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Article

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Factors Affecting Energy-Saving Intentions among Youth in Vietnam

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ABSTRACT

This study aims to demonstrate the factors that influence the energy-saving intentions of youth in Vietnam. The study applies an expanded Theory of Planned Behavior model with the addition of moral norms, product quality, and energy policy to enhance the explanatory power of youth's energy-saving intentions. The research data were collected using a stratified random sampling method with a sample size of 263 respondents from 5 provinces/cities: Ho Chi Minh City, Can Tho City, Binh Thuan Province, Dong Thap Province, and Kien Giang Province. By employing Structural Equation Modeling method, the study has demonstrated the positive factors influencing youth's energy-saving intentions, including attitudes towards energy-saving, perceived behavioral control, subjective norms, personal ethical standards, product quality, and energy policies. Among these factors, attitudes towards energy saving have the most impact on the energy-saving intentions of youth.

Keywords: Theory of Planned Behavior, Behavioral Intention, Energy Saving, Youth, Vietnam

JEL Classifications: E21, Q47, O13, E03

1. INTRODUCTION

The increasing energy consumption has a significant impact on greenhouse gas emissions and environmental pollution (Nguyen and Hoang, 2022). Energy-saving behavior is one of the most important factors that greatly influence energy consumption and is susceptible to the influence of energy policies (Abrahamse and Steg, 2009; Manjunath et al., 2014). Therefore, energy policies need to generate effective changes in energy consumption to reduce global warming and ensure energy security (Zhang et al., 2017).

The relationship between humans and nature is one of the most critical issues today (Hanh, 2022). This relationship helps educate young people to embrace global challenges and be ready to address pressing issues of the times (Shutaleva et al., 2021). The younger generation, accounting for approximately 23% of Vietnam's population, possesses sharp thinking skills and a quick grasp of progress and global issues (Bao et al., 2023). They can mobilize their families, friends, and communities to participate in movements aimed at tackling climate change

challenges, reducing emissions, and raising awareness of energy conservation (Bao et al., 2023). Today's youth have to confront the negative consequences of climate change, and their environmental behavior is crucial in minimizing these adverse outcomes (Balundè et al., 2020). To reduce greenhouse gas emissions and mitigate the adverse impacts of climate change, human actions, including energy-saving behavior, are necessary, especially among the young generation who represent the future of the nation (Hanh, 2022).

Most studies on the intention to save energy use the Theory of Planned Behavior (TPB) to explain the factors influencing the intention to save energy (Hao et al., 2022). Among them, attitude, subjective norms, and perceived behavioral control are the three factors commonly studied to determine the factors influencing the intention to save energy. This study also relies on the foundation of the TPB model but supplements it with additional factors (personal moral norms, product quality, and energy policies) to enhance the explanatory power of the intention to save energy among young people in Vietnam.

2. THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

2.1. Theoretical Framework

The TPB is an extension of the Theory of Reasoned Action (TRA), incorporating the structure of perceived behavioral control (Ajzen and Fishbein, 1980). TPB posits that an individual's specific behavior is predicted by their intentions to perform that behavior. When an individual's behavior is volitional, TPB suggests that these intentions can be predicted by three main factors: attitude toward the behavior, subjective norms, and perceived behavioral control. Within TPB, the relative importance of each factor in predicting intentions or behaviors varies across behaviors and contexts (Ajzen, 1991). Although TPB has certain limitations, such as its focus on rational decision-making rather than emotions, it has been widely used in numerous studies on human behavioral intentions across various fields. Several meta-analyses have indicated that TPB is a robust and useful tool for predicting behavior in many situations (Armitage and Conner, 2001).

2.1.1. Energy-saving intentions

Intention is a factor used to assess the ability to perform a behavior in the future (Engel et al., 1986). According to Ajzen (1991), behavioral intention is considered a combination of motivational factors influencing an individual's behavior, reflecting their readiness or effort to engage in the behavior. The intention is a behavioral process of an individual aimed at achieving a future behavior (Mowen and Minor, 2006; Zhao and Othman, 2010). As presented by Bosnjak et al. (2020), intention is a precursor to behavior and an important factor leading to behavior. Energy saving is understood as reducing unnecessary or disproportionate energy consumption in utility, services, and everyday life (Oikonomou et al., 2009).

