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Energy Conservation Behaviour Among the Malaysian Youth: A Study Under the Premises of Value-Belief-Norm Model

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Intensive energy consumption has become a norm among the younger generation. Energy consumption can be reduced when consumers develop environmental values, beliefs, and norms to build pro-environmental behaviours. The current study's objective is to expose the intention and behaviour to minimise energy consumption among young Malaysian residents using the value-belief-norm (VBN) framework. Data collection was performed using social media in a cross-sectional manner. The collected data were analysed using partial least squares structural equation modelling (PLS-SEM) and necessary condition analysis (NCA). Data analysis confirmed the application of VBN framework on the energy conservation behaviours among Malaysian youth. Personal biospheric and altruistic values significantly saturated the new environmental paradigm that harnessed the awareness of consequences and ascription of responsibility to engage in pro-environmental behaviours. The personal norms significantly influenced the energy conservation intention, leading to energy conservation behaviours. The NCA results suggest that the ascription of responsibility, biospheric and altruistic values are the most significant necessary conditions for promoting energy conservation behaviours. The policy and practical implications have proposed that the collaborative efforts are required to address the issue of wasteful energy consumption at a personal level, promote energy-efficient household devices, and increase monetary nudges to reward energy conservation behaviours. The study limitations and future research openings are also discussed in this paper.

Keywords: energy conservation, value-belief-norm theory, Malaysian youth, intention, behaviour

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INTRODUCTION

Humans have been experiencing climate shifts for the last 50 years, and a significant part of the ecological shift has been triggered by industrial development (Unal et al., 2019; Azam et al., 2021a). Furthermore, human behaviours are regarded as the primary cause of environmental problems. The global population's intensive utilisation of natural resources for personal and economic purposes promotes greenhouse gas emissions (Yildirim and Semiz, 2019), causing climate change. Recent

literature has explored pro-environmental behaviors among adults, but limited research has examined the environmentally friendly behaviors among young adults or millennials (Suraya et al., 2020; Delistavrou, 2021). In general, environmentally friendly behaviours are costly and require full effort from individuals (Zulkifli, 2021). The behavioural cost is associated with changing the adopted behaviors and effectively being involved in environmental conservation behaviors (Choi et al., 2015; Xu et al., 2021).

Energy usage at the national level reflects a country's economic development (Azam et al., 2021b). Energy production, distribution, and consumption represent the way of life in a country and are considered the significant causes instigating climate challenges (Zhang et al., 2014). Psychological, social, and economic factors influence personal energy consumption (Sanchez et al., 2015). The industrial sector energy requirement is necessary for national development, but personal consumption can be reduced by developing the right personal values and pro-environmental norms leading to pro-environmental behaviours (Song et al., 2018). Individual-level energy consumption concerns the civic lifestyle and significantly relies on the energy required for hedonic activities (Yangita and Iwafune, 2021).

As a signatory of the United Nations Sustainable Development Goals (UNSDGs), Malaysia is working to achieve sustainable development (Phrakhuopatnontakitti et al., 2020). The nation's energy production is primarily based on imported coal, oil, and natural gas, while energy consumption is based on oil, natural gas, and electricity (Zulkifli, 2021). Until 2019, Malaysia has been consistently experiencing an average of 5% yearly energy growth in usage, and the residential sector remains the single largest energy consumption sector, accounting for 21% of the total energy consumption (Suraya et al., 2020). Besides, Malaysia's current per capita energy consumption stands at 4,600 kilowatt-hours (KWhs), which is higher than the neighbouring countries (Zulkifli, 2021).

Malaysia's 11th National Energy Efficiency Action Plan (NEEAP) 2016–2025 has listed the instrumental strategies to implement well-coordinated and cost-effective energy production and usage (Phrakhuopatnontakitti et al., 2020). The 11th NEEAP stresses increasing the penetration of energy-efficient instruments and conservation at the consumer level. Nevertheless, mixed results have been reported for responsible energy consumption among Malaysian consumers. Malaysia is progressing toward converting the existing energy production mix towards a renewable energy mix in which hydro and solar power will become the major energy resources (Zulkifli, 2021).

Building conservation behaviours depends on individuals' personal values and environmental norms (Yildirim and Semiz, 2019). Exhibiting environmentally friendly behaviours in private settings requires personal resources that empower the mitigation of climate challenges. In private settings, the energy conservation behaviours require different personal resources than in public settings. Therefore, the current study explores the intention and behaviour to minimise energy consumption among the Malaysian youth with the value-belief-norm (VBN) framework. This study is expected to add to the growing body of evidence that personal values and beliefs encourage energy use and promote pro-environmental standards among people in emerging nations. People who adhere to pro-environmental values are more likely to have energy saving intents and behaviors. Energy conservation is a shared obligation across communities, and personal environmental predisposition and environmental conventions can aid in mitigating climate change issues such as reckless energy consumption. Environmental responsibility must be harnessed by policymakers in order to reduce energy usage and effectively encourage energy conservation.

