

Article

Recycling Intention and Behavior among Low-Income Households

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Abstract: To improve our knowledge of how to protect the environment, this study examined the factors that influence recycling intention and behavior among low-income households. The study adopted a cross-sectional design that relied on 380 low-income households who live in coastal Peninsular Malaysia. The findings revealed a positive effect of eco-literacy, environmental concern, and self-efficacy on the attitude towards environmentally friendly products. Subsequently, the findings also illustrated a positive effect of normative beliefs on subjective norms. Moreover, the results revealed a positive effect of attitude towards environmentally friendly products and perceived behavioral control (PBC) on recycling intention. Finally, there was a positive effect of both PBC and recycling intention on recycling behavior. Although this study's focus on a specific income group from a single country could limit generalizability; the findings nevertheless provide scholars and policymakers with significant insights into promoting recycling activities, which are expected to contribute to the environment and reduce the environmental and economic vulnerability among low-income households. Therefore, environmental and socio-economic development organizations should assess the feasibility of recycling materials and develop a supportive system that facilitates and encourages recycling activities.

Keywords: environmental protection; recycling; low-income households; theory of planned behavior

1. Introduction

Environmental pollution and degradation are major causes of social problems for both present and future generations. Kutting [1] and Habib [2] asserted that every individual is under threat as no urgent solutions to environmental problems are available for which the capitalist system and consumer society are responsible. One of the implications of adaptation to global environmental changes is in the form of economic and social vulnerability. Both poverty and marginalization are key driving forces of vulnerability that prevent individuals from coping with long-term adaptation to climate change [3]. Poverty is the main determinant of vulnerability which influences resource dependency at the individual level, and institutional adaptation and inequality at the collective level [3]. In Malaysia, environmental issues impact economic vulnerability directly, thereby reducing agricultural productivity and food security [4,5].

One of the common tenants of both environmental degradation and poverty are low-income households. According to Ferreira and Lugo [6], victims of poverty are those deprived of basic human needs, including food, nutrition, clean water, health, shelter, clothing, education, and others. In Malaysia, despite reduced incidence of poverty and hardcore poverty, inequality in income distribution and socio-economic vulnerability to poverty remains a threat, particularly among the low-income households of the country [7]. According to Mamun et al. [7], low-income households in Malaysia reflect those with net household income below RM2000, characterized by lack of financial means to acquire basic needs including food and non-food components.

Recycling is a popular and cost-effective mitigation strategy from climate change that offers job creation and economic developmental opportunities simultaneously [8,9]. Recycling operations have emerged as one of the major strategies both for waste management and poverty reduction worldwide because they offer sustainable techniques for creating new jobs locally and reducing the amount of municipal solid waste disposed at landfill sites [10]. In Malaysia, the perception on recycling, as a creditable solution to environmental and poverty issues is not different. As reflected through the national campaign launched in 1993 by the Ministry of Urban Wellbeing, Housing, and Local Government to promote recycling activities; it is evident that recycling is perhaps considered the most sensible solution for both ecological and economic problems by the Malaysian government [11]. It is not surprising that recycling of solid waste [11], recycling of organic matter [12], green resorts [13], and recycling of construction waste as viable recycling concepts have attracted considerable research attention in Malaysia.

Although poverty and environmental issues are significant at the present, studies that address both concerns simultaneously are inadequate. Earlier studies on recycling initiatives focused on three key areas, particularly the green supply chain [14], green purchasing [15–17], and green vehicles [18–20]. However, recycling intention and behavior remain an unexplored topic particularly among poor households who are common subjects of both climate change and poverty. Moreover as regards Malaysia, a country that has had active recycling programs since 1993, a current recycling rate of only five percent [16,21] calls for further research into the subject matter. It is not surprising that although the government has put in a lot of efforts, recycling has not been a regular practice in the ‘truly Asia’ country [11]. We argue that this is because a recycling program requires initiation and cooperation of government, small business owners who supply consumables to the public, and households who use the consumables. Hence in response to the above, this study intends to examine the factors that affect recycling intention and behavior among low-income households in coastal Peninsular Malaysia.

2. Literature Review

2.1. Theory of Planned Behavior (TPB)

Despite the existence of numerous behavioral theories, Theory of Planned Behavior (TPB) is the most commonly applied theory to explain pro-environmental intention and behavior [22]. The TPB stresses that behavior refers to a willingness to avoid or perform a certain task (i.e., intention), and the degree of control an individual perceives he/she has over a concerned behavior (i.e., perceived behavioral control (PBC)). Besides PBC, intention also functions as an individual’s attitudes and subjective norms [23]. According to the TPB, human actions are driven by three kinds of belief. The first type of belief is about the possible outcome of a specific behavior and the evaluations of such outcome (behavioral belief). The second type of belief is concerned with the normative expectation of others significant and the motivation to comply with such expectation (normative beliefs). The third type of belief concerns the absence or presence of other factors that may impede or facilitate the performance of behavior along with the perceived power of such factors (control beliefs). Collectively, behavioral beliefs form favorable or unfavorable attitude towards a particular behavior. Normative beliefs form subjective norms, while control beliefs form PBC. The combination of attitude, subjective norms, and PBC forms behavioral intention [23,24].

Since TPB is a foundational theory, which provides opportunity to systematically determine the elements that influence recycling decision, related previous studies applied it extensively to examine the factors of recycling intention and behavior [21,25]. However, several scholars argued that the TPB does not explain recycling intention behavior adequately [26,27] which summons the need to integrate additional constructs into the TPB model [27]. Thus, although TPB has its own predictors of intention (attitude, subjective norms, and PBC), it is possible to integrate relevant new constructs in order to enhance its predictive power that could better explain recycling intention and behavior [26]. Therefore based on the above and existing literature [27], this study extended the TPB by integrating relevant subcomponents into the original TPB model (i.e., the dimensions of eco-literacy, environmental concern, and self-efficacy as antecedents of attitude towards environmentally friendly products along with the dimensions of moral obligation and normative beliefs as determinants of subjective norms); wherein the integrated dimensions are expected to have indirect effects on recycling intention, mediated by the original constructs [25].

2.2. Attitude towards Environmentally Friendly Products

Theoretically, attitude is defined as an individual's assessment of favorableness with regard to an object [27]. In the present context, attitude would capture the "attitude about the behavior" [28], which could be translated as an individual's attitude towards environmentally friendly products. TPB justifies that attitude, while subjective norms, and PBC influence an individual's intention to perform a behavior [28]. Afroz et al. [20] found that attitudes towards environment friendly products have a significant relationship with intention to purchase environment friendly vehicles. Chen and Deng [29] echoed that a green purchase attitude affects the intention to purchase green products. Literature on recycling intention confirmed that recycling attitude significantly predicts recycling intention [30,31]. Although Ajzen and Fishbein [32] showed that recycling-specific environmental attitudes predict recycling intention better than general attitudes, Mahmud and Osman [21] found that recycling-specific attitudes can predict recycling intention indirectly. Based on the theory and existing literature; this study considered attitude towards the environment as a predictor of pro-environmental intention. However, the inconsistent findings of the relationship between attitude towards environmentally friendly products and recycling intention require further investigation. Hence, this study proposed the following hypothesis.

Hypothesis 1 (H1). *Attitude towards environmentally friendly products has a significant positive effect on Recycling Intention among low-income households in Coastal Peninsular Malaysia.*

2.3. Factors of Attitude towards Environmentally Friendly Products

Although attitude can be perceived as a multidimensional construct [33], the antecedents of attitude towards environmentally friendly products are hardly identified due to the inconsistency of environmental attitudes across existing studies [34]. In fact, product information, knowledge, concern for environment, culture, and perceived ability are potential non-exhaustive determinants of attitude towards environmentally friendly products [35–37]. Drawing upon the TPB, this study focused on the dimensions of attitude that were relevant to both the TPB and recycling; and thereby following theory and existing literature [21,27], this study adopted three dimensions of attitude represented by self-efficacy (predictor of attitude in general), eco-literary, and environmental concern (factors related to specific attitude towards environmental friendly products, recycling intention, and behavior).

2.3.1. Eco-Literacy

Knowledge is linked to the characteristics of individuals that influence all phases of decision-making processes [38]. Eco-literacy or ecological knowledge is defined as an individual's ability to identify ecological symbols, concepts, and behavior [39]. Laroche et al. [39] indicated that

knowledge about environmental issues could raise environmental awareness of individuals to promote a favorable attitude towards green products. According to Cheah and Phau [40], eco-literacy provides individuals with knowledge about issues and action strategies that determine their attitudes and intentions. Cheah and Phau [40] proved that eco-literacy has strong correlations with consumers' favorable attitudes towards environmentally friendly products, which in turn leads to purchase of green products. In the Malaysian context, related study found that students who had higher environmental knowledge were more likely to form a positive attitude towards environmental issues [41]. In fact, eco-literacy was a significant predictor of environmentally friendly behavior [42]. However, a few existing studies found no significant effect of the eco-literacy on enthusiasm to conserve the environment [43]. The inconsistent findings of prior studies call for further investigation. Based on the above discussion, this study proposed a positive effect of eco-literacy on attitude towards environment friendly products.

Hypothesis 2 (H2). *Eco-literacy has a positive effect on attitude towards environmentally friendly products among low-income households in Coastal Peninsular Malaysia.*

2.3.2. Environmental Concern

Environmental concern is defined as an appraisal of attitude towards facts, which brings consequences to the environment [37]. According to Minton and Rose [44], environmental concerns formed positive attitudes towards the environment protection with an indirect effect on behavioral intention and behavior. Fransson and Gärling [37] signified that environmental concern influenced specific attitude directly, thereby determining intentions. Similarly, Schultz and Oskamp [45] noted that environmental concern influences attitude towards environmental issues and thus determines the effort people were willing to exert in order to recycle. In addition, environmental concern had a significant influence on the implementation of recycling [46] and attitude towards green products [47]. Laroche, Bergeron, and Barbaro-Forleo [48] stressed that consumers with environmental awareness were willing to pay more for environmentally friendly products. Kim and Choi [49] found that environmental concern influenced green purchase behavior. However, Hassan, Noordin, and Sulaiman [50] conversely noted that individuals even with high levels of environmental concern failed to act and/or practice certain attitudes that could improve the environment. Hence, based on the above discussion and inconclusive findings of previous studies; this study proposed the following hypothesis.

