention can be urged by three predicting factors which is Attitude Towards Traits (ATT), the factor of Social Norms (SN) and the factor of Perceived Behaviour Control (PBC). The three predicting factors are then become the main reasons to the intention in the TPB theory which was developed by Ajzen (1991).

The ATT factor is defined as the belief of an individual towards particular behaviour that is evaluated positively or negatively towards the behaviour (Ajzen, 1991) who influences the expected behaviour (Begum, Siwar, Pereira, & Jaafar, 2009). Subjective Norm (SN) is defined as the belief of an individual to the normative belief and motivation to obey the conduct of the behaviour. Positive SN is when an individual believes that the society in the surrounding appreciates his behaviour and he would fulfill the hope of the society as believed. (Ajzen, 1991). Ajzen (1991) defines PBC as the perception of an individual towards his ability to conduct his behaviour whereas the perception can influence ones motivation to manage it.

TPB is the most effective theoretical draft and commonly used to explain the process in making decision including the research of behaviour which is related to the environment (Han, 2015; Yu-Long Chao, 2012). From this analysis towards certain empirical research, the TPB predicting factors (ATT, SN and PBC) are able to predict the intention of an individual which is related to the environment up to 76% (Zemore & Ajzen, 2014). Ajzen (1991) had stressed that the intention factor is the best to predict the personal involvement. Therefore, this research tries to develop TPB upon the personal involvement of an individual. In order to achieve this purpose, there are four hypotheses created which are:

- H1: There is a positive relationship between the ATT factor and INT factor.
- H2: There is a positive relationship between SN factor and INT factor.
- H3: There is a positive relationship between PBC factor and INT factor.
- H4: There is a positive relationship between INT factor and PI factor.



*Figure 1: Research Concept Framework*

## **Personal Involvement**

One of the tasks and responsibilities of a teacher is to encourage the involvement of parents and society in shaping the connection and collaborative network (Ministry of Education Malaysia, 2016) in order to collaborate in the effort to overcome the challenges of climate change (tMinistry of Natural Resources and Environment Malaysia, 2009). A teacher should be able to carry out the task and responsibility by showing personal involvement in society. Teacher's personal involvement is the main issue in creating connection and collaborative network between teachers



and the society (Kukemelk, Lillemaa, & Tondi, 2011). Therefore, by taking the importance of connection and collaborative network between teachers and the society into consideration, thus researchers choose to identify the level of personal involvement of the respondents which are the pre-service teachers.

According to Zaichkowsky (1994) the PI is defined as the relevant ability of an individual to involve themselves based on the needs, values and interests. PI can also be defined as the involvement that is influenced by the application of some behaviour which results in the formation of habit as the behaviour is related to the environment (Sarabia-sánchez, Rodríguez-sánchez, & Hyder, 2014). Whereas as a teacher, the personal involvement can be defined as the professionalism involvement of a teacher in producing and conducting a quality management system (Kukemelk et al., 2011). Consequently, in this research, the PI is defined as the ability of a pre-service teacher to share their behaviour to carry out activities that can reduce the release of carbon dioxide to the environment.

From Zaichkowsky (1994) perspective, the PI can be measured using the personal involvement inventory index. The simple inventory is created and tested by Exploration of Factors Analysis (EFA). Zaichkowsky (1994) had also tested ten items from the inventory index empirically towards first degree students and university top management and it is found that all of the ten items of this questionnaire showed high reliability and validity (Foxall & Pallister, 1998) and supported by the results of many other research.

One of it is Sarabia-Sánchez et al., (2014) proved that the ten items from the PI inventory index has high reliability and validity ( $\alpha$  and CR > 0.8, loading > 0.70, AVE > 0.5, and passed the CI test). Sarabia-Sánchez et al., (2014) used the PI inventory index to analyse the PI of Spanish towards the environment (water conservation).

## **Methodology**

This research review is conducted to identify the influence of predicting factors (behaviour factor towards the release of carbon dioxide, Norm and Subjective factor towards PBC) towards the intention of an individual to conduct the behaviour that can reduce the release of carbon dioxide and thus to identify the influence of intention factor (INT) towards the PI of an individual. In this research, the predicting factors of intention is the factor of the attitude towards behaviour (ATT), SN factor, PBC factor whereas the intention factor had become the predictor of the individual PI.