LITERATURE REVIEW

Theoretical Foundation

Norm activation theory (NAT) is the model establishing the link between the individual values and beliefs activating the pro-social and environmental norms (Stern, 2000). The VBN theory is the extension of NAT. The green behaviours are mainly based on personal values nurturing the beliefs that activate personal norms (Kim and Seock, 2019). In other words, the set of personal values helps establish the beliefs that initiate the norms promoting green behaviours (Lopez-Mosquera and Sanchez, 2012).

Values are essential interpreters of the individual personality directing personal norms and behaviours (Han et al., 2016). Stern (2000) has postulated that biospheric and altruistic values are the vital morals nurturing conservation behaviours. Biospheric values are the innate perception of an individual that humans are not the only component of the ecology whereby other types of living and non-living elements also form a vital part of the global environment (Unal et al., 2019). On the other hand, altruistic values are a significant interpreter of the individual engagement with pro-social behaviours (Kim et al., 2016). Altruistic values are the set of personal morals instigating individual engagement in using environmentally friendly products and services (Kim and Seock, 2019) and using recycled clothing to reduce the impact of fashion on the climate (Dhir et al., 2021).

The first significant belief emerges from the biospheric and altruistic values termed the new ecological paradigm (Gkargkavouzi et al., 2019). These values nurture the diverse set of beliefs and thinking that the environment is crucial to sustaining life on earth (Fornara et al., 2016). The personal thoughts are that the environment requires our attention and that we need to address the issue of climate change by believing that the environment needs care because human actions have increased the global temperature through technological development leading to climate change (Han et al., 2016). The new environmental paradigm is the personal belief that human actions are a source of climate change and global warming (Lopez-Mosquera and Sanchez, 2012). The new environmental paradigm as a belief instigates another belief called awareness of consequences (Stern, 2000). Climate change is happening and requires responsible action to mitigate climate issues by engaging in energy conservation behaviours (Zeiske et al., 2020).

The outcome of climate change is detrimental to human life and their continued existence (Ma et al., 2019; Azam et al., 2021c).

The understanding is that humans are causing climate change, and thus, they must take responsibility to tackle and correct the climate impact due to human actions (Leygue et al., 2017). The awareness of consequences initiates another belief termed the ascription of responsibility, whereby humans are responsible for the climate shift and also the necessary mitigating actions required (Mao et al., 2020).

The new environmental paradigm, awareness of consequences, and ascription of responsibility as nascent beliefs help the advancement of the personal norms to engage in pro-climate behaviours (Fornara et al., 2016). Environmental awareness nurtures the innate consideration to take personal responsibility to engage in pro-environmental behaviours (Han et al., 2016). Personal norms activated by the set of environmental beliefs (Zeiske et al., 2020) prompt the pro-environmental behaviours.

Moreover, personal norms help the formation of the intention to engage in energy conservation behaviours (Maichum et al., 2016) and instigate to engage in pro-environmental behaviours (Walton and Austin, 2011). The pro-environmental behaviours in personal settings are largely based on innate environmental responsibility and economic consideration to develop energy conservation behaviours (Mao et al., 2020).

ASSOCIATIONS AND HYPOTHESES

The Development of the New Environmental Paradigm

People engage in pro-environmental behaviours, and personal values that are essential to instigate the personal understanding of the environment. Biospheric values (BOV) are the innate morality that non-living organisms are a vital aspect of life on earth and taking good care of the environment is crucial (Fornara et al., 2016). Landon et al. (2018) have postulated that biospheric values are a key predictor of the new environmental paradigm among United States respondents looking for green hospitality services. Thus, the following hypothesis is proposed:

Hypothesis (H1a): BOVs Positively Affect NEP

Altruistic values (ALV) are personal values based on equality, harmony, and righteousness for all and help individuals engage in green behaviours (Gkargkavouzi et al., 2019). Personal ALVs promote reasonableness and consciousness to reduce the personal impact on the climate. Kiatkawsin and Han (2017) documented a positive and significant impact of personal altruistic values on the new ecological paradigm for youth travellers. As such, this study proposes the following hypothesis:

Hypothesis (H1b): ALVs Positively Affect NEP.