Hypothesis 3 (H3). *Environmental concern has a positive effect on attitude towards environmentally friendly products among low-income households in Coastal Peninsular Malaysia.*

2.3.3. Self-Efficacy

Self-efficacy describes an individual's perception of his or her abilities to perform a behavior that differentiates how an individual thinks, feels, and acts [51,52]. Undeniably, self-efficacy beliefs (perceived ability) affect an individual's thoughts and emotional responses [27,53]. Durndell and Haag [54] found better computer self-efficacy related to positive attitudes towards the use of the internet. Sniehotta, Scholz, and Schwarzer [55] found that self-efficacy mediated the relationship between intention and actual behavior. In the context of environment, self-efficacy was found to determine behavioral intention. Janmaimool [56] also believed that self-efficacy predicted all types of sustainable waste management behaviors. Besides, Kim and Choi [49] suggested that self-efficacy improved green purchase behavior. According to Cheah and Phau [40], failure to respond to environmental problems is due to the negative perception of their self-efficacy with regard to the degree to which individuals feel they can make a difference in improving the quality of their environment. Based on the above discussion, this study proposes a hypothesis as follows.

Hypothesis 4 (H4). *Self-efficacy has a positive effect on attitude towards environmentally friendly products among low-income households in Coastal Peninsular Malaysia.*

2.4. Mediating Effect of Attitude towards Environmentally Friendly Products

This study intended to measure the mediating effect of attitude towards environmentally friendly products on the relationship between eco-literacy, environmental concern, self-efficacy, and recycling intention. This is because TPB echoes that available information mediates the effects of personal and environmental factors (eco-literacy, environmental concern, and self-efficacy) on intention (recycling intention) [28]. The dimensions of eco-literacy, environmental concern, and self-efficacy were included in the TPB to increase the strength of the model [57]. These dimensions are expected to have an indirect effect on intention, mediated by the component of the original model (attitude) [25]. As suggested by Baron and Kenny [58], this study proposes the hypotheses as follows.

Hypothesis 5 (H5). *Attitude towards environmentally friendly products mediates the effect of eco-literacy on recycling intention among low-income households in Coastal Peninsular Malaysia.*

Hypothesis 6 (H6). *Attitude towards environmentally friendly products mediates the effect of environmental concern on recycling intention among low-income households in Coastal Peninsular Malaysia.*

Hypothesis 7 (H7). *Attitude towards environmentally friendly products mediates the effect of self-efficacy on recycling intention among low-income households in Coastal Peninsular Malaysia.*

2.5. Subjective Norms

Theoretically subjective norms are defined as the perceived social pressure of others referent to perform or not to perform a behavior [28]. In the present context, subjective norms are related to both moral obligations and normative beliefs that emerge from the expectations of significant individuals or groups to imply a perceived social pressure over an individual who intends to perform a certain behavior, that is, recycling [28]. TPB posits that subjective norms refer to an individual's beliefs about whether significant individuals or groups related to them approve of performing a behavior or intention to perform a behavior [28,59]. Existing studies have shown that recycling intention is encouraged by the social norms that are important for them [31,60]. Previous studies also found a significant effect of subjective norms on green product purchase intention [21,61]. Based on theory and existing literature, this study proposed a hypothesis as follows.

Hypothesis 8 (H8). *Subjective norms have a positive effect on recycling intention among low-income households in Coastal Peninsular Malaysia.*

2.6. Factors Affecting Subjective Norms

Since the present study relied on the TPB to explain recycling behavior, it incorporated subjective norm to relate to recycling through moral obligation and normative belief. Although Ajzen and Fishbein [27] excluded moral obligation, it was useful for the TPB as a second-order variable [62,63]. Moral issues influenced subjective norms that were crucial for predicting behaviors in moral situations [62]. Moreover, Beck and Ajzen [57] stressed the importance of moral obligation that required individuals to perform or refuse to perform a behavior (lying, cheating, and shoplifting), thereby influencing perceived social pressures (subjective norms).

Normative beliefs reflect the normative expectations of others significant and the motivation to comply with these expectations [24] in order to determine subjective norm [24,28]. According to Ajzen and Driver [23], normative beliefs formed the underlying determinants of subjective norms.

Normative pressure created essential pathways for both subjective pressure and behavioral control, thereby, fostering a sense of belonging to a group to perform a behavior [27,64,65]. Based on the above discussion, this study considered both moral obligations and normative beliefs as key factors affecting subjective norms, hence the hypotheses are proposed as follows.

2.6.1. Moral Obligation

Moral obligation refers to an individual's feelings that emerge from the sense of responsibility to perform or omit a behavior [57]. According to Gorsuch and Ortberg [63], in morally relevant situations (defined independently by three criteria—importance, immunity from deliberate change, and form of moral pressure), moral values influenced perceived social pressures and behavioral intentions. Beck and Ajzen [57] found that moral obligation enhanced the predictive power of their model where moral obligation and attitude were significantly correlated with each other. Beck and Ajzen [57] indicated potential significance of moral obligations in influencing perceived social pressures. Parker et al. [66] noted that an individual's belief in right and wrong could influence what other individuals want him/her to do. As underpinned by the TPB, it is perceived that moral obligation could improve the prediction of an individual's intention to recycle or willingness to recycle through subjective norms since both environmental and recycling issues are often viewed as social dilemma [66]. As the inconsistent findings are taken into consideration, it could be perceived that moral obligation facilitates social norms to predict intention occasionally [62]. Based on the literature, this study proposed a positive effect of moral obligation on subjective norms.

Hypothesis 9 (H9). *Moral obligation has a positive effect on subjective norms among low-income households in Coastal Peninsular Malaysia.*

2.6.2. Normative Beliefs

Normative beliefs refer to the beliefs that are associated with an individual's normative expectations of others significant and motivation to comply with the expectations [24]. Normative beliefs are concerned with the likelihood that significant referent individuals or groups would approve performing or omitting a behavior [23]. Based on the TPB, normative beliefs cause perceived social pressure or subjective norm [24,28]. According to Ajzen and Driver [23], normative beliefs determine subjective norms. Basically, normative beliefs are essential pathways for both subjective norms and behavioral control [64]. Furthermore, normative beliefs induce perceived social pressure of belonging to a group who may or may not perform a behavior [27]. Oskamp et al. [67] noted that friends and neighbors who recycled regularly influenced others as well. This implied that peer influence, as a form of normative belief, is crucial for decision to recycle. Chu and Chiu [68] also echoed that normative beliefs are positively associated with subjective norms, thereby leading to effective recycling behavior. Based on the existing literature, this study proposed the following hypothesis:

Hypothesis 10 (H10). *Normative beliefs have a positive effect on subjective norms among low-income households in Coastal Peninsular Malaysia.*

2.7. Mediating Effect of Subjective Norms

This study articulated a relationship of moral obligations and normative beliefs with subjective norms along with a relationship of subjective norms with recycling intention, therefore logically; this study assumes subjective norms to have a significant mediating effect on the relationships of moral obligation and normative beliefs with recycling intention. TPB echoes that available information (in the form of subjective norms) mediates the effects of personal and environmental factors (moral obligation and normative beliefs) on intention (recycling intention) [28]. As this study integrated the dimensions

of moral obligation and normative beliefs into the TPB, they are expected to enhance the predictive power of the original model [57]. Hence, these constructs are predicted to have an indirect effect on intention, mediated by the components of the original model (subjective norms) [25]. As suggested by Baron and Kenny [58], this study proposed the below hypotheses.

Hypothesis 11 (H11). *Subjective norms mediate the effect of moral obligation on recycling intention among low-income households in Coastal Peninsular Malaysia.*

Hypothesis 12 (H12). *Subjective norms mediate the effect of normative beliefs on recycling intention among low-income households in Coastal Peninsular Malaysia.*

2.8. Perceived Behavioral Control

Reverting to the TPB, PBC is defined as the degree of control individuals perceive they have to engage in a particular behavior [28]. The main determinant of PBC is control belief that reflects an individual's beliefs in the presence of the opportunities and resources to perform a behavior besides obstacles and impediments [59]. In the present context, PBC could be perceived as an individual's beliefs in the presence of the opportunities and resources to perform recycling activities. TPB asserts that when individuals possess adequate opportunities and resources, less impediments or obstacles arise. Consequently, their perceived control over a behavior should be greater in increasing the likelihood of performing that behavior [28]. This indicates that PBC must pair with other dimensions (attitude and subjective norms) of the TPB to affect behavior as perceived control does influence both intention and actual behavior [23,28,59].

Although intention is considered as the immediate antecedent of behavior, many behaviors pose difficulties in execution that limit volitional control. Hence it is useful to consider PBC in addition to intention in order to predict behavior directly [26]. Afroz et al. [20] and Maichum et al. [62] found that PBC influenced intention to purchase environmental friendly vehicles. Surprisingly, Botetzagias, Dima, and Malesios [69] proved that PBC was the most important predictor of recycling intention. Similarly, Mahmud and Osman [21] stated that PBC was the strongest predictor of both recycling intention and behavior among university students. Based on the theory and existing literature, this study proposed the below hypotheses.

Hypothesis 13 (H13). *PBC has a positive effect on recycling intention among low-income households in Coastal Peninsular Malaysia.*

Hypothesis 14 (H14). *PBC has a positive effect on recycling behavior among low-income households in Coastal Peninsular Malaysia.*

2.9. Recycling Intention and Behavior

Fundamentally, recycling intention represents the construct of intention from the original model of the TPB [28,70]. On the other hand, recycling behavior is determined by an individual's intention to perform a behavior. It is defined as the subjective probability of the relationship between individual and specific behavior [70]. TPB confirms that intention is the most influential predictor of behavior [26]. Prior studies also revealed that intention is the immediate antecedent of behavior [26,71]. However, Fishbein and Ajzen [72] reported both causal relationship and discrepancies between intention and behavior. Nevertheless, since most literature agrees that intentions can predict behavior [73], the following hypothesis is proposed.