By using the Cross Sectional Study technique, adaptation of questionnaires from previous researcher had become the measuring instrument to obtain the quantitative data. A total of ten items to measure the PI factors had been adapted from Zaichkowsky (1994) whereas the items to test the Attitude factor (7 items), SN factor (3 items), PBC (5 items) and INT (3 items) had been adapted from Chen & Tung (2014). All of the items employ 7 likert scale which is the same as the original scale. This 7 likert scale also has an accurate suggestion with Dawes (2008). Besides, all of the items reported by Chen & Tung (2014) and Zaichkowsky (1994) did not come up against any convergent reliability and validity problem.

A pre-test is carried out to test the validity of the content, the concrete validity, after 'back to back translation' is being carried out (Hunt, SParkman JR., & Wilcox, 1982). The respondents are the samples that were chosen by the purposive sampling technique. They are among pre-service teachers who are having courses in ITE all over Malaysia. The population is spread into twenty seven ITEs in Malaysia. By referring to the qualification of teacher enrollment and the placement method for the pre-service teachers (refer [https://pismp.moe.gov.my/iklan\\_pismp.cfm](https://pismp.moe.gov.my/iklan_pismp.cfm)), the population is homogeny. Other than that, the pre-service teachers are chosen as the research population referring to age range between 18 to

25 years old. This age range is considered as young generation that can give critical impact to the stakeholder (de Leeuw et al., 2015; R. Gifford & Comeau, 2011; Ministry of Natural Resources and Environment Malaysia, 2014) and includes 19.5% out of 30.2 million Malaysia population (Department of Statistic Malaysia, 2014). Whereas teachers are the agents of catalyst to change the dominant citizen (Fatma Sadik & Semra Sadik, 2014; Malaysia Ministry of Education, 2016).

Researchers distributed the questionnaires personally to the respondents to obtain data. There are 401 PISMP students (an undergraduate degree program of education) semester 1 from ITE campuses were involved as respondents. The total of the samples exceeded the suggested minimum sample (119 to effect size,  $f^2 = 0.15$  and statistical power = 0.95) generated from the G\*Power software. All the respondents gave their cooperation to fill in all the items that contributed to 100% respond rate.

All the data had fulfilled the requirements of the data checker to identify the errors including the lost data test, straight lining, outliers, expecting parametric test (normality test, linearity test, Homoscedasticity) and Common Method Bias test. All the data tests are conducted by SPSS ver 22 software except for the non-normalised univariate data and multivariate data which use online power of statistics (Webpower) <https://webpower.psychstat.org/wiki/> as suggested by Cain, Zhang, & Yuan (2016) dan Zhang & Yuan (2017).

Profile		frequency	percentage
Sex	Man	123	30.7%
	Woman	278	69.3%
Nationality	Malay	274	68.3%
	Chinese	116	28.9%
	Indian	01	00.3%
	Others	10	2.5%
Age	18	03	0.7%
	19	53	13.0%
	20	74	18.0%
	21	111	27.7%
	22	121	30.2%
	23	38	9.5%
	24	1	0.2%

*Table 2: Respondent Profile*

## **Results and Discussion**

This model is analysed using the Partial Least Square Smart-PLS 3.0 software referring to the analysing method-choosing criteria by Hair, M. Hunt, M. Ringle, & Sarstedt (2014). There are two ways of testing need to be done which are the model-measuring test (validity and reliability measurer) and the structural model test (hypotheses test).

### ***The Test of Measuring Model***



The test of measuring model is carried out to ensure the requirements of reliability and validity of all the construct items in the research model are being fulfilled. In this research, the main focus of this measuring model test is towards Convergent Validity which is the factor loading, cross loading, reliability composite, AVE and discriminant validity (cross loading, Fornell & Larcker Criterion and HTMT) as suggested by Hair et al. (2014) and Henseler, Ringle, & Sarstedt (2015).