Development of Awareness of Consequences

As the first belief, the new environmental paradigm nurtures another belief that is awareness of consequences (Stern, 2000). The understanding is that the environment is vital and a change in everyone's behaviour is needed to reduce the climate impact (Kim and Seock, 2019). Climate thoughts initiate the understanding that mitigating the climate issues is necessary as the climate is damaged and may harm human life (Fornara et al., 2016). The ecological paradigm, according to Nordfjaern and Zavareh (2017), has a substantial impact on public understanding of the environmental repercussions of transportation. Gkargkavouzi et al. (2019) have reported that the new environmental paradigm significantly predicts the awareness of consequences. Therefore, the following hypothesis is proposed:

Hypothesis (H2): NEP Positively Affects AOC

Development of the Ascription of Responsibility

Following the VBN model, awareness of consequences directly influences the ascription of responsibility. The acknowledgment is that every individual is responsible for reducing the resources drain and should make personal efforts to engage in conservation behaviours (Obeng et al., 2018). Zhang et al. (2020) have proposed that Chinese farmers' personal acknowledgment of climate consequences influences their willingness to take responsibility and engage in pro-climate behavior. Hence, this study proposes the following hypothesis:

Hypothesis (H3): AOC Positively Affects AOR

Development of Personal Norms

Beliefs are the source that activates norms (Stern, 2000). The NEP, as personal beliefs, develops the understanding that the environment is a necessary part of human life and a vital source of pro-environmental behaviours (Choi et al., 2015). Zhang et al. (2020) have provided vital evidence that NEP activates the PNS among Chinese farmers. Meanwhile, Zieske et al. (2020) have posited that the new environmental paradigm helps in developing the necessary personal norms to engage in climate-friendly activities such as reducing the climate impact of taking baths. Thus, the following hypothesis is proposed:

Hypothesis (H4a): NEP Positively Affects PNS

AOC instigates the necessary personal belief that the world's climate needs our attention for us to sustain life on earth (Stern, 2000). Gkargkavouzi et al. (2019) have suggested that the AOC significantly nurtures the personal norms to take necessary action to protect the climate. Recently, Zhang et al. (2020) have stated that the AOC significantly instigates the personal norms to develop personal environmental norms to engage in environmentally friendly farming practices. Therefore, the following hypothesis is proposed in this study:

Hypothesis (H4b): AOC Positively Affects PNS

The sense of responsibility nurtures the innate notion to take action for the environment (Zhang et al., 2020). For example, Nordfjaern and Zavareh (2017) documented a positive and significant impact of the ascription of responsibility on personal norms whereby young Iranian respondents used the most environmentally friendly means of transportation such as walking or bicycling. Hence, this study proposes the following hypothesis:

Hypothesis (H4c): AOR Positively Affects PNS

Energy Conservation Intention

Personal norms build the necessity to adopt pro-ecological behaviours (Gkargkavouzi et al., 2019). In their study, Zeiske et al. (2020) have postulated that individual personal norms help

select the shower time to reduce the environmental impact. As such, the following hypothesis is proposed:

Hypothesis (H5): PNS positively affects ECI

Energy Conservation Behaviour

Intention is the antecedent of actual behaviour. Therefore, the intention to execute green behaviour positively triggers green behaviour (Mao et al., 2020). Gkargkavouzi et al. (2019) have posited that behavioural intention significantly envisages voluntary actions to reduce the impact of climate change among the Greek samples. On the other hand, taking responsibility to reduce unnecessary energy use in the household instigates household energy conservation behaviors (Ma et al., 2019). Thus, this study proposes the following hypothesis:

Hypothesis (H6): ECI Positively Affects ECB

RESEARCH METHODOLOGY

The current study employed an explorative and explanatory research design. Cross-sectional survey-based data were collected to explore the energy conservation intention and the energy conservation behaviours among the Malaysian youth using the VBN framework. All associations hypothesised and examined are presented in **Figure 1**. The target sample for this study was the Malaysian youth aged between 18 and 30 years old. The sample size was estimated using the G-power 3.1 application with a power of 0.95 and an effect size of 0.15 with seven predictors. The minimum sample size required for analysis with suitable power was 145 (Faul et al., 2007). Nonetheless, Hair et al. (2019) suggest a minimum sample size of 200 to be used in partial least square structural equation modelling (PLS-SEM). Data collection was performed by uploading the online survey form (Google Form) on social media platforms, including Facebook and WhatsApp groups. The convenience sampling technique was applied for data collection with a few qualifying questions to receive responses from appropriate respondents, i.e., the Malaysian youth. The final analysis was performed with 1,587 valid responses.

Survey Instrument

This study's survey instrument was a structured questionnaire. All the questions (presented in Supplementary Material) were adopted from earlier studies with minor modifications. In this study, a seven-point Likert scale (not important at all, not important, slightly not important, neutral, slightly important, important, and very important) was used to measure biospheric and altruistic values, and another seven-point Likert scale (strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, and strongly agree) was used to determine the other variables.

Common Method Bias

The single factor accounted for 36.029%, i.e., below the recommended threshold of 50.00%, thus, revealing the inconsequential influence of CMB on this study (Podsakoff et al., 2012). Additionally, CMB was evaluated for the current study by testing the full collinearity for all the study constructs (Kock, 2015). Every study construct was regressed on the common variable (i.e., constructed by taking all the items from the study variables). Variance inflation factor (VIF) values were determined for biospheric values (1.981), altruistic values (2.123), new environmental paradigm (2.336), awareness of consequences (2.872), the ascription of responsibility (2.439), personal norms (3.088), energy conservation intention (3.248), and energy conservation behaviours (2.401). All the VIF values were less than 3.3, which implied the absence of bias from the single-source data (Kock, 2015).