Hypothesis 15 (H15). *Recycling intention has a positive effect on recycling behavior among low-income households in Coastal Peninsular Malaysia.*

2.10. Mediating Effect of Recycling Intention

This study intended to look at how recycling intention mediated the effect of attitude towards environmentally friendly products, subjective norms, and PBC on recycling behavior. Consistent with the TPB, intention should mediate the effects of constructs that serve as predictors on behavior [28]. Kok and Siero [70] contended that recycling intention consists of three determinants, particularly attitude towards environment friendly products, subjective norms, and PBC. However, recycling behavior can be determined by an individual's intention to perform a behavior. Therefore, it is possible to examine the mediating effect of intention on the relationship between the three components of the TPB and behavior. Although the mediating effect of intention was associated with the TPB and past studies [28,74,75], some literature showed otherwise [26]. Therefore, the inconsistent findings incorporated with intention as a mediator paved the way for the following hypotheses. Finally the Figure 1 presented all the associations and hypothesis (H1-H18) presented above.

Hypothesis 16 (H16). *Recycling intention mediates the effect of attitude towards environmentally friendly products on recycling behavior among low-income households in Coastal Peninsular Malaysia.*

Hypothesis 17 (H17). *Recycling intention mediates the effect of subjective norms on recycling behavior among low-income households in Coastal Peninsular Malaysia.*

Hypothesis 18 (H18). *Recycling intention mediates the effect of PBC on recycling behavior among low-income households in Coastal Peninsular Malaysia.*

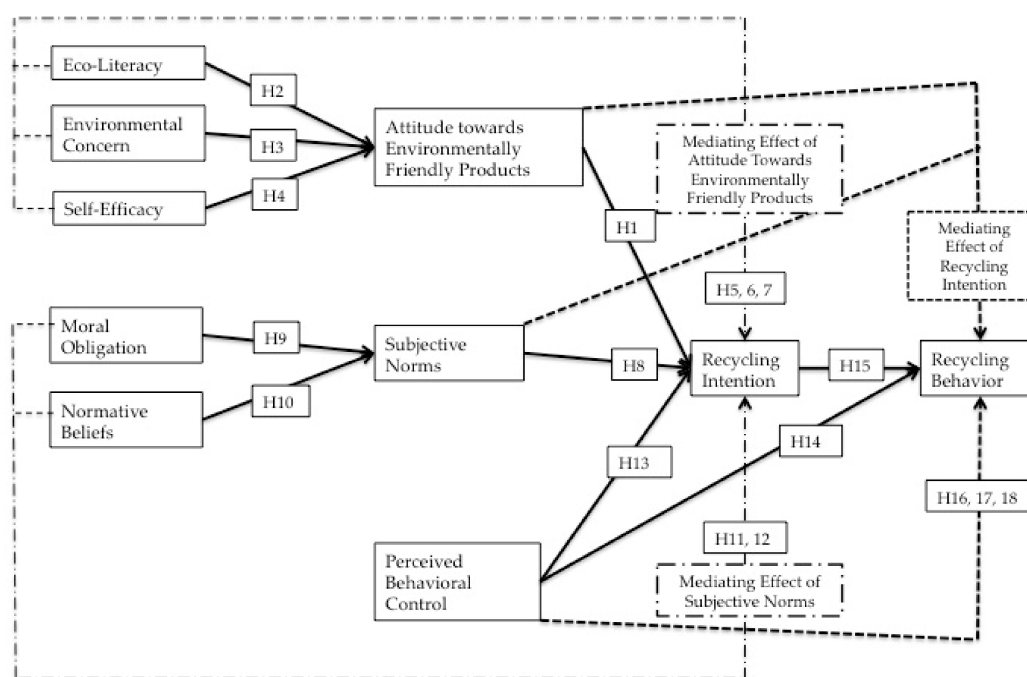


Figure 1. Research model. **Note:** Solid lines represent direct effects while dashed lines reflect indirect effects.

3. Research Methodology

This study adopted a cross-sectional design and collected quantitative data through structured interviews, as the survey administration procedure; in order to measure the effect of different variables on recycling intention and behavior among the low-income households in coastal Peninsular Malaysia. The population of this study was low-income households (net household income below RM2000, as noted

in the report by the Prime Minister's Department [76] in coastal Peninsular Malaysia. In addition, the Implementation and Coordination Unit of the Prime Minister's Department (ICU-JPM), Malaysia developed the database of low-income households with personal particulars. Upon formal request, ICU-JPM provided a list 500 low-income households in 36 coastal districts from 10 states in Peninsular Malaysia. Using random sampling, as the sampling strategy, 500 potential respondents were selected from a total of 78,118 low-income households. Before the data collection began, all 500 households were contacted. Also, the purpose of the survey was explained and interview appointments were made. To avoid non-response issue, only respondents who voluntarily participated in the survey were interviewed face to face. Data collection was carried out from July until August in 2017. By the end of the data collection, the researchers managed to interview 380 respondents. Particularly, a total of 40 were from Johor (8—Pontian, 9—Johor Bharu, 7—Muar, 7—Mersing, and 9—BatuPahat), 35 were from Pahang (20—Pekan, and 15—Rompin), 36 were from Kedah (10—Kota Setar, 13—Kuala Muda, and 13—Yan), 37 were from Kelantan (9—Bachok, 11—Kota Bharu, 10—PasirPuteh, and 7—Tumpat), 35 were from Perlis (15—Kayang, 15—Kuala Perlis, and 15—Sanglang), 38 were from Terengganu (6—Kuala Terengganu, 6—Setiu, 6—Kuala Nerus, 8—Kemaman, 6—Besut, and 6—Marang), 39 were from Penang (7—Seberang Prai Selatan, 8—Utara, 5—Tengah, 10—Timor Laut, and 9—Barat Daya), 40 were from Selangor (10—SabakBernam, 10—Kuala Selangor, 10—Klang, 10—Kuala Langat and Sepang), 41 were from Perak (11—Hilir Perak, 10—Manjung, 11—LarutMatang and Selama, and 9 from Kerian), and 39 were from Melaka Tengah, Melaka.

3.1. Sample Size

The sample size was calculated using G-Power version 3.1 [77]. Following Cohen [78] on the power of 0.95 (should be more than 0.80, as required in social and behavioral science research) with an effect size of 0.15, this study needed a sample size of 166 to test the model with nine predictors. Furthermore, Reinartz, Haenlein, and Henseler [79] proposed a minimum sample size of 100 when employing PLS-SEM. To minimize possible complications arising from a small sample size, a total of 380 low-income households were collected.

3.2. Research Instrument

The questionnaire was designed using simple and unbiased wording so that the respondents could understand the questions easily. Questions items were adapted from earlier studies with minor modifications. First of all, items that measured eco-literacy were adopted from Maichum, Parichatnon, and Peng [62], and Mostafa [80]. For environmental concern, questions were adopted from Maichum, Parichatnon, and Peng [62]. Questions that measured self-efficacy were adopted from Qader and Zainuddin [81]. Next, items that measured moral obligations and normative beliefs were adopted from Wu and Chen [82]. Then, items that measured attitude towards environmentally friendly products were adopted from Ha and Janda [83] and Maichum, Parichatnon, and Peng [62]. Items that measured subjective norms were taken from Wu and Chen [82], and Maichum, Parichatnon, and Peng [62]. PBC was measured using items by Maichum, Parichatnon, and Peng [62]. Items that measured recycling intentions towards green business were adopted from Zhang, Huang, Yin, and Gong [84], and Osman, Isa, Othman, and Jaganathan [85], whereas items that measured recycling behavior were adopted from Walton and Austin [86], Sanchez, López-Mosquera, and Lera-López [87], and Osman, Isa, Othman, and Jaganathan [85]. The dependent variables were asked in a seven-point Likert-type scale (1 to 7, from “strongly disagree” to “strongly agree”), while the independent variables were asked in a five-point Likert-type scale (1 to 5, from “strongly disagree” to “strongly agree”).

3.3. Common Method Variance (CMV)

Common Method Variance (CMV) refers to the systematic measurement error, originating from the features intended to represent the construct of interest, and the characteristics of the specific method being employed which may be common to measures of other constructs [83]. Since, this study

adopted a self-report, single-informant approach in gathering data, it was necessary to check for the possibility of CMV [88]. To minimize the effect of CMV, besides constructing the items, this study 'informed the respondent that the responses will be evaluate anonymously and there are no right or wrong answers' while collecting the data [88]. As recommended by Podsakoff, et al., [88], this study adopted a five-point Likert-type scale for all independent variables and a seven-point Likert-type scale for dependent variable. This study also adopted Harman's one-factor test, in which one fixed factor is extracted from all principal constructs and the one extracted factor should explain less than 50 percent of the variance. The analysis showed that one of the components (the one extracted factor) explained 32.25 percent of the variance. Furthermore, the correlation with more than 0.9 indicates CMV [89]. In this study, the relationship between eco-literacy and subjective norms was 0.62. In other words, there was minimal CMV.

3.4. Multivariate Normality

This study examined multivariate normality using the Web Power online tool, which measures Mardia's multivariate skewness, kurtosis coefficients, and p -values. The analysis showed that the p -value of Mardia's multivariate skewness and kurtosis coefficients was less than 0.05, which confirmed multivariate non-normality.

3.5. Data Analysis Method

Structural equation modelling-partial least squares (PLS-SEM) is a causal modeling approach which maximizes the explained variance of the dependent latent constructs [90]. Since this study was exploratory in nature with non-normality issue, variance-based PLS-SEM (SmartPLS) estimation was used [79,90]. As recommended by Hair, Ringle, and Sarstedt [91], the analysis PLS-SEM includes indicator reliability, internal consistency reliability, convergent validity, discriminant validity, Average Variance Extracted (AVE), effect size, path coefficient estimates, and predictive relevance.

4. Findings

4.1. Demographic Characteristics

Of 380 respondents, 50.3% of them were male and the remaining 49.7% were female. In terms of age, 22.9% of the respondents were aged between 21 to 30 years old, followed by 46.4% of them aged between 31 to 50 years old. The remaining 11% were below 21 or over 60 years old. The majority of the respondents (51.6%) completed their secondary education, 16.8% of them completed their primary school, and 14.2% completed their diploma level. Only 7.1% of them were degree holders. The remaining 10.3% never attended school. For the employment status, 98.4% of them were 'gainfully employed' and the remaining 1.6% were unemployed. Only 7.4% of them were engaged in fulltime or part-time employment, 12% of them were engaged in manufacturing activities, 16.6% of them were involved in retailing activities, 6.6% of them were involved in wholesaling activities, 12.6% of them were involved in agricultural activities, 4.7% of them were involved in livestock farming, and 39.2% of them were involved in services. A total of 88.4% of the respondents reported entrepreneurial activity as the main economic activity, whereas 11.1% reported employment, and the remaining reported no economic activities. For the source of income, only two respondents reported that they did not have income and 61.1% of them reported that they relied on 'one' source of income. Then, 31.8% of the respondents reported 'two' sources of income and the remaining 6.6% had three or more sources of income.