Construct	item	Loading	Cronbach	AVE	CR
Personal Involvement (PI)	Z1	0.786	0.957	0.717	0.962
	Z2	0.792			
	Z3	0.778			
	Z4	0.829			
	Z5	0.896			
	Z6	0.875			
	Z7	0.853			
	Z8	0.882			
	Z9	0.883			
	Z10	0.885			
Attitude (ATT)	ATT1	0.832	0.965	0.830	0.971
	ATT2	0.905			
	ATT3	0.945			
	ATT4	0.942			
	ATT5	0.928			
	ATT6	0.922			
	ATT7	0.896			
Subjective Norm (SN)	S1	0.927	0.918	0.859	0.948
	S2	0.941			
	S3	0.911			
Perceived Behaviour Change (PBC)	P1	0.730	0.882	0.680	0.914
	P2	0.834			
	P3	0.788			
	P4	0.871			
	P5	0.891			
Intention (INT)	N1	0.940	0.939	0.892	0.961
	N2	0.947			
	N3	0.946			

*Table 3: Reliability and Convergent Validity*

Table 3 points out the loading values of each item and the Alpha Cronbach values, AVE values and CR values to all the constructs. All the loading values above had fulfilled the requirement of the loading test. Loading values have to pass the critical value at 0.708 (Hair et al., 2014). Hair et al. (2014) also stressed that the AVE value and CR value had to pass their own critical value (AVE 0.5, CR 0.708). However, Hair et al. (2014) stipulated that the elimination method can only be done if the CR value and AVE value are yet to pass their critical value at 0.5 and 0.708. Since the CR value and AVE value of all the constructs had passed both the critical values so, all the items



and constructs have their internal consistency of reliability and validity. As AVE value had passed the critical value at 0.5, it shows that all the items only focus on their constructs (Bagozzi & Yi, 1988; Fornell & Larcker, 1981; Hair et al., 2014). This reveals that all the constructs had fulfilled the requirements of validity and convergent reliability and thus proved that all the constructs do not have any issue with validity and convergent reliability.

	ATT	INT	PBC	PI	SN
ATT1	<b>0.832</b>	0.562	0.453	0.646	0.421
ATT2	<b>0.905</b>	0.537	0.418	0.663	0.422
ATT3	<b>0.945</b>	0.518	0.413	0.616	0.421
ATT4	<b>0.942</b>	0.506	0.393	0.632	0.424
ATT5	<b>0.928</b>	0.516	0.430	0.620	0.455
ATT6	<b>0.922</b>	0.497	0.429	0.615	0.448
ATT7	<b>0.896</b>	0.504	0.417	0.618	0.414
N1	0.556	<b>0.940</b>	0.768	0.645	0.685
N2	0.536	<b>0.947</b>	0.779	0.639	0.710
N3	0.531	<b>0.946</b>	0.774	0.630	0.742
P1	0.282	0.571	<b>0.730</b>	0.347	0.583
P2	0.539	0.817	<b>0.834</b>	0.655	0.643
P3	0.332	0.571	<b>0.788</b>	0.303	0.640
P4	0.336	0.662	<b>0.871</b>	0.414	0.623
P5	0.376	0.706	<b>0.891</b>	0.461	0.633
S1	0.460	0.714	0.703	0.451	<b>0.927</b>
S2	0.432	0.701	0.713	0.441	<b>0.941</b>
S3	0.420	0.682	0.687	0.445	<b>0.911</b>
Z1	0.584	0.677	0.535	<b>0.786</b>	0.486
Z10	0.599	0.514	0.401	<b>0.885</b>	0.344
z2	0.574	0.671	0.566	<b>0.792</b>	0.492
z3	0.570	0.710	0.592	<b>0.778</b>	0.547
z4	0.542	0.454	0.382	<b>0.829</b>	0.318
z5	0.606	0.517	0.408	<b>0.896</b>	0.348
z6	0.596	0.503	0.394	<b>0.875</b>	0.338
z7	0.574	0.481	0.392	<b>0.853</b>	0.336
z8	0.599	0.500	0.398	<b>0.882</b>	0.340
z9	0.584	0.507	0.403	<b>0.883</b>	0.365

Table 4: Discriminant Validity (Cross Loading)

Table 4: The Discriminant Validity above indicates the comparison between loading values in every item in every construct and it is found that all the highest values adhere to their own constructs. All the values of every item is set forth to have a higher loading value only towards

their own construct (Hair et al., 2014). However, the loading value upon other constructs exhibits the lower values. In conclusion, all the items of the constructs cannot be shifted with each other. Therefore, the loading values showed that all the items in this research are only suitable to be the measurer of each own construct. The proof highlights that all the items are free from Discriminant Validity drawback.