Data Analysis Method

Multivariate normality for the study's data was assessed using the Web Power online tool (source: https://webpower.psychstat.org/wiki/tools/index). The calculated Mardia's multivariate *p*-value showed that the study's data had a non-normality issue as the *p*-values were below 0.05 (Cain et al., 2017). Due to multivariate non-normality, this study utilised PLS-SEM.

Partial Least Squares Structural Equation Modelling (PLS-SEM)

Due to the existence of multivariate non-normality in the dataset, this study employed PLS-SEM. Hair et al. (2014) recommend that variance-based structural equation modelling is adopted to analyse the exploratory nature and non-normality issues to explain variance in the structural equation model's dependent constructs in-depth.

The Smart-PLS 3.1 program was employed to analyse the data collected in the current study. PLS-SEM is a multivariate exploratory method for analysing integrated latent constructs' path structure (Hair et al., 2019). It empowers the researchers to work well with the non-normal dataset with a small dataset. Furthermore, PLS-SEM is a casual-predictive analytical tool to execute complex models with composites and no specific assumption of the goodness-of-fit static requirements (Hair et al., 2014). In the present study, PLS-SEM analysis was performed in two phases. The first phase dealt with model estimation, where the models' construct reliability and validity were evaluated (Hair et al., 2019). Meanwhile, the second phase dealt with evaluating the correlations of the models and systematic testing of the study path model (Hair et al., 2014). The path values (β) represent the effect of the input variable on the outcome variable. Analysis performed with the coefficient of determination (r^2), predictive relevance (Q^2), and effect size (f^2) can explain the endogenous construct's change caused by the exogenous constructs (Hair et al., 2019).

Necessary Condition Analysis

NCA is a data analysis approach used to identify the necessary conditions that yield the outcome (Dul, 2016). This approach is complementary to regression-based analysis (Richter et al., 2021). Without the existence of necessary conditions, the outcome may not be present. The absence of necessary conditions determines the absence of the outcome and may not compensate for the other variables in the dataset (Dul, 2018). Thus, NCA facilitates the researchers to understand the critical role of the necessary conditions to establish the outcome (Dul, 2020). Moreover, NCA offers the results for the must-have or bottleneck factors

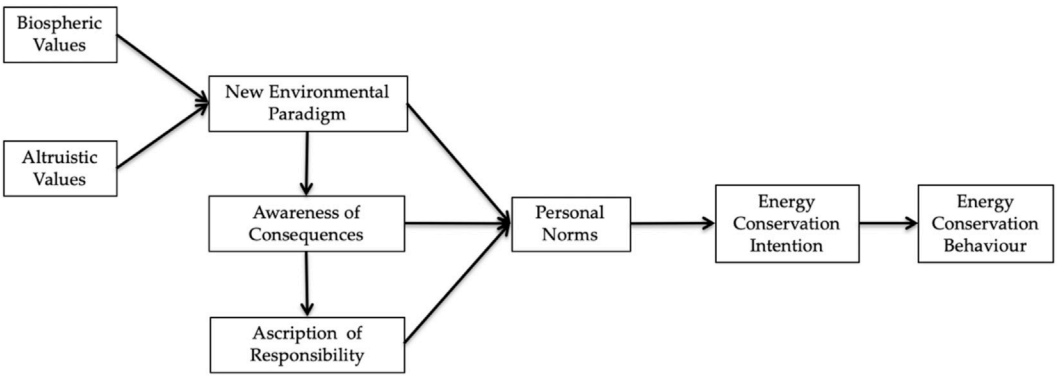

FIGURE 1 | Research framework.

essential for the occurrence of the outcome. Dul (2018) has suggested using the two-stage NCA. In the first stage, each input variable's effect size and ceiling line are estimated to establish the necessary conditions for the outcome variable (Dul, 2018). For the second stage, the significance level of each input variable's effect size was determined. The bottleneck analysis was performed to explore the influence of the necessary conditions on the different percentile levels of the outcome variable (Dul, 2016). The NCA was performed in the R studio with the NCA package (Dul, 2018).

DATA ANALYSIS

Demographic Characteristics

In the current study, 53.1% of the total respondents were female. Most of the respondents were aged between 21 and 25 years old (53.6%). On the other hand, 39.8% of respondents were aged between 18 and 20 years old, while the remaining respondents were between 26 and 30 years old. Next, most of the respondents were single (95.1%); the rest were either married or divorced. Respondents who completed secondary school education comprised 13.5% of the total respondents, while 15.2% of the respondents completed a diploma or technical school level education, and 69.0% completed a bachelor level education.