4.2. Reliability and Validity

Table 1 presents the descriptive statistics in term of mean and standard deviation of all the variables (eco-literacy, environmental concern, self-efficacy, moral obligation, normative beliefs, attitude towards environmentally friendly products, subjective norms, PBC, recycling intention, and recycling behavior). The Cronbach's alpha showed that all variables were higher than 0.85, which indicated the reliability of

the variables. This study also adopted a different measure of internal consistency reliability, known as ‘composite reliability’. The threshold value for composite reliability is 0.7 [90]. As shown in Table 1, the composite reliability values for all variables were higher than 0.9, indicating reliability of the items of all variables. Moreover, the Dillon–Goldstein ρ values for all variables were higher than 0.8. This also confirmed the reliability of the items [90,91]. To achieve convergent validity, the AVE value should be higher than 0.50 [90,91]. As depicted in Table 1, the AVE values for all variables were higher than 0.70, which indicated acceptable convergent validity. Besides the variance inflation factor (VIF) values for all variables were lower than 1.5. This implied that no multicollinearity issue was detected in this study [92].

To enhance robustness of statistical results, this study used two separate methods of validity assessment including the traditional Fornell–Larcker criterion along with the alternative Heterotrait–Monotrait Ratio (HTMT). As the Fornell–Larcker criterion was used to identify discriminant validity, the AVE for each indicator should be greater than the construct’s highest squared correlation with another construct [90,91]. As presented in Table 2, all constructs managed to meet this criterion. The HTMT is an estimate of the correlation between constructs, paralleling the disattenuated construct score. Based upon the threshold value of 0.9 [93,94], this study concluded that there was no evidence of a lack of discriminant validity. Table 1 also shows that the average variance extracted (AVE) values for all variables were higher than 0.5. Then, Table 2 illustrates that both the loading and cross-loading values were higher than 0.7, which indicated reliability. Table 3 describes all loadings were higher than the total cross-loadings, which confirmed the discriminant validity.

Table 1. Reliability and validity.

Variables	No. Items	Mean	SD	CA	DG ρ	CR	AVE	VIF
EL	4	3.282	1.050	0.964	0.973	0.974	0.903	1.092
EC	4	4.321	0.792	0.981	0.981	0.986	0.947	1.434
SE	4	4.297	0.694	0.943	0.943	0.960	0.856	1.332
MO	4	4.012	0.779	0.930	0.970	0.949	0.823	1.023
NB	4	3.329	1.008	0.979	0.980	0.985	0.942	1.023
ATE	4	4.050	0.761	0.972	0.972	0.980	0.923	1.183
SUN	4	3.193	0.996	0.944	0.947	0.960	0.857	1.125
PBC	4	3.362	0.810	0.957	0.964	0.969	0.887	1.250
REIN	4	4.232	0.925	0.945	0.946	0.960	0.857	1.081
REBH	4	5.102	1.362	0.882	0.906	0.919	0.741	-

Note: EL: Eco-Literacy; EC: Environmental Concern; SE: Self-Efficacy; MO: Moral Obligation; NB: Normative Beliefs; ATE: Attitude towards Environmentally Friendly Products; SUN: Subjective Norms; PBC: Perceived Behavioral Control; REIN: Recycling Intention; REBH: Recycling Behavior; SD: Standard Deviation; CA: Cronbach’s Alpha; DG ρ —Dillon–Goldstein’s ρ ; CR—Composite Reliability; AVE—Average Variance Extracted; VIF—Variance Inflation Factors. **Source:** Author’s data analysis.

Table 2. Discriminant validity.

	EL	EC	SE	MO	NB	ATE	SUN	PBC	REIN	REBH
<i>Fornell–Larcker Criterion</i>										
EL	0.950									
EC	0.288	0.973								
SE	0.111	0.498	0.925							
MO	0.147	0.439	0.442	0.907						
NB	0.657	0.262	0.098	0.150	0.970					
ATE	0.265	0.444	0.377	0.386	0.312	0.961				
SUN	0.617	0.100	0.019	0.078	0.583	0.220	0.926			
PBC	0.383	0.276	0.330	0.428	0.351	0.379	0.315	0.942		
REIN	0.066	0.383	0.341	0.385	0.077	0.377	−0.054	0.274	0.926	
REBH	0.055	0.409	0.366	0.455	0.038	0.322	−0.099	0.324	0.581	0.861

Table 2. Cont.

	EL	EC	SE	MO	NB	ATE	SUN	PBC	REIN	REBH
<i>Heterotrait–Monotrait Ratio (HTMT)</i>										
EL	-									
EC	0.295	-								
SE	0.117	0.518	-							
MO	0.151	0.447	0.465	-						
NB	0.676	0.267	0.102	0.151	-					
ATE	0.271	0.455	0.393	0.399	0.320	-				
SUN	0.645	0.104	0.042	0.084	0.606	0.229	-			
PBC	0.400	0.284	0.346	0.455	0.362	0.391	0.332	-		
REIN	0.069	0.397	0.361	0.412	0.080	0.392	0.058	0.286	-	
REBH	0.067	0.432	0.401	0.510	0.071	0.341	0.114	0.354	0.625	-

Note: (1) EL: Eco-Literacy; EC: Environmental Concern; SE: Self-Efficacy; MO: Moral Obligation; NB: Normative Beliefs; ATE: Attitude towards Environmentally Friendly Products; SUN: Subjective Norms; PBC: Perceived Behavioral Control; REIN: Recycling Intention; REBH: Recycling Behavior. (2) The top higher values are square-root of AVE and other values are correlation between the constructs. **Source:** Author's data analysis.

Table 3. Loadings and cross-loading.

	EL	EC	SE	MO	NB	ATE	SUN	PBC	REIN	REBH
EL—Item 1	0.949	0.294	0.124	0.109	0.627	0.252	0.589	0.341	0.076	0.046
EL—Item 2	0.969	0.285	0.094	0.119	0.632	0.270	0.597	0.350	0.070	0.066
EL—Item 3	0.971	0.269	0.095	0.157	0.638	0.267	0.608	0.380	0.058	0.046
EL—Item 4	0.912	0.243	0.112	0.181	0.602	0.211	0.547	0.392	0.045	0.053
EC—Item 1	0.305	0.961	0.478	0.430	0.279	0.440	0.094	0.266	0.379	0.423
EC—Item 2	0.259	0.983	0.486	0.431	0.245	0.425	0.092	0.270	0.392	0.396
EC—Item 3	0.258	0.967	0.488	0.423	0.241	0.428	0.096	0.250	0.353	0.373
EC—Item 4	0.297	0.980	0.486	0.425	0.253	0.435	0.108	0.287	0.364	0.400
SE—Item 1	0.108	0.476	0.949	0.410	0.093	0.335	0.029	0.298	0.317	0.332
SE—Item 2	0.137	0.500	0.954	0.420	0.109	0.357	0.044	0.314	0.328	0.340
SE—Item 3	0.112	0.469	0.945	0.389	0.096	0.350	0.038	0.315	0.312	0.315
SE—Item 4	0.053	0.395	0.849	0.414	0.064	0.350	−0.039	0.292	0.303	0.363
MO—Item 1	0.163	0.452	0.415	0.937	0.172	0.386	0.084	0.378	0.352	0.403
MO—Item 2	0.145	0.435	0.447	0.939	0.157	0.376	0.075	0.387	0.363	0.424
MO—Item 3	0.110	0.345	0.368	0.884	0.093	0.306	0.068	0.412	0.335	0.422
MO—Item 4	0.092	0.322	0.356	0.866	0.100	0.313	0.038	0.389	0.356	0.416
NR—Item 1	0.650	0.246	0.075	0.132	0.969	0.303	0.577	0.342	0.059	0.034
NR—Item 2	0.632	0.258	0.081	0.130	0.972	0.323	0.565	0.336	0.061	0.045
NR—Item 3	0.634	0.259	0.109	0.168	0.975	0.288	0.557	0.346	0.095	0.030
NR—Item 4	0.635	0.253	0.117	0.153	0.966	0.296	0.564	0.336	0.084	0.037
ATE—Item 1	0.261	0.425	0.358	0.358	0.297	0.933	0.209	0.381	0.378	0.316
ATE—Item 2	0.254	0.429	0.361	0.379	0.281	0.965	0.213	0.360	0.357	0.302
ATE—Item 3	0.247	0.430	0.351	0.362	0.311	0.973	0.202	0.355	0.341	0.299
ATE—Item 4	0.255	0.422	0.376	0.382	0.309	0.972	0.219	0.358	0.374	0.319
SUN—Item 1	0.522	0.083	0.023	0.019	0.486	0.196	0.876	0.270	−0.062	−0.085
SUN—Item 2	0.609	0.105	−0.004	0.037	0.566	0.224	0.921	0.284	−0.038	−0.107
SUN—Item 3	0.576	0.078	0.018	0.098	0.545	0.193	0.952	0.303	−0.056	−0.091
SUN—Item 4	0.573	0.102	0.035	0.129	0.557	0.199	0.951	0.310	−0.044	−0.084
PBC—Item 1	0.406	0.320	0.314	0.395	0.353	0.393	0.321	0.921	0.247	0.303
PBC—Item 2	0.327	0.221	0.300	0.406	0.323	0.314	0.261	0.935	0.274	0.291
PBC—Item 3	0.363	0.273	0.337	0.423	0.333	0.386	0.305	0.963	0.288	0.337
PBC—Item 4	0.345	0.222	0.287	0.382	0.310	0.328	0.302	0.947	0.213	0.284
REIN—Item 1	0.062	0.374	0.301	0.344	0.091	0.336	−0.070	0.251	0.923	0.515
REIN—Item 2	0.056	0.353	0.332	0.363	0.052	0.321	−0.044	0.286	0.940	0.523
REIN—Item 3	0.056	0.362	0.329	0.358	0.083	0.402	−0.066	0.229	0.912	0.563
REIN—Item 4	0.071	0.328	0.300	0.358	0.058	0.333	−0.018	0.248	0.928	0.547
REBH—Item 1	0.092	0.395	0.325	0.395	0.074	0.306	−0.043	0.300	0.581	0.923
REBH—Item 2	0.054	0.375	0.292	0.387	0.071	0.249	−0.069	0.224	0.534	0.925
REBH—Item 3	−0.009	0.235	0.280	0.389	−0.062	0.171	−0.111	0.279	0.343	0.729
REBH—Item 4	0.035	0.378	0.361	0.408	0.016	0.359	−0.134	0.320	0.506	0.853

Note: (1) EL: Eco-Literacy; EC: Environmental Concern; SE: Self-Efficacy; MO: Moral Obligation; NB: Normative Beliefs; ATE: Attitude towards Environmentally Friendly Products; SUN: Subjective Norms; PBC: Perceived Behavioral Control; REIN: Recycling Intention; REBH: Recycling Behavior. (2) The Bold and Italic values in the matrix above are the item loadings and others are cross-loadings. **Source:** Author's data analysis.