Construct	ATT	INT	PBC	PBC	SN
ATT	<b>0.911</b>				
INTENTION	0.573	<b>0.944</b>			
PBC	0.464	0.819	<b>0.825</b>		
PI	0.693	0.676	0.547	<b>0.847</b>	
SN	0.472	0.755	0.757	0.481	<b>0.927</b>

Table 5: Discriminant Validity (Fornell & Larcker Criterion)

Table 5 above shows the comparison square root of AVE with the correlation value within the construct. The AVE square root value of each construct must be higher than the correlation value with the other construct (Fornell & Larcker, 1981). All the square root values of AVE of each construct that is obtained (refer to table 3) is higher than the correlation value with other constructs. It is clear to see that all the constructs do not come across any issue of Discriminant Validity.

Construct	ATT	INT	PBC	PI	SN
ATT					
INT	0.600 [0.529; 0.673]				
PBC	0.490 [0.405; 0.573]	0.888 [0.854; 0.917 ]			
PI	0.714 [0.639; 0.790]	0.688 [0.626; 0.748 ]	0.555 [0.477; 0.632 ]		
SN	0.501 [0.416; 0.584]	0.813 [0.744; 0.874 ]	0.843 [0.790; 0.893 ]	0.493 [0.403; 0.582 ]	

Table 6: Discriminant Validity (HTMT)

By referring to the table 6, the result of the HTMT<sub>.90</sub> for every construct had fulfilled the HTMT criterion (Gold, Malhotra, & Segars, 2001). The HTMT Criterion Value which exceeds 0.90 unveils that there is cross loading problem in the constructs. Referring to the CI value of the HTMT inference test indicates that the cross loading is obeyed (Henseler et al., 2015). By using HTMT technique, the discriminant test showed that the all the research constructs do not have any trouble with Discriminant Validity.

### **Structural Model Test**



The evaluation of structural model to test the hypothesis model had undergone five steps which are identification of Colinearity issue, identification of significant level and relevant relationship (t value), coefficient level ( $R^2$ ), effect size ( $f^2$ ), relevant predictions ( $Q^2$ ) and effect size as suggested by Hair et al. (2014).

By referring to the colinearity test, the measure of VIF value (Variance Inflatior Factor) had been used to test each predicted construct separately. In this research, there is only a set of predicted construct including ATT construct, SN construct and PBC construct that predicts INT construct. Therefore, the colinearity significant level between predicted construct had been tested. The VIF value exceeded 5.00 in the predicted construct demonstrates that there is an issue of colinearity and can interfere the result of the research (Kock & Lynn, 2012). As for the prediction construct that shows the presence of colinearity issue, Hair et al. (2014) suggested that the construct is to be eliminated, or combined or create a high-order construct to overcome this issue.

Construct	VIF Value
ATT	1.333
PBC	2.424
SN	2.447

Table 7: Collinearity Test, VIF

According to the VIF test value in Table 7 above, it is found that all the constructs pass the VIF test requirements which are not more than 5.00 and VIF values below 5.00 prove that there is no collinearity issue. Hence, it can be concluded that the data of this study is free from the collinearity issues that may interfere the findings of the study.

Hypotheses	Relation	Beta Std	Error Std	t value	Result	$R^2$	$f^2$	$Q^2$	$q^2$
H1	ATT -> INT	0.206	0.034	6.132***	accepted	0.745	0.125	0.663	0.08
H2	PBC -> INT	0.530	0.062	8.556***	accepted		0.455		0.07
H3	SN -> INT	0.256	0.069	3.691***	accepted		0.106		0.31
H4	INT -> PI	0.675	0.031	21.558***	accepted	0.456	0.840	0.300	0.12

Note: \*\*\* $p < 0.001$ , \*\* $p < 0.01$  and \* $p < 0.05$

Table 8: Hypotheses Test

In this research there are four hypotheses created. All the significant level (t value) of the hypotheses are tested using bootstrapping function in Smart-PLS 3.0 software. By referring to the table 8 above (hypotheses test), all the construct relationships that are hypothesized provide the value of  $t > 1.645$ .