Respondents with a monthly income below RM 2,500 formed 77.9% of the total respondents. Meanwhile, 12.6% of the respondents earned between RM 2,501 and RM 5000, whereas 4.3% had an income between RM 5001 and RM 7500, and the rest had a monthly income of more than RM 7500. The respondents' demographic profile is provided in **Table 1**.

Reliability and Validity

This study followed the recommendations of Hair et al. (2019), whereby the latent constructs' reliabilities were attained and estimated with the Cronbach's alpha (CA), Dijkstra-Hensele's (DH) rho, and composite reliability (CR). The results are listed in **Table 2**. The CA values for each construct were well above the minimum value of 0.650, whereby the minimum CA value attained was 0.698 (Hair et al., 2014). Furthermore, all the Dijkstra-Hensele's *rho* scores of each construct were well above the threshold of 0.700, where the minimum Dijkstra-Hensele's *rho* value was 0.705 (Hair et al., 2019).

Additionally, the CR scores were well above the minimum value of 0.700, whereby the lowest CR value recorded was 0.814 (Hair et al., 2014). These results implied that the latent constructs had an appropriate level of reliability and, thus, were good to execute the next level of analysis. The average value extracted (AVE) for all the items for each construct must be above 0.50 to justify the suitable convergent validity to withstand the uni-dimensionality of every construct (Hair et al., 2019). As tabulated in **Table 3**, the constructs had acceptable convergent validity. Finally, all the value inflation factor (VIF) values for each construct were well under the minimum value of 3.3, showing no apprehension toward multicollinearity (Hair et al., 2014).

Next, the Fornell-Larcker criterion (1981) was utilised to assess the model's discriminant validity. This criterion was calculated using the square root of a construct's AVE. The AVE's square root for each construct must be more than the correlation between all the other model constructs (Hair et al., 2019). Besides, the Heterotrait-Monotrait (HTMT) ratio values for the study's constructs had acceptable scores, indicating adequate convergent validity. The study's constructs also had suitable discriminant validities (see **Table 3**). The item loading and cross-loading revealed the appropriate level of discriminant validity for the study constructs (see **Supplementary Appendix S1**).

Path Analysis

A study model measurement assessment was performed to examine the study's hypotheses. The adjusted r^2 value for the two exogenous constructs (i.e., biospheric and altruistic values) on the new environmental paradigm explicated 43.9% of the variance in the new environmental paradigm. On the other hand, the predictive relevance (Q^2) score for the part of the model was 0.220, representing a medium predictive relevance (Hair et al., 2014). The adjusted r^2 value for the new environmental paradigm as the exogenous construct on the awareness of consequences explained 48.6% of the variance in the awareness of consequences. Meanwhile, the predictive relevance (Q^2) score for the part of the model was 0.264, representing a medium predictive relevance (Hair et al.,

TABLE 1 | Demographic characteristics.

	N	%		N	%
Gender			*Marital Status*		
Female	843	53.1	Single	1509	95.1
Male	744	46.9	Married	67	4.2
Total	1587	100.0	Divorced	8	0.5
			Widowed	3	0.2
Age Group			Total	1587	100.0
18–20 years	631	39.8			
21–25 years	850	53.6	*Education*		
26–30 years	106	6.7	Secondary school certificate	215	13.5
Total	1587	100.0	Diploma certificate	242	15.2
			Bachelor degree or equivalent	1095	69.0
Average Monthly Income (RM)			Master degree and Above	35	2.2
Below RM2500	1237	77.9	Total	1587	100.0
RM2501-RM5000	200	12.6			
RM5001-RM7500	69	4.3			
More than RM7501	81	5.1			
Total	1587	100.0			

TABLE 2 | Reliability and validity.

Variables	No. Items	Mean	Standard deviation	Cronbach's alpha	Dijkstra-hensele's *rho*	Composite reliability	Average variance extracted	Variance inflation factors
BOV	6	4.312	0.582	0.854	0.858	0.892	0.579	1.624
ALV	4	4.306	0.579	0.698	0.705	0.814	0.524	1.624
NEP	5	4.250	0.568	0.759	0.763	0.838	0.509	2.135
AOC	6	4.392	0.561	0.834	0.834	0.879	0.547	2.242
AOR	5	4.272	0.647	0.865	0.866	0.903	0.650	2.528
PNS	5	4.143	0.667	0.857	0.859	0.898	0.637	1.000
ECI	6	3.976	0.692	0.859	0.859	0.895	0.587	1.000
ECB	5	3.946	0.718	0.819	0.842	0.875	0.590	-

BOV, biospheric values; ALV, Altruistic Values NEP, new environmental paradigm; AOC, awareness of consequences; AOR, ascription of responsibility; PNS, personal norms; ECI, energy conservation intention, ECB, energy conservation behaviour.

TABLE 3 | Discriminant validity.