4.3. Path Analysis

First and foremost, as noted in Table 4, eco-literacy had a positive effect on attitude towards environmentally friendly products (less than 5% significance level) (H_2 , Beta = 0.157, p -value of <0.01). However, the f^2 value of 0.030 indicated a small effect of eco-literacy on attitude towards environmentally friendly products. Second, results indicated that environmental concern had a positive effect on attitude towards environmentally friendly products (H_3 , Beta = 0.292, p -value of <0.01). The f^2 value of 0.080 indicated a small effect of environmental concern on attitude towards environmentally friendly products. Findings further indicated that self-efficacy had a positive effect on attitude towards environmentally friendly products (H_4 , Beta = 0.214, p -value of <0.01). The standardized regression coefficients indicated that environmental concern had a higher effect on attitude towards environmentally friendly products than eco-literacy and self-efficacy. Moreover, the f^2 value of 0.046 indicated the effect of self-efficacy on attitude towards environmentally friendly products, which was also lower than environmental concern. The r^2 value, which represented the degree of explained variance, showed that 25.2% of the variation in attitude towards environmentally friendly products was explained by eco-literacy, environmental concern, and self-efficacy. Finally, the Q^2 value of 0.216 indicated that eco-literacy, environmental concern, and self-efficacy had a medium predictive relevance for attitude towards environmentally friendly products.

The finding indicated that moral obligations did not have a significant effect on subjective norms (H_9 , Beta = (0.010), p -value of 0.408, more than chosen 5% significance level). Moreover, the f^2 value of <0.01 indicated a nearly zero effect of moral obligations on subjective norms. Normative beliefs was found to have a positive effect on subjective norm (H_{10} , Beta = 0.585, p -value of <0.01). The standardized regression coefficients indicated that normative beliefs had a higher effect on subjective norms than moral obligations. Moreover, the f^2 value of 0.507 indicated a strong effect of normative beliefs on subjective norms, which was higher than moral obligations. The r^2 value, which represented the degree of explained variance, indicated that 34% of the variation in subjective norms was explained by moral obligation and normative beliefs. Finally, the Q^2 value of 0.272 indicated that both moral obligation and normative beliefs had a medium predictive relevance for subjective norms.

The findings also showed that attitude towards environmentally friendly products had a positive effect on recycling intention (H_1 , Beta = 0.324, p -value of <0.01). Moreover, the f^2 value of 0.123 indicated a small to moderate effect of attitude towards environmentally friendly products on recycling intention. The finding indicated that subjective norms had an unexpected negative effect on recycling intention (H_8 , Beta = 0.193, p -value of <0.01). Moreover, the f^2 value of 0.041 indicated a low effect of subjective norms on recycling intention. PBC was found to have a positive effect on recycling intention (H_{13} , Beta = 0.205, p -value of <0.01). The standardized regression coefficients indicated that attitude towards environmentally friendly products had a higher effect on recycling intention than PBC and subjective norms. Moreover, the f^2 value of 0.042 indicated a low effect of PBC on recycling intention, which was also lower than attitude towards environmentally friendly products. The r^2 value, which represented the degree of explained variance, indicated that 19.6% of the variation in recycling intention was explained by attitude towards environmentally friendly products, subjective norms, and PBC. Finally, the Q^2 value of 0.156 indicated that attitude towards environmentally friendly products, subjective norms, and PBC had a medium predictive relevance for recycling intention.

Finally the findings indicate that PBC has a positive effect on recycling behavior (H_{14} , Beta = 0.179, p -value of <0.01). The f^2 value of 0.047 indicates a small effect of PBC on recycling behavior. The findings also indicate that recycling intention has a positive effect on recycling behavior (H_{15} , Beta = 0.532, p -value of <0.01). The standardized regression coefficients indicate that recycling intention has a higher effect on recycling behavior than PBC. Moreover, the f^2 value of 0.413 indicates a strong effect of recycling intention on recycling behavior, which was higher than PBC. The r^2 value, which represented the degree of explained variance, indicated that 36.7% of the variation in recycling behavior was explained by recycling intention and PBC. Finally, the Q^2 value of 0.253 indicated that recycling intention and PBC had a medium predictive relevance for recycling behavior.

Table 4. Path coefficients.

Hypo		Beta	CI—Min	CI—Max	T	p	r ²	f ²	Q ²	Decision
<i>Factors Affecting Attitudes towards Environmentally Friendly Products</i>										
H2	EL → ATE	0.157	0.090	0.228	3.887	<0.01	0.252	0.030	0.216	Accept
H3	EC → ATE	0.292	0.198	0.381	5.333	<0.01				Accept
H4	SE → ATE	0.214	0.116	0.307	3.673	<0.01				Accept
<i>Factor Affecting Subjective Norms</i>										
H9	MO → SUN	(0.010)	(0.082)	0.067	0.234	0.408	0.340	0.000	0.272	Reject
H10	NB → SUN	0.585	0.517	0.647	14.763	<0.01				Accept
<i>Factors Affecting Recycling Intention</i>										
H1	ATE → REIN	0.342	0.255	0.423	6.762	<0.01	0.196	0.123	0.156	Accept
H8	SUN → REIN	(0.193)	(0.256)	(0.124)	4.861	<0.01				Accept
H13	PBC → REIN	0.205	0.115	0.295	3.846	<0.01				Accept
<i>Factors Affecting Recycling Behavior</i>										
H14	PBC → REBH	0.179	0.105	0.243	4.208	<0.01	0.367	0.047	0.253	Accept
H15	REIN → REBH	0.532	0.460	0.595	13.260	<0.01				Accept
<i>Mediating Effect of ATE</i>					Beta	CI—Min	CI—Max	t	p	Decision
H5	EL → ATE → REIN				0.054	0.028	0.078	3.470	<0.01	Mediation
H6	EC → ATE → REIN				0.100	0.060	0.145	3.946	<0.01	Mediation
H7	SE → ATE → REIN				0.073	0.035	0.113	2.987	0.001	Mediation
<i>Mediating Effect of Subjective Norms</i>										
H11	MO → SUN → REIN				0.002	(0.014)	0.015	0.227	0.410	No Mediation
H12	NB → SUN → REIN				(0.113)	(0.152)	(0.074)	4.718	<0.01	Mediation
<i>Mediating Effect of Recycling Intention</i>										
H16	ATE → REIN → REBH				0.182	0.127	0.236	5.649	<0.01	Mediation
H17	SUN → REIN → REBH				(0.103)	(0.144)	(0.064)	4.331	<0.01	Mediation
H18	PBC → REIN → REBH				0.109	0.061	0.159	3.573	<0.01	Mediation

Note: EL: Eco-Literacy; EC: Environmental Concern; SE: Self-Efficacy; MO: Moral Obligation; NB: Normative Beliefs; ATE: Attitude towards Environmentally Friendly Products; SUN: Subjective Norms; PBC: Perceived Behavioral Control; REIN: Recycling Intention; REBH: Recycling Behavior. **Source:** Author's data analysis.

4.4. Mediating Effects

Regarding the mediating effects of attitude towards environmentally friendly products, subjective norms, PBC, and recycling intention, this study presented indirect effect coefficients, confidence intervals, and *p*-values. The finding revealed that eco-literacy (H₅), environmental concern (H₆), and self-efficacy (H₇) had a significant (*p*-values < 0.05) indirect effect on recycling intention, which confirmed that attitude towards environmentally friendly products mediated the relationship between eco-literacy, environmental concern, and self-efficacy on recycling intention. The finding for moral obligations (H₁₁) revealed an insignificant (*p*-values > 0.05) indirect effect on recycling intention, which confirmed that subjective norms did not mediate the relationship between moral obligations and recycling intention. For normative beliefs (H₁₂), the finding revealed a significant negative (*p*-values < 0.05) indirect effect of normative beliefs on recycling intention, which confirmed that subjective norms mediated the relationship between normative beliefs and recycling intention.

Furthermore, the findings revealed that attitude towards environmentally friendly products (H₁₆) had a positive (*p*-values < 0.05) indirect effect on recycling behavior, which confirmed that recycling intention mediated the relationship between attitude towards environmentally friendly products and recycling behavior. The finding also revealed that subjective norms (H₁₇) had a significant and unexpected negative (*p*-values < 0.05) indirect effect on recycling behavior, which confirmed that recycling intention mediated the relationship between subjective norms and recycling behavior. Finally, PBC (H₁₈) revealed a positive (*p*-values < 0.05) indirect effect on recycling behavior, which confirmed that recycling intention mediated the relationship between PBC and recycling behavior.

4.5. Importance Performance Matrix Analysis

This study conducted a post-hoc importance–performance matrix analysis (IPMA) using recycling behavior as the target construct. The IPMA builds on the PLS estimates of the structural model relationships (importance of each latent variable) and includes an additional dimension to the analysis that considers the latent variables’ average values (performance) [85,86]. The importance scores were derived from the total effects of the estimated relationships in the structural model for explaining the variance of the endogenous target construct. On the other hand, the computation of the performance scores or index values were carried out by rescaling the latent variables scores to range from 0 (lowest performance) to 100 (highest performance). The findings, as noted in Table 5 revealed that environmental concern, self-efficacy, attitude towards environmentally friendly products, PBC, and recycling intention were the most important factors of recycling behavior.