The construct relationship ATT ( $\beta = 0.206$ ,  $p < 0.001$ ), construct PBC ( $\beta = 0.530$ ,  $p < 0.001$ ) and SN construct ( $\beta = 0.256$ ,  $p < 0.001$ ) have positively influence the INT. The three predicting constructs (ATT, SN and PBC) are able to describe only 74.5% variance of INT. Meanwhile, INT construct only describe 45.6% variance of PI construct. However, both  $R^2$  INT at 0.745 and  $R^2$  PI at 0.456 far exceeds from 0.26 value, as suggested by Cohen (1988) to be a huge value. Therefore, the four hypotheses (H1, H2, H3 and H4) are accepted.

By referring to the identification of effect size  $f^2$ , PBC construct ( $f^2 = 0.455$ ) has the biggest effect size meanwhile ATT construct ( $f^2 = 0.125$ ) holds the second biggest value and SN construct

( $f^2 = 0.106$ ) has the smallest value in producing  $R^2$  value. According to Cohen (1988), the effect size that is more than 0.35 is considered as the biggest value of effect size, 0.15 as the average effect size value and 0.02 as the smallest effect size value in producing  $R^2$ . It can be concluded that only PBC constructs can contribute a huge effect size. While SN construct and ATT constructs produce a small effect in producing INT values.

Relevant prediction  $Q^2$  is tested using the Blindfolding function in the Smart-PLS software. If the value of  $Q^2$  is bigger than 0, the measuring model is said to have accurate relevant prediction endogenous construct (Hair et al., 2014). By referring to table 6: Hypotheses Test, it is shown that the two  $Q^2$  relevant predicted values is more than zero. It indicates that this research model provides adequate and accurate relevant prediction. In addition, the  $Q^2$  effect size test that examines the exogenous construct contribution towards the  $Q^2$  endogenous construct values is done by using the manual calculation as suggested by Hair et al. (2014) with the following formula:

$$q^2 = \frac{Q^2_{\text{included}} - Q^2_{\text{excluded}}}{1 - Q^2_{\text{included}}}$$

According to Hair et al. (2014), if the value of  $q^2 = 0.02$  it shows that the strength of the prediction is small, the value 0.15 is average and 0.35 is considered as great value. By referring to table 6, the value of  $q^2$  ATT construct (0.31) is big, meanwhile the value of  $q^2$  PBC construct (0.07) and the value of  $q^2$  SN construct (0.22) can be categorized as small. This shows that the effect of  $q^2$  ATT contribution towards INT construct is the biggest of the three predicting constructs in the research model.

## Discussion

The result of the analysis between ATT factor with INT factor in the structural model clearly shows the positive and significant relationship with value  $\beta = 0.206$  ( $p > 0.001$ ,  $f^2 = 0.125$ ) but the effect size shown is small (Cohen, 1988). The result of the analysis supports the first research hypothesis, H1, so the research hypothesis H1 is accepted but the ATT factor only bears a small effect in producing  $R^2$  INT factor. This means that an individual will be more inclined to have intention in reducing the release of carbon dioxide if the individual behaves positively towards the behaviour to reduce the release of carbon dioxide. However, the role of ATT in influencing the behaviour is small (due to small effect size).

According to Sau Neo, Choong Weng, & Rahmalan Ahamad (2016) the role of attitude towards behaviour might be impeded by the lacking of awareness. Awareness towards the problem of releasing carbon dioxide can be improved with the formal educational efforts about the climate change systematically (Ministry of Natural Resources and Environment Malaysia, 2010).

By referring to the result of the structural model analysis towards the PBC factors and INT factor, it demonstrates positive relationship with the value of  $\beta = 0.530$  ( $p < 0.001$ ,  $f^2 = 0.455$ ) with effective size,  $f^2$  is more than 0.35 shows a huge value of effect size (Cohen, 1988). This result supports H2 (There is a positive significant relationship between PBC factor and INT factor). This result means that the perception of an individual towards how easy or difficult for him to conduct a behaviour that will be done can shape his belief to act in reducing the release of carbon dioxide and gives huge effect in INT contribution. The result of structural model analysis towards the relationship between SN factor and INT factor shows positive and significant relationship with the value  $\beta = 0.256$  ( $p < 0.001$ ,  $f^2 = 0.106$ ) and the size effect,  $f^2$  less than the 0.15 shows small size



effect (Cohen, 1988). The result supports H3 (There is a positive significant relationship between SN factor and INT factor). Although Cohen (1988) had suggested the effect produced is small but the SN factor also gives significant effect in producing R<sup>2</sup> INT factor. This means that the motivation and hope of the society are able to give impact in influencing the intention of an individual to reduce the release of carbon dioxide.