	BOV	ALV	NEP	AOC	AOR	PNS	ECI	ECB
Fornell-Larcker Criterion								
BOV	0.761							
ALV	0.620	0.724						
NEP	0.566	0.621	0.714					
AOC	0.605	0.645	0.697	0.740				
AOR	0.518	0.585	0.648	0.714	0.806			
PNS	0.572	0.549	0.586	0.607	0.605	0.798		
ECI	0.471	0.467	0.484	0.496	0.536	0.754	0.766	
ECB	0.418	0.367	0.384	0.386	0.428	0.640	0.754	0.768
Heterotrait-Monotrait Ratio								
BOV								
ALV	0.795							
NEP	0.697	0.841						
AOC	0.714	0.838	0.871					
AOR	0.600	0.749	0.796	0.840				
PNS	0.670	0.713	0.724	0.718	0.703			
ECI	0.552	0.612	0.599	0.587	0.622	0.877		
ECB	0.519	0.517	0.507	0.490	0.527	0.769	0.894	

BOV, biospheric values; ALV, Altruistic Values NEP, new environmental paradigm; AOC, awareness of consequences; AOR, ascription of responsibility; PNS, personal norms; ECI, energy conservation intention, ECB, energy conservation behaviour.

2014). Next, the adjusted r^2 value for awareness of consequences as the input variable on the ascription of responsibility explained 51% of the variance in the ascription of responsibility. The predictive relevance (Q^2) score for the part of the model was 0.329, representing a medium predictive relevance (Hair et al., 2014).

The adjusted r^2 value for the three exogenous variables (i.e., new environmental paradigm, awareness of consequences, and ascription of responsibility) elucidated 45.5% of the change in the personal norms of the respondents. The part of the model's predictive relevance (Q^2) value was 0.287, suggesting a medium predictive relevance (Hair et al., 2014). Meanwhile, the adjusted r^2 value for personal norms as an exogenous variable affected the energy conservation intention and explained a 56.8% change in the energy conservation intention. The predictive relevance (Q^2) value for the part of the model was 0.330, signifying a medium predictive relevance (Hair et al., 2014). The energy conservation intention explained 56.8% of the change in the energy conservation behaviour. This part of the model had a medium predictive relevance with a Q^2 score of 0.332.

Model standardised path values, t-values, and significance levels are listed in **Table 4** The path coefficient between BOV and NEP represents the biospheric values' significant and positive

TABLE 4 | displays the path coefficients. The path between PNS and ECI validated that personal norms significantly influenced the energy conservation intention; the outcome offered evidence to support H_5. The path coefficient for ECI and ECB demonstrated a positive and significant effect, offering support for H_6.

Hypo		Beta	CI - min	CI - max	*t*	*P*	Decision	r^2	f^2	Q^2
H_{1a}	BOV → NEP	0.294	0.249	0.339	10.357	0.000	Accept		0.095	
H_{1b}	ALV → NEP	0.439	0.391	0.488	15.261	0.000	Accept	0.439	0.211	0.220
H_2	NEP → AOC	0.697	0.672	0.722	45.729	0.000	Accept	0.486	0.944	0.264
H_3	AOC → AOR	0.714	0.684	0.743	39.730	0.000	Accept	0.510	1.041	0.329
H_{4a}	NEP → PNS	0.234	0.170	0.295	6.203	0.000	Accept		0.047	
H_{4b}	AOC → PNS	0.245	0.182	0.304	6.897	0.000	Accept	0.455	0.044	0.287
H_{4c}	AOR → PNS	0.278	0.214	0.347	6.950	0.000	Accept		0.063	
H_5	PNS → ECI	0.754	0.730	0.780	50.229	0.000	Accept	0.568	1.314	0.330
H_6	ECI → ECB	0.754	0.732	0.777	54.229	0.000	Accept	0.568	1.315	0.332

BOV, biospheric values; ALV, Altruistic Values NEP, new environmental paradigm; AOC, awareness of consequences; AOR, ascription of responsibility; PNS, personal norms; ECI, energy conservation intention, ECB, energy conservation behaviour.

effect on the new environmental paradigm. The result offered substantial statistical support for the acceptance of H_{1a}. Next, the path value for ALV and NEP showed that the altruistic values were significant. It presents statistical support to accept H_{1b}. The path between NEP and AOC, demonstrating the influence of the new environmental paradigm on awareness of consequences, was positive and significant and supported the acceptance of H_2. The path coefficient for AOC and AOR signified a positive and significant effect of awareness of consequences on the ascription of responsibility. The result offered evidence to accept H_3. Additionally, the path from NEP to PNS showed the positive and significant impact of the new environmental paradigm on personal norms; it delivered the support to accept H_{4a}. Similarly, the path between AOC and PNS indicated a positive and significant impact of awareness of consequences on personal norms, supporting the acceptance of H_{4b}. Meanwhile, the path coefficient for AOR and PNS signified a positive and significant effect of the ascription of responsibility on personal norms; the result offered evidence to accept H_{4c}.