Table 5. Performance and total effects.

Construct Variables	Recycling Behavior			Recycling Behavior	
	Total Effect	Performance		Total Effect	Performance
EL	0.037	57.220	ATE	0.330	76.268
EC	0.093	83.042	SUN	(0.142)	54.830
SE	0.077	82.524	PBC	0.488	59.056
MO	0.002	76.222	REIN	0.877	82.857
NB	(0.082)	58.244	-	-	-

Note: EL: Eco-Literacy; EC: Environmental Concern; SE: Self-Efficacy; MO: Moral Obligation; NB: Normative Beliefs; ATE: Attitude towards Environmentally Friendly Products; SUN: Subjective Norms; PBC: Perceived Behavioral Control; REIN: Recycling Intention. **Source:** Author’s data analysis.

5. Discussions and Conclusions

Environmental degradation, pollution, and poverty are the main challenges of today! Recycling has recently emerged as a savior with regard to both ecological degradation and economic problems. Responding to the significance of the context and limited literature, this study examined the factors affecting recycling intention and behavior among low-income household entrepreneurs in Coastal Peninsular Malaysia. With the present debate on consumers’ attitudes, behavioral tendencies, and governments’ role on influencing pro-environmental behavior; this study argues that emerging threats (environmental, economical issues) and opportunities (such as recycling) require attention and cooperation of the government, business owners, and the public in general. Although it is the obligation of government to devise policies and programs to encourage recycling, it is the perception and adoption of recycling practices by different communal groups (such as low-income households) that make such government policies successful and effective.

The findings of this study revealed that eco-literacy, environmental concern, and self-efficacy had a positive effect on the attitude towards environmentally friendly products, which was in line with Laroche et al. [48] and Cheah and Phau [40]. These studies showed that eco-literacy influenced individuals to form a favorable attitude towards green products. The finding also supported previous studies [37,44], which indicated that environmental concerns shaped strong positive attitude towards environmental protection. For self-efficacy, the finding proved the argument of Cheah and Phau [40] that attitude towards environmental problems was caused by the limited contribution to self-efficacy with regard to an individual’s ability to improve the quality of the surrounding environment.

The finding revealed that moral obligations did not have a significant effect on subjective norms. According to Beck and Ajzen [57], moral issues were important to predict negative behaviors such as lying, cheating, and shoplifting. Perhaps, recycling, as a positive and socially accepted behavior is thus not depended on moral obligations. Moreover, Bobek and Hatfield [60] argued that moral values did not “intrude [on] or twist rational deliberation”. This suggests that morality is not a significant factor in the case of rational action; and thus recycling, as a grounded rational action need not be

driven by moral obligation. Normative belief, on the other hand, was found to have a positive effect on subjective norm. This finding agreed with the TPB, which indicated that normative beliefs determined subjective norms [23,24,28].

To support the TPB, the finding also indicated that both attitude towards environmentally friendly products and PBC had a positive effect on recycling intention [26]. This finding was in line with the existing literature [4,29], which ascertained that environment-specific attitudes predicted recycling intention effectively [27]. For PBC, we found when individuals had adequate opportunities and resources; their perceived control over behavior became greater which increased the likelihood of performing a behavior [28]. Interestingly, subjective norms had an unexpected negative effect on recycling intention indicating that recycling was perhaps not dependent on social approval [59].

The findings further showed a positive effect of PBC and recycling intention on recycling behavior. This finding supported TPB in re-establishing both PBC and intention as significant predictors of behavior in the context of recycling [24,28,70]. In terms of mediation, the attitude towards environmentally friendly products was found to significantly mediate the relationship between eco-literacy, environmental concern, and self-efficacy on recycling intention. This finding was in line with the research of Tonglet et al. [25], which confirmed that the new constructs had an indirect effect on recycling intention. Similarly, subjective norms were found to mediate the relationship between normative beliefs and recycling intention. As suggested by Ajzen [28], recycling intention was found to mediate the relationship between attitude towards environmentally friendly products, subjective norms, PBC, and recycling behavior.

Vicens et al. [95] expressed that the poorest individuals with the least resources contribute more significantly to the public good than the richer. In the context of recycling intention and behavior, as an act of public good by the low-income households in Malaysia, our findings do not differ. In terms of significant contribution, this study provided empirical evidence on the factors affecting recycling intention and behavior among the low-income households in Coastal Peninsular Malaysia, which remains an under-researched study context. Moreover, this study contributed towards the body of knowledge significantly by integrating the sub-components of eco-literacy, environmental concern, and self-efficacy as antecedents of attitude and the dimensions of moral obligation and normative beliefs as determinants of subjective norm; thus extending the TPB. This study furthermore extended the scope and applicability of theory by examining recycling intention behavior of low-income household through the lens of TPB.

In terms of practical implications, the findings provided insights into recycling activities, which contribute positively to both the environment and economy. These findings can be used by scholars and policymakers to address both environmental and economic vulnerability among low-income households. Based on the findings, government, environmental, and socio-economic developmental organizations should assess the feasibility of recycling materials and develop a supportive system that facilitates and encourages recycling activities among the low-income households. Respective authorities should also adopt policies and measures to enhance environmental concern, self-efficacy, and attitude towards environmentally friendly products to encourage recycling behavior. As for managers of recycling agencies, particularly in Malaysia, this study equips them with the relevant knowledge regarding factors of recycling intention and behavior that could be manipulated to devise effective training programs and develop recycling-friendly infrastructure and facilities for low-income community members in order to raise social and environmental awareness and boost the presently low recycling rate among Malaysians.

In terms of limitations, the study could not include all possible factors of recycling intention and behavior. Since this study focused on a specific income group from a country, it reduced the generalizability of the findings. Moreover, it relied on structured interviews only as the single survey administration procedure. Hence, future researchers could use other data collection strategies (singly or in combination), such as postal survey or focus groups to apply the present model to examine

recycling intention behavior among different income groups across countries, which would help us better understand its antecedents.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A Research Instrument

Item Code	Questions
EL—Item 1	I prefer to check the eco-labels and certifications on green products before I purchase.
EL—Item 2	I want to have a deeper insight of the inputs, processes and impacts of products before I purchase.
EL—Item 3	I would prefer to gain substantial information on green products before I purchase
EL—Item 4	I understand the environmental phrases and symbols on product package.
EC—Item 1	I believe humans must live in harmony with nature to survive.
EC—Item 2	I think that environmental problems are very important to address.
EC—Item 3	I think that environmental problems cannot be ignored.
EC—Item 4	I think that we should care more about environmental problems.
SE—Item 1	If I am faced with an environmental problem, I usually search for solutions.
SE—Item 2	I am confident in leading an environmentally friendly lifestyle.
SE—Item 3	I am confident in making an environmentally friendly choice whenever possible.
SE—Item 4	I am confident when choosing environmentally friendly products.
MO—Item 1	<i>I feel it is a moral obligation.....</i> to purchase environmental friendly products in fulfilling my responsibility to the environment
MO—Item 2	to purchase environmental friendly products for environmental protection.
MO—Item 3	to make an effort to stay at environmentally friendly accommodation when on holiday.
MO—Item 4	to purchase environmentally friendly products although they are expensive.
NB—Item 1	I value the opinion and feeling of my family about my environmentally friendly behaviour.
NB—Item 2	I value the opinion and feeling of my friends about my environmentally friendly behaviour.
NB—Item 3	My family think that I should purchase environmentally friendly products.
NB—Item 4	My friends think that I should purchase environmentally friendly products.
ATE—Item 1	Using environmentally friendly products is necessary to mitigate global warming.
ATE—Item 2	I think that purchasing a environmentally friendly product is favourable.
ATE—Item 3	I think that purchasing environmentally friendly products is a good idea.
ATE—Item 4	I think that purchasing environmentally friendly products is safe.
SUN—Item 1	I feel bad if I buy conventional products instead of environmentally friendly products.
SUN—Item 2	Everyone has a responsibility to contribute to environmental preservation by purchasing EFPs.
SUN—Item 3	People who are important to me would wish that I am very environmentally friendly.
SUN—Item 4	People who are important to me think that I should absolutely purchase EFPs.
PBC—Item 1	I am capable of purchasing environmentally friendly products in future.
PBC—Item 2	I have time to search and purchase environmentally friendly products.

Item Code	Questions
PBC—Item 3	I have willingness to purchase environmentally friendly products.
PBC—Item 4	There are many opportunities for me to purchase environmentally friendly products.
REIN—Item 1	I intend to recycle
REIN—Item 2	I intend to practice recycling by bringing my own container or reuse bags.
REIN—Item 3	I have time to separate my household waste.
REIN—Item 4	I have actually planned to perform recycling.
REBH—Item 1	I collect and recycle used paper.
REBH—Item 2	I recycle paper, glass and/or metal waste products at home.
REBH—Item 3	I support policy that eliminates the use of paper cups and styrofoam materials.
REBH—Item 4	I set a positive environmental example (recycling) for my friends to follow.

Note: EL: Eco-Literacy; EC: Environmental Concern; SE: Self-Efficacy; MO: Moral Obligation; NB: Normative Beliefs; ATE: Attitude towards Environmentally Friendly Products; SUN: Subjective Norms; PBC: Perceived Behavioral Control; REIN: Recycling Intention; REBH: Recycling Behavior.