By referring to the result of the analysis, the value of coefficient R<sup>2</sup> INT factor (0.745) is found to have the value exceeds 0.50. The R<sup>2</sup> value exceed 0.50 is more than the critical value underlined by Hair et al. (2014) who stated that values exceeding 0.50 shows contributing predicting factors are moderate. However, the value of R<sup>2</sup> is reaching the average value of R<sup>2</sup> (R<sup>2</sup> around 76%) that is reported by Zemore & Ajzen (2014) and also proceed towards the value of R<sup>2</sup> at 0.75 for huge coefficient value Hair et al. (2014).

## **Conclusion**

The release of carbon dioxide is the main factor to the world's climate change issue. In particular, the main contributor to the release of carbon dioxide is the use of fossil fuels produced from vehicles and generation of electric (Hsu et al., 2014). The rate of carbon dioxide release can be reduced if the predicting factors of the correct behaviour can be identified (Steg & Vlek, 2009; Stern, 2000). Identification of predicting factors that are significant influenced the intention and PI of an individual to reduce the release of carbon dioxide is very important in saving the earth upon climate change issue (Burck et al., 2015; IPCC, 2014; Jane Lu Hsu & Ting-Yu Lin, 2015).

The result of this research reveals that the ATT factor, SN factor, PBC factor are successfully proven in reducing the release of carbon dioxide in accordance with the TBC theory proposed by Ajzen (1991). On the other hand, the INT factor also proves to significantly influence the PT of an individual.

The result of the finding verifies that the INT is created from the correct attitude, as SB and PBS successfully influenced the PI of an individual to conduct behaviour that can reduce the release of carbon dioxide up to 40% in 2020, lesser than the rate in 2009 (Ministry of Natural Resources and Environment Malaysia, 2014).

The findings of this research are imperative to show the shaping of specific attitude towards behaviour. In the context of climate change issue, the shaping of attitude as a result of awareness promoted by education concerning the issue is very important to change the behaviour of the society (Ministry of Natural Resources and Environment Malaysia, 2010). Therefore, the environmental education curricular has to be upgraded by highlighting the climate change issue systemically.

Apart from above, the most important thing to ensure the effectiveness of reducing the release of carbon dioxide is by creating a caring society that awares upon the worrying climate change (Ministry of Natural Resources and Environment Malaysia, 2010) and the production of facilities (Siti Nur Diyana & Kamisah, 2010) that are able to conduct behaviour (Zemore & Ajzen, 2014) to reduce the release of carbon dioxide. Caring society will influence each other to believe that everyone wants the release of carbon dioxide to be reduced.

Due to the result of the contributing model research that only provides average contribution to the coefficient value R<sup>2</sup> which is 0.456, proves the probability of the presence of other predicting factors is not considered in the research as claimed Klöckner (2015). Therefore, the further research has to be carried out to find the predicting factors so that a more comprehensive model is able to be created (Klöckner & Blöbaum, 2010). The predicting factors such as knowledge and skills (Yu-Long Chao, 2012), habits (Lheureux, Auzoult, Charlois, Hardy-Massard, & Minary, 2016) and personal norms (Hines et al., 1987; Klöckner, 2013) are suggested to be expanded to



the TPB theory in behaviour to reduce the release of carbon dioxide. Nonetheless, further analysis such as IPMA (Importance and Performance Matrix) needs to be considered to be tested towards the predicting factors so that accurate suggestion can be given to all prioritized authorities such as the stakeholder (Hair et al., 2014) especially in the curricular development sector of Malaysia Ministry of Education so that the shaping of attitude to be instilled in the Environmental Education Curricular can be smoothened.