Post-Hoc Power Analysis

To confirm the statistical power of the study results, the post hoc power analysis was performed with G*Power (Faul et al., 2007). The result in Annexure 2 shows that the study analysis did not depict any Type-II errors, as at the level of significance of 0.05, sample size of 1578, with the low effect size achieved for the study of 0.044, the power (1-beta probability) was found to be 0.999. It implies that there is no issue of Type-II errors in the study (Faul et al., 2007).

NCA Results

NCA was utilised to appraise the necessary conditions for energy conservation behaviours. The NCA results depicted that biospheric values (d = 0.242, p = 0.000), altruistic values (d = 0.281, p = 0.000), new environmental paradigm (d = 0.206, p = 0.003), awareness of consequences (d = 0.159, p = 0.000), ascription of responsibility (d = 0.103, p = 0.039), personal norms (d = 0.165, p = 0.000), and the energy conservation intention (d = 0.142, p = 0.000) significantly affected energy conservation behaviours. The results are shown in **Table 5**.

The bottleneck analysis confirmed that 59.0% of the biospheric values were necessary for developing energy conservation behaviours. Altruistic values (54.8%) were also necessary for the advent of energy conservation behaviours. On the other hand, a less than moderate level of new environmental paradigm was necessary to instigate energy conservation behaviours. Similarly, a less than moderate level of awareness of consequences (45%) was necessary to promote energy conservation behaviours. In contrast, a higher level of the ascription of responsibility (72.1%) was necessary to encourage energy conservation behaviours. Meanwhile, a lower level of personal norms (40.8%) was necessary to attain the highest level of energy conservation behaviours. Finally, the least necessary condition for instigating energy conservation behaviours was the energy conservation intention (40.8%). The analysis results are provided in **Table 6**.

TABLE 5 | Effect size.

	Energy conservation behaviour (*p*-value)
BOV	0.242 (0.000)
ALV	0.281 (0.000)
NEP	0.206 (0.003)
AOC	0.159 (0.000)
AOR	0.103 (0.039)
PNS	0.165 (0.000)
ECI	0.142 (0.000)

The d value is base on the ceiling envelopment-free disposal hull ceiling technique (ce-fdh). Significance testing was performed in NCA, with 10,000 permutations.

DISCUSSION

The current study's results offer significant evidence that the VBN theory has efficaciously explained young Malaysians' energy conversation intention and behaviours. As shown in the VBN model, the causal link was significantly associated with the next stages of the model variables (Ghargkavouzi et al., 2019). Biospheric and altruistic values have significantly predicted the new environmental paradigm that the environment is a substantial part of human life on earth. Hence, it is vital to take the necessary action to reduce human activities' impact on the ecology (Fornara et al., 2016). This study's results coincide with Kim and Seock's (2019) findings that the values remain the

TABLE 6 | Bottleneck analysis for energy conservation behaviour.

Predictors	Selected percentiles									
	10	20	30	40	50	60	70	80	90	100
BOV	NN	NN	5.0	12.7	20.4	28.1	35.8	43.5	51.3	59.0
ALV	0.7	6.7	12.8	18.5	24.8	30.8	36.8	42.8	48.8	54.8
NEP	NN	NN	NN	5.6	11.5	17.5	23.5	29.5	35.5	41.5
AOC	NN	NN	NN	0.8	8.2	15.5	22.9	30.3	37.7	45.0
AOR	NN	NN	NN	NN	NN	NN	NN	1.6	36.8	72.1
PNS	NN	NN	NN	5.6	11.4	17.3	23.2	29.0	34.9	40.8
ECI	NN	NN	NN	NN	3.4	9.9	16.4	22.8	29.3	35.7

BOV, biospheric values; ALV, Altruistic Values NEP, new environmental paradigm; AOC, awareness of consequences; AOR, ascription of responsibility; PNS, personal norms; ECI, energy conservation intention, ECB, Energy Conservation Behaviour. NN, not necessary condition.

significant predictors of the understanding to take necessary actions to mitigate climate issues.

The new environmental paradigm as a psychological state instigates the awareness among the people that the human race has been inattentively using global resources (Kiatkawsin and Han, 2017). Furthermore, corrective action emerges from the innate realisation that we need to change our lifestyle and reduce the wasteful consumption of global natural resources (Dhir et al., 2021). The present study confirms that the new environmental paradigm predicts the awareness of the consequences of reducing the use of electricity and agrees with Fornara et al. (2016).

Next, the awareness of consequences nurtures the attitude to take responsibility to correct the declining climate situation. The current study's results have confirmed that the awareness of consequences positively and significantly influenced the ascription of responsibility. This study's findings agree with the outcome reported by Unal et al. (2019) that awareness actively promotes the sense of taking responsibility to reduce the personal impact on the climate by adopting environmentally-friendly transportation modes.