References

1. Kutting, G. Globalization and the Environment: Moving Beyond Neoliberal Institutionalism. *Int. J. Peace Stud.* **2004**, *9*, 29–46.
2. Habib, B. Climate change and regime perpetuation in North Korea. *Asian Surv.* **2010**, *50*, 378–401. [[CrossRef](#)]
3. Adger, W.N.; Huq, S.; Brown, K.; Conway, D.; Hulme, M. Adaptation to climate change in the developing world. *Prog. Dev. Stud.* **2003**, *3*, 179–195. [[CrossRef](#)]
4. Afroz, R. An Alternative Model for Supporting the Rice Farmers in Adaptation of Climate Change. *Int. J. Econ. Financ. Issues* **2017**, *7*, 317–330.
5. Al-Amin, A.Q.; Jaafar, A.H.; Siwar, C. Climate change mitigation and policy concern for prioritization. *Int. J. Clim. Chang. Strateg.* **2010**, *2*, 418–425. [[CrossRef](#)]
6. Ferreira, F.H.; Lugo, M.A. Multidimensional poverty analysis: Looking for a middle ground. *World Bank Res. Obs.* **2013**, *28*, 220–235. [[CrossRef](#)]
7. Mamun, A.A.; Ibrahim, M.A.H.B.; Muniady, R.; Ismail, M.B.; Nawi, N.B.C.; Nasir, N.A.B.M. Development programs, household income and economic vulnerability: A study among low-income households in Peninsular Malaysia. *World J. Entrep. Manag. Sustain. Dev.* **2018**. [[CrossRef](#)]
8. Skumatz, L.P. Recycling and climate change. *Resour. Recycl.* **2008**, *27*, 14–17.
9. Whitmarsh, L. Behavioural responses to climate change: Asymmetry of intentions and impacts. *J. Environ. Psychol.* **2009**, *29*, 13–23. [[CrossRef](#)]
10. Mbeng, L.O. Informal Waste Recovery and Recycling: Alleviating Poverty, Environmental Pollution and Unemployment in Douala, Cameroon. *J. Sci. Res. Rep.* **2013**, *2*, 474–490. [[CrossRef](#)]
11. Omran, A.; Mahmood, A.; Aziz, H.A.; Robinson, G.M. Investigating households attitude toward recycling of solid waste in Malaysia: A case study. *Int. J. Environ. Res.* **2009**, *3*, 275–288.
12. Alongi, D.M.; Sasekumar, A.; Tirendi, F.; Dixon, P. The influence of stand age on benthic decomposition and recycling of organic matter in managed mangrove forests of Malaysia. *J. Exp. Mar. Biol. Ecol.* **1998**, *225*, 197–218. [[CrossRef](#)]
13. Azam, N.R.A.N.; Rashid, B.; Zainol, N.A. Conceptualizing the Influence of Environmental Knowledge on Perceived Visit Value to Green Resort in Malaysia. *J. Tour.* **2017**, *2*, 1–17.
14. Vachon, S.; Klassen, R.D. Environmental management and manufacturing performance: The role of collaboration in the supply chain. *Int. J. Prod. Econ.* **2008**, *111*, 299–315. [[CrossRef](#)]
15. Vermeir, I.; Verbeke, W. Sustainable food consumption: Exploring the consumer “attitude-behavioral intention” gap. *J. Agric. Environ. Ethics* **2006**, *19*, 169–194. [[CrossRef](#)]
16. Ramayah, T.; Lee, J.W.C.; Mohamad, O. Green product purchase intention: Some insights from a developing country. *Resour. Conserv. Recycl.* **2010**, *54*, 1419–1427. [[CrossRef](#)]
17. Zhang, H.; Lahr, M.L.; Bi, J. Challenges of green consumption in China: A household energy use perspective. *Econ. Syst. Res.* **2016**, *28*, 183–201. [[CrossRef](#)]

18. Heffner, R.R.; Kurani, K.S.; Turrentine, T.S. Symbolism in California's early market for hybrid electric vehicles. *Transp. Res. Part D* **2007**, *12*, 396–413. [CrossRef]
19. Gallagher, K.S.; Muehlegger, E. Giving green to get green? Incentives and consumer adoption of hybrid vehicle technology. *J. Environ. Econ. Manag.* **2011**, *61*, 1–15. [CrossRef]
20. Afroz, R.; Rahman, A.; Masud, M.M.; Akhtar, R.; Duasa, J.B. How individual values and attitude influence consumers' purchase intention of electric vehicles—Some insights from Kuala Lumpur, Malaysia. *Environ. Urban. ASIA* **2015**, *6*, 193–211. [CrossRef]
21. Mahmud, S.N.D.; Osman, K. The determinants of recycling intention behavior among the Malaysian school students: An application of theory of planned behaviour. *Procedia Soc. Behav. Sci.* **2010**, *9*, 119–124. [CrossRef]
22. Chan, L.; Bishop, B. A moral basis for recycling: Extending the theory of planned behaviour. *J. Environ. Psychol.* **2013**, *36*, 96–102. [CrossRef]
23. Ajzen, I.; Driver, B.L. Prediction of leisure participation from behavioral, normative, and control beliefs: An application of the theory of planned behavior. *Leis. Sci.* **1991**, *13*, 185–204. [CrossRef]
24. Ajzen, I. *Constructing a TPB Questionnaire: Conceptual and Methodological Considerations*; Working Paper; University of Massachusetts: Amherst, MA, USA, 2002. Available online: http://chuang.epage.au.edu.tw/ezfiles/168/1168/attach/20/pta_41176_7688352_57138.pdf (accessed on 3 May 2018).
25. Tonglet, M.; Phillips, P.S.; Read, A.D. Using the Theory of Planned Behaviour to investigate the determinants of recycling behaviour: A case study from Brixworth, UK. *Resour. Conserv. Recycl.* **2004**, *41*, 191–214. [CrossRef]
26. Ajzen, I. Residual effects of past on later behavior: Habituation and reasoned action perspectives. *Personal. Soc. Psychol. Rev.* **2002**, *6*, 107–122. [CrossRef]
27. Rhodes, R.E.; Courneya, K.S. Investigating multiple components of attitude, subjective norm, and perceived control: An examination of the theory of planned behaviour in the exercise domain. *Br. J. Soc. Psychol.* **2003**, *42*, 129–146. [CrossRef] [PubMed]
28. Ajzen, I. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* **1991**, *50*, 179–211. [CrossRef]
29. Chen, K.; Deng, T. Research on the Green Purchase Intentions from the Perspective of Product Knowledge. *Sustainability* **2016**, *8*, 943. [CrossRef]
30. Nigbur, D.; Lyons, E.; Uzzell, D. Attitudes, norms, identity and environmental behaviour: Using an expanded theory of planned behaviour to predict participation in a kerbside recycling programme. *Br. J. Soc. Psychol.* **2010**, *49*, 259–284. [CrossRef] [PubMed]
31. Ramayah, T.; Lee, J.W.C.; Lim, S. Sustaining the environment through recycling: An empirical study. *J. Environ. Manag.* **2012**, *102*, 141–147. [CrossRef] [PubMed]
32. Ajzen, I.; Fishbein, M. Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychol. Bull.* **1977**, *84*, 888–918. [CrossRef]
33. Jorgensen, B.S.; Stedman, R.C. Sense of place as an attitude: Lakeshore owners attitudes toward their properties. *J. Environ. Psychol.* **2001**, *21*, 233–248. [CrossRef]
34. Kaiser, F.G.; Wölfing, S.; Fuhrer, U. Environmental attitude and ecological behaviour. *J. Environ. Psychol.* **1999**, *19*, 1–19. [CrossRef]
35. Chen, W.J.; Cheng, H.Y. Factors affecting the knowledge-sharing attitude of hotel service personnel. *Int. J. Hosp. Manag.* **2012**, *31*, 468–476. [CrossRef]
36. Elliott, M.T.; Speck, P.S. Factors that affect attitude toward a retail web site. *J. Mark. Theory Pract.* **2005**, *13*, 40–51. [CrossRef]
37. Fransson, N.; Gärling, T. Environmental concern: Conceptual definitions, measurement methods, and research findings. *J. Environ. Psychol.* **1999**, *19*, 369–382. [CrossRef]
38. Alba, J.W.; Hutchinson, J.W. Dimensions of consumer expertise. *J. Consum. Res.* **1987**, *13*, 411–454. [CrossRef]
39. Laroche, M.; Toffoli, R.; Kim, C.; Muller, T.E. The influence of culture on pro-environmental knowledge, attitudes, and behavior: A Canadian perspective. In *North American Advances in Consumer Research*; Corfman, K.P., Provo, J.G.L., Jr., Eds.; Association for Consumer Research: Duluth, MN, USA, 1996; Volume 23, pp. 196–202.
40. Cheah, I.; Phau, I. Attitudes towards environmentally friendly products: The influence of ecoliteracy, interpersonal influence and value orientation. *Mark. Intell. Plan.* **2011**, *29*, 452–472. [CrossRef]