## References

- Ajzen, I. (1991). The Theory of Planned Behavior. *Organisation Behavior and Human Decision Process*, 179–211.
- Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16(1), 74–94.
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, 27(1), 14–25.
- Begum, R. A., Siwar, C., Pereira, J. J., & Jaafar, A. H. (2009). Attitude and behavioral factors in waste management in the construction industry of Malaysia. *Resources, Conservation and Recycling*, 53, 321–328.
- Burck, J., Marten, F., Bals, C., Kolboske, E. B., Devarti, L., & Baum, D. (2015). *The Climate Change Performance Index Results 2015*. Berlin.
- Cain, M. K., Zhang, Z., & Yuan, K.-H. (2016). Univariate and multivariate skewness and kurtosis for measuring nonnormality: Prevalence, influence and estimation. *Behavior Research Methods*.
- Chen, M., & Tung, P. (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.
- Chin, W. W. (1998). *Modern methods for Business Research*. (G. A. Marcoulides, Ed.). New Jersey: Lawrence Erlbaum Associates.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (Second Edition). New York: Lawrence Erlbaum Associates.
- Dawes, J. (2008). Do data characteristics change according to the number of scale points used? *International Journal of Market Research*, 50(1), 61–78.
- de Leeuw, A., Valois, P., Ajzen, I., & Schmidt, P. (2015). Using the theory of planned behavior to identify key beliefs underlying pro-environmental behavior in high-school students: Implications for educational interventions. *Journal of Environmental Psychology*, 42, 128–138.
- Fatma Sadik, & Semra Sadik. (2014). A study on environmental knowledge and attitudes of teacher candidates. *Procedia - Social and Behavioral Sciences*, 116, 2379–2385.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Foxall, G. R., & Pallister, J. G. (1998). Measuring purchase decision involvement for financial services: comparison of the Zaichkowsky and Mittal scales. *International Journal of Bank Marketing*, 16(5), 180–194.
- Gifford, R., & Comeau, L. A. (2011). Message framing influences perceived climate change competence, engagement, and behavioral intentions. *Global Environmental Change*, 21(4),



- 1301–1307.
- Gifford, R. D., & Chen, A. K. S. (2016). Why aren't we taking action? Psychological barriers to climate-positive food choices. *Climatic Change*.
- Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management : An organizational capabilities perspective. *Journal of Management Information Systems*, 18(1), 185–214.
- Hair, J. F., M. Hunt, G. T., M. Ringle, C., & Sarstedt, M. (2014). *A Primer On Partial Least Squares Structural Equation Modelling (PLS- SEM)*. Los Angeles: SAGE Publications, Inc.
- Han, H. (2015). Travelers' pro-environmental behavior in a green lodging context: Converging value-belief-norm theory and the theory planned behavior. *Tourism Management*, 47, 164–177.
- Hansen, J., Sato, M., Russell, G., Kharecha, P., & A, P. T. R. S. (2013). Climate sensitivity , sea level and atmospheric carbon dioxide. *Philosophical Transactions of The Royal Society A*, (September).
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135.
- Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and Synthesis of Research on Responsible Environmental Behavior: A Meta-Analysis. *The Journal of Environmental Education*, 18(2), 1–8.
- Hsu, A., Emerson, J., Johnson, L., Malik, O., Schwartz, J. D., Allison, A., ... Mala, O. (2014). *The 2014 Environmental performance Index* (Vol. 1). New Haven, CT.
- Hsu, A., Emerson, J., Johnson, L., Malik, O., Schwartz, J. D., Allison, A., ... Mala, O. (2016). *2016 Environmental Performance Index*. New Haven, CT.
- Hunt, S. D., SParkman JR., R., & Wilcox, J. B. (1982). The pretest in survey research : Issues and preliminary findings. *Journal of Marketing Research*, XIX(May), 269–274.
- IPCC. (2001a). Greenhouse Gas Emission Mitigation Scenarios and Implications. *Working Group III Mitigatuion*, 52.
- IPCC. (2001b). Setting the Stage : Climate Change and Sustainable Development Lead Authors : Contributing Authors : Review Editors : *Working Group III Mitigatuion*, 42.
- IPCC. (2014). *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva, Switzerland.
- Jabatan Perangkaan Malaysia. (2014). *Buku Maklumat Perangkaan Malaysia 2014*. Jabatan Perangkaan Malaysia.
- Jane Lu Hsu, & Ting-Yu Lin. (2015). Carbon reduction knowledge and environmental consciousness in Taiwan. *Management of Environmental Quality: An International Journal*, 26(1), 37–52.
- Kementerian Pendidikan Malaysia. (2016). Deskripsi Tugas Pegawai Perkhidmatan Pendidikan.
- Kementerian Sumber Asli dan Alam Sekitar Malaysia. (2009). *National policy on Climate Change*.
- Kementerian Sumber Asli dan Alam Sekitar Malaysia. (2010). *Dasar perubahan Iklim Negara*.
- Kementerian Sumber Asli dan Alam Sekitar Malaysia. (2014). *Malaysia Second National Communication to the UNFCCC*. (L. K. Fei, G. W. Theseira, A. R. Nik, A. J. Shaaban, A. Zainal Abidin, & L. L. Rama Iyer, Eds.).
- Klößner, C. A. (2013). A comprehensive model of the psychology of environmental behaviour-A meta-analysis. *Global Environmental Change*, 23, 1028–1038.
- Klößner, C. A. (2015). *The Psychology of Pro-Environmental Communication; Beyond*