Personal norms emerge from the three beliefs as postulated in the VBN (Stern, 2000). This study's outcome suggests that the three beliefs account for about 45% of the variance in personal norms. The finding concurs with the work of Yildirim and Semiz (2019) that personal norms are significantly promoted by norm activators (new environmental paradigm, awareness of consequences, and ascription of responsibility) to engage in pro-environment attitudes such as responsible consumption of water.

Subsequently, the results suggest that personal norms significantly nurture the energy conservation intention among the Malaysian youth. These findings coincide with Zhang et al. (2020) that individual personal norms facilitate the development of willingness to engage in environmentally friendly practices to mitigate the climate challenges. Lastly, the energy conservation intention significantly promotes energy conservation behaviours. The current study's finding agrees with Landon et al. (2018) that the intention to use sustainable tourist services promotes the actual adoption of sustainable hotel services.

Furthermore, the NCA helped to explore the necessary conditions for energy conservation behaviours among young Malaysians. Ascription of responsibility emerged as the most significant necessary condition to form energy conservation behaviours followed by biospheric and altruistic values. The results indicate that ascription of responsibility promotes pro-environmental behaviours when it emerges within individuals. Meanwhile, biospheric and altruistic values also play a vital role in developing the norm activation process in instigating climate-friendly behaviours (Ogbuanya et al., 2020). Norm activation provides support to build the necessary intention and later behaviour to engage in conservation behaviours.

Implications

The current study's results support the VBN framework's predictive power, suggesting that personal values are essential for promoting environmental beliefs that instigate pro-environmental norms and later pro-environmental energy conservation behaviours. Moreover, the study model has contributed to promoting biospheric and altruistic values as a prominent facilitator of pro-environmental beliefs and norms (Kiatkawsin and Han, 2017). Thirdly, the current research is among the few studies that have evaluated the VBN model with PLS-SEM and NCA. The NCA results have established that ascription of responsibility, biospheric and altruistic values are the most significant influencers of energy conservation behaviours among the study sample.

The study's results have several significant practical implications. First, energy consumption at the individual consumer level is an important daily activity, and consumers are willing to minimise energy consumption and display pro-environmental behaviours by conserving energy. Consumers require a reminder that can elicit biospheric and altruistic values, as well as personal determination to address climate challenges and engage in personal actions to limit climate effect (Ogbuanya et al., 2020). As climate change mitigation requires communal exertions from the general public, policymakers and leaders must help promote energy conservation behaviours in all possible manners. One option is facilitating the consumers to adopt energy-efficient energy instruments by reducing the tax. Next, setting price slabs on energy also facilitate the general energy consumers to reduce energy consumption as higher energy consumption leads to a higher payment. As such, the higher energy production cost is transferred to consumers using energy at a higher rate.

The existing study has three vital limitations. First, the current study emphasised energy conservation in a personal setting. Nevertheless, social influence plays a prominent role in personal energy-setting behaviors. It would be interesting to

add descriptive and injunctive norms impacting personal norms. Future studies can incorporate social influence to evaluate its specific role in promoting pro-environmental personal norms. Second, the current study used the VBN framework to consider that limited types of values act as antecedents of pro-environmental beliefs, activating personal norms that nurture the intention and later pro-environmental behaviours. Environmental knowledge may have a more significant role in instigating pro-environmental beliefs. Thus, future studies need to incorporate environmental knowledge to predict pro-environmental beliefs. Lastly, the current study employed a cross-sectional research design and an online survey data collection method. The cross-sectional research approach is associated with common method bias and limited generalisation. Furthermore, the current study used statistical and non-statistical tools to collect and analyze the appropriate data. Thus, future research should utilise multiple data collection sources and longitudinal data collection techniques to promote the research outcome.

CONCLUSIONS

It is critical to develop personal conservation behaviors among youth in order to address climate challenges. The VBN model was used to investigate the minimization of energy consumption intentions and conservation practices among young Malaysian consumers in the current study. According to the findings, Malaysian youth's values and norms strongly harness pro-environmental behavior in their own ability to minimize energy usage. Personal inclination and understanding are required to promote conservation practices in order to address global climate concerns, particularly energy consumption reduction.

Climate ideals must be instilled and internalized in youth so that they can take climate responsibility and mitigation activities. The two most important factors driving climate action to reduce energy consumption are understanding of the consequences of irresponsible energy consumption and assigning blame. Joint and communal efforts, on the other hand, are required to reduce climate impact and improve the global climate effectiveness of future generations. Policymakers can play an important role in encouraging energy-saving behaviors by launching public awareness campaigns and providing financial incentives.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

MM, QY, AS, and MS—Conceptualisation, Methodology, Instrument, Writing—Original Draft. AM and NH—Data collection, Formal Analysis and Writing—Revision.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fenrg.2022.902619/full#supplementary-material

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