41. Aminrad, Z.; Zakariya, S.Z.B.S.; Hadi, A.S.; Sakari, M. Relationship between awareness, knowledge and attitudes towards environmental education among secondary school students in Malaysia. *World Appl. Sci. J.* **2013**, *22*, 1326–1333.
42. Mei, O.J.; Ling, K.C.; Piew, T.H. The antecedents of green purchase intention among Malaysian consumers. *Asian Soc. Sci.* **2012**, *8*, 248–263. [[CrossRef](#)]
43. Omran, A.; Gebril, A.O. Study of household attitude toward recycling of solid wastes: A case study. *Acta Tech. Corviniensis Bull. Eng.* **2011**, *4*, 79–82.
44. Minton, A.P.; Rose, R.L. The effects of environmental concern on environmentally friendly consumer behavior: An exploratory study. *J. Bus. Res.* **1997**, *40*, 37–48. [[CrossRef](#)]
45. Schultz, P.W.; Oskamp, S. Effort as a moderator of the attitude-behavior relationship: General environmental concern and recycling. *Soc. Psychol. Q.* **1996**, *59*, 375–383. [[CrossRef](#)]
46. Elayan, M.; Ibrawish, E. Factors Influencing the Implementation of Recycling: Evidence from Ayla Aviation Academy in Jordan. *Int. J. Econ. Perspect.* **2017**, *11*, 354–377.
47. Danish, K.M.; Naved, K.M. Environmental concern to attitude towards green products: Evidences from India. *Serbian J. Manag.* **2016**, *11*, 159–179. [[CrossRef](#)]
48. Laroche, M.; Bergeron, J.; Barbaro-Forleo, G. Targeting consumers who are willing to pay more for environmentally friendly products. *J. Consum. Mark.* **2001**, *18*, 503–520. [[CrossRef](#)]
49. Kim, Y.; Choi, S.M. Antecedents of green purchase behavior: An examination of collectivism, environmental concern, and PCE. In *ACR North American Advances in Consumer Research*; Menon, G., Rao, A.R., Eds.; Association for Consumer Research: Duluth, MN, USA, 2005; Volume 32, pp. 592–599.
50. Hassan, A.; Noordin, T.A.; Sulaiman, S. The status on the level of environmental awareness in the concept of sustainable development amongst secondary school students. *Procedia Soc. Behav. Sci.* **2010**, *2*, 1276–1280. [[CrossRef](#)]
51. Bandura, A. The explanatory and predictive scope of self-efficacy theory. *J. Soc. Clin. Psychol.* **1986**, *4*, 359–373. [[CrossRef](#)]
52. Giles, M.; Mcclenahan, C.; Cairns, E.; Mallet, J. An application of the theory of planned behaviour to blood donation: The importance of self-efficacy. *Health Educ. Res.* **2004**, *19*, 380–391. [[CrossRef](#)] [[PubMed](#)]
53. Bandura, A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychol. Rev.* **1977**, *84*, 191–215. [[CrossRef](#)] [[PubMed](#)]
54. Durndell, A.; Haag, Z. Computer self efficacy, computer anxiety, attitudes towards the Internet and reported experience with the Internet, by gender, in an East European sample. *Comput. Hum. Behav.* **2002**, *18*, 521–535. [[CrossRef](#)]
55. Sniehotta, F.F.; Scholz, U.; Schwarzer, R. Bridging the intention-behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychol. Health.* **2005**, *20*, 143–160. [[CrossRef](#)]
56. Janmaimool, P. Application of Protection Motivation Theory to Investigate Sustainable Waste Management Behaviors. *Sustainability* **2017**, *9*, 1079. [[CrossRef](#)]
57. Beck, L.; Ajzen, I. Predicting dishonest actions using the theory of planned behavior. *J. Res. Personal.* **1991**, *25*, 285–301. [[CrossRef](#)]
58. Baron, R.M.; Kenny, D.A. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *J. Personal. Soc. Psychol.* **1986**, *51*, 1173–1182. [[CrossRef](#)]
59. Lee, M.C. Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit. *Electron. Commer. Res. Appl.* **2009**, *8*, 130–141. [[CrossRef](#)]
60. Bobek, D.D.; Hatfield, R.C. An investigation of the theory of planned behavior and the role of moral obligation in tax compliance. *Behav. Res. Account.* **2003**, *15*, 13–38. [[CrossRef](#)]
61. Shaw, P.J. Nearest neighbour effects in kerbside household waste recycling. *Resour. Conserv. Recycl.* **2008**, *52*, 775–784. [[CrossRef](#)]
62. Maichum, K.; Parichatnon, S.; Peng, K. Application of the Extended Theory of Planned Behavior Model to Investigate Purchase Intention of Green Products among Thai Consumers. *Sustainability* **2016**, *8*, 1077. [[CrossRef](#)]
63. Gorsuch, R.L.; Ortberg, J. Moral obligation and attitudes: Their relation to behavioral intentions. *J. Personal. Soc. Psychol.* **1983**, *44*, 1025–1028. [[CrossRef](#)]

64. Zuckerman, M.; Reis, H.T. Comparison of three models for predicting altruistic behavior. *J. Personal. Soc. Psychol.* **1978**, *36*, 498–510. [[CrossRef](#)]
65. Maddock, J.; Glanz, K. The relationship of proximal normative beliefs and global subjective norms to college students' alcohol consumption. *Addict. Behav.* **2005**, *30*, 315–323. [[CrossRef](#)] [[PubMed](#)]
66. Parker, D.; Manstead, A.S.; Stradling, S.G. Extending the theory of planned behaviour: The role of personal norm. *Br. J. Soc. Psychol.* **1995**, *34*, 127–138. [[CrossRef](#)]
67. Oskamp, S.; Harrington, M.J.; Edwards, T.C.; Sherwood, D.L.; Okuda, S.M.; Swanson, D.C. Factors influencing household recycling behavior. *Environ. Behav.* **1991**, *23*, 494–519. [[CrossRef](#)]
68. Chu, P.Y.; Chiu, J.F. Factors influencing household waste recycling behavior: Test of an integrated model. *J. Appl. Soc. Psychol.* **2003**, *33*, 604–626. [[CrossRef](#)]
69. Botetzagias, I.; Dima, A.F.; Malesios, C. Extending the theory of planned behavior in the context of recycling: The role of moral norms and of demographic predictors. *Resour. Conserv. Recycl.* **2015**, *95*, 58–67. [[CrossRef](#)]
70. Kok, G.; Siero, S. Tin recycling: Awareness, comprehension, attitude, intention and behavior. *J. Econ. Psychol.* **1985**, *6*, 157–173. [[CrossRef](#)]
71. Linan, F.; Rodríguez-Cohard, J.C.; Rueda-Cantuche, J.M. Factors affecting entrepreneurial intention levels. In Proceedings of the 45th Congress of the European Regional Science Association: Land Use and Water Management in a Sustainable Network Society, Amsterdam, The Netherlands, 23–27 August 2005.
72. Fishbein, M.; Ajzen, I. *Belief, Attitude, Intention, and Behavior*; AddisonWesley: Reading, MA, USA, 1975.
73. Marques, C.S.; Ferreira, J.J.; Gomes, D.N.; Gouveia Rodrigues, R. Entrepreneurship education: How psychological, demographic and behavioural factors predict the entrepreneurial intention. *Educ. Train.* **2012**, *54*, 657–672. [[CrossRef](#)]
74. Albarracín, D.; Johnson, B.T.; Fishbein, M.; Muellerleile, P.A. Theories of reasoned action and planned behavior as models of condom use: A meta-analysis. *Psychol. Bull.* **2001**, *127*, 142–161. [[CrossRef](#)] [[PubMed](#)]
75. Bamberg, S.; Ajzen, I.; Schmidt, P. Choice of travel mode in the theory of planned behavior: The roles of past behavior, habit, and reasoned action. *Basic Appl. Soc. Psychol.* **2003**, *25*, 175–187. [[CrossRef](#)]
76. Prime Minister's Department. *Government Transformation Programme Annual Report*; Prime Minister's Department: Canberra, Australia, 2011. Available online: https://www.pemandu.gov.my/assets/publications/annual-reports/GTP_2011_EN.pdf (accessed on 12 December 2017).
77. Faul, F.; Erdfelder, E.; Lang, A.G.; Buchner, A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav. Res. Methods* **2007**, *39*, 175–191. [[CrossRef](#)] [[PubMed](#)]
78. Cohen, J. Statistical power analysis. *Curr. Dir. Psychol. Sci.* **1992**, *1*, 98–101. [[CrossRef](#)]
79. Reinartz, W.; Haenlein, M.; Henseler, J. An empirical comparison of the efficacy of covariance-based and variance-based SEM. *Int. J. Res. Mark.* **2009**, *26*, 332–344. [[CrossRef](#)]
80. Mostafa, M. Antecedents of Egyptian Consumers' Green Purchase Intentions. *J. Int. Consum. Mark.* **2006**, *19*, 97–126. [[CrossRef](#)]
81. Qader, I.; Zainuddin, Y. The Influence of Media Exposure, Safety and Health Concerns, and Self-Efficacy on Environmental Attitudes towards Electronic Green Products. *Asian Acad. Manag. J.* **2011**, *16*, 167–186.
82. Wu, S.; Chen, J. A Model of Green Consumption Behavior Constructed by the Theory of Planned Behavior. *Int. J. Mark. Stud.* **2014**, *6*, 119–132. [[CrossRef](#)]
83. Ha, H.; Janda, S. Predicting consumer intentions to purchase energy-efficient products. *J. Consum. Mark.* **2012**, *29*, 461–469. [[CrossRef](#)]
84. Zhang, D.; Huang, G.; Yin, X.; Gong, Q. Residents' Waste Separation Behaviors at the Source: Using SEM with the Theory of Planned Behavior in Guangzhou, China. *Int. J. Environ. Res. Public Health* **2015**, *12*, 9475–9491. [[CrossRef](#)] [[PubMed](#)]
85. Osman, A.; Isa, F.; Othman, S.; Jaganathan, M. Attitude towards Recycling Among Business Undergraduate Students in Malaysia. *Am. Eurasian J. Sustain. Agric.* **2014**, *8*, 6–12.
86. Walton, T.; Austin, D. Pro-Environmental Behavior in an Urban Social Structural Context. *Sociol. Spectr.* **2011**, *31*, 260–287. [[CrossRef](#)]
87. Sanchez, M.; López-Mosquera, N.; Lera-López, F. Improving Pro-environmental Behaviours in Spain. The Role of Attitudes and Sociodemographic and Political Factors. *J. Environ. Plan. Manag.* **2015**, *18*, 47–66.
88. Podsakoff, P.M.; MacKenzie, S.B.; Lee, J.Y.; Podsakoff, N.P. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *J. Appl. Psychol.* **2003**, *88*, 879–903. [[CrossRef](#)] [[PubMed](#)]

89. Bagozzi, R.P.; Yi, Y.; Phillips, L.W. Assessing construct validity in organizational research. *Adm. Sci. Q.* **1991**, *36*, 421–458. [[CrossRef](#)]
90. Hair, J.F.; Ringle, C.M.; Sarstedt, M. PLS-SEM: Indeed a silver bullet. *J. Mark. Theory Pract.* **2011**, *19*, 139–152. [[CrossRef](#)]
91. Hair, J.F.; Ringle, C.M.; Sarstedt, M. Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long Range Plan.* **2013**, *46*, 1–12. [[CrossRef](#)]
92. Diamantopoulos, A.; Siguaw, J.A. Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration. *Br. J. Manag.* **2006**, *17*, 263–282. [[CrossRef](#)]
93. Gold, A.H.; Malhotra, A.; Segars, A.H. Knowledge management: An organizational capabilities perspective. *J. Manag. Inf. Syst.* **2001**, *18*, 185–214. [[CrossRef](#)]
94. Teo, T.S.H.; Srivastava, S.C.; Jiang, L. Trust and electronic government success: An empirical study. *J. Manag. Inf. Syst.* **2008**, *25*, 99–132. [[CrossRef](#)]
95. Vicens, J.; Bueno-Guerra, N.; Gutiérrez-Roig, M.; Gracia-Lázaro, C.; Gómez-Gardeñes, J.; Perelló, J.; Sánchez, A.; Moreno, Y.; Duch, J. Resource Heterogeneity Leads to Unjust Effort Distribution in Climate Change Mitigation. Available online: <https://arxiv.org/pdf/1709.02857.pdf> (accessed on 22 February 2018).



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