- Standards Information Strategies* (first). New York: Palgrave Macmillan.
- Klößner, C. A., & Blöbaum, A. (2010). A comprehensive action determination model : Toward a broader understanding of ecological behaviour using the example of travel mode choice. *Journal of Environmental Psychology, 30*(4), 574–586.
- Kock, N., & Lynn, G. S. (2012). Lateral Collinearity and Misleading Results in Variance-Based SEM : An Illustration and Recommendations. *Journal of the Association for Information Systems, 13*(7), 546–580.
- Kukemelk, H., Lillemaa, T., & Tondi, J. (2011). Teachers' professional involvement in creating a general learning environment in Estonian schools. *Procedia - Social and Behavioral Sciences, 11*, 47–51.
- Lheureux, F., Auzoult, L., Charlois, C., Hardy-Massard, S., & Minary, J. P. (2016). Traffic Offences: Planned or Habitual? Using the Theory of Planned Behaviour and habit strength to explain frequency and magnitude of speeding and driving under the influence of alcohol. *British Journal of Psychology, 107*(1), 52–71.
- Ong, H. C., Mahlia, T. M. I., & Masjuki, H. H. (2011). A review on emissions and mitigation strategies for road transport in Malaysia. *Renewable and Sustainable Energy Reviews, 15*(8), 3516–3522.
- Sarabia-sánchez, F. J., Rodríguez-sánchez, C., & Hyder, A. (2014). The role of personal involvement, credibility and efficacy of conduct in reported water conservation behaviour. *Journal of Environmental Psychology, 38*, 206–216.
- Sau Neo, M., Choong Weng, W., & Rahmalan, Ahamad. (2016). Environmental Awareness and Behaviour Index for Malaysia. *Procedia - Social and Behavioral Sciences, 222*(7), 668–675.
- Siti Nur Diyana, M., & Kamisah, O. (2010). The determinants of recycling intention behavior among the Malaysian school students : an application of theory of planned behaviour. *Procedia - Social and Behavioral Sciences, 9*, 119–124.
- Steg, L., & Vlek, C. (2009). Encouraging Pro-Environmental Behavior : An Integrative Review and Research Agenda. *Journal of Environmental Psychology, 29*(3), 309–317.
- Stern, P. C. (2000). Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues, 56*(3), 407–424.
- Unit Perancang Ekonomi. (2015). Rancangan Malaysia Kesebelas: Menuju ke arah pertumbuhan hijau bagi meningkatkan kemampuan dan daya tahan.
- Yu-Long Chao. (2012). Predicting people's environmental behaviour: theory of planned behaviour and model of responsible environmental behaviour. *Environmental Education Research, 18*(4), 437–461.
- Zaichkowsky, J. L. (1994). The Personal Involvement Inventory: Reduction, revision, and application to advertising. *Journal of Advertising, 23*(4), 59–70.
- Zemore, S. E., & Ajzen, I. (2014). Predicting substance abuse treatment completion using a new scale based on the theory of planned behavior. *Journal of Substance Abuse Treatment, 46*(2), 174–182.
- Zhang, Z., & Yuan, K.-H. (2017). *Practical Statistical Power Analysis using WebPower and R* (First). Granger: Whenchoo Press.