2.2. Research Hypotheses

2.2.1. The relationship between personal moral norms and energy-saving intentions

According to Gao et al. (2017), personal moral norms are seen as a core factor for individuals to engage in specific ethical behaviors. High personal moral norms will motivate individuals to engage in pro-social behaviors, whereas low or nonexistent personal moral norms will hinder individuals from engaging in socially supportive behaviors (Fornara et al., 2016). Personal moral norms predict whether individuals support or oppose energy-saving actions (Nga, 2022). Personal moral norms are one of the factors predicting energy-saving intentions (Klößner, 2013; Gao et al., 2017; Schaffner et al., 2017; Shi et al., 2017; Ru et al., 2018; Wang et al., 2018; Hien and Chi, 2020; Fu et al., 2021). Therefore, the research hypothesis H1 is proposed as follows: *Personal moral norms positively influence the energy-saving intentions of youth.*

2.2.2. The relationship between subjective norms and energy-saving intentions

Subjective norms can be described as an individual's perception of social pressures to perform or not perform a behavior (Fishbein and Ajzen, 1975; Ajzen, 1991). For youth, social pressures, especially those from friends, are strong explanatory factors for behavioral intentions (Bao et al., 2023). Several studies have demonstrated

that subjective norms have a positive impact on energy-saving intentions (Zhang et al., 2013; Chen et al., 2017; Ding et al., 2019; Bonan et al., 2020; Hien and Chi, 2020; Xu et al., 2020; Chen and Chen, 2021; Tverskoi et al., 2021; Si-Dai et al., 2021; Hao et al., 2022). Therefore, the research hypothesis H2 is proposed as follows: *Subjective norms positively impact the energy-saving intentions of youth.*

2.2.3. The relationship between perceived behavioral control and energy-saving intentions

Perceived behavioral control is an individual's perception of the ease or difficulty of performing a specific behavior and is believed to reflect past experiences as well as anticipated difficulties and obstacles (Ajzen, 1991). Perceived behavioral control is a crucial factor in predicting an individual's future behavior (Klößner, 2013; Bosnjak et al., 2020; La Barbera and Ajzen, 2020). In the field of energy saving, perceived behavioral control has been shown to have a positive impact on energy-saving intentions (Zhang et al., 2014; Wang et al., 2018; Chen and Chen, 2021; Fu et al., 2021; Wang et al., 2021; Ahmad et al., 2022; Hao et al., 2022; Nguyen and Hoang, 2022). Therefore, the research hypothesis H3 is proposed as follows: *Perceived behavioral control positively affects the energy-saving intentions of youth.*

2.2.4. The relationship between attitude and energy-saving intentions

Attitude toward behavior is the extent to which an individual evaluates a behavior positively or negatively (Ajzen, 1991). Attitude is often formed based on an individual's beliefs about the consequences of engaging in a behavior and the outcomes of that behavior (Ajzen, 1991). Attitude is a significant factor related to an individual's intention to engage in a behavior (Verplanken and Orbell, 2003; Bosnjak et al., 2020). The more positive an individual's attitude toward a behavior, the more likely they are to have the intention to engage in that behavior (Nga, 2022). In the field of energy saving, several studies have demonstrated the positive impact of attitude on energy-saving intentions (Wang et al., 2011; Zhang et al., 2014; Chen et al., 2017; Wang et al., 2018; Ding et al., 2019; Hien and Chi, 2020; Chen and Chen, 2021; Hao et al., 2022; Nguyen and Hoang, 2022; Bao et al., 2023). Therefore, the research hypothesis H4 is proposed as follows: *Attitude positively influences the energy-saving intentions of youth.*

2.2.5. The relationship between product quality and energy-saving intentions

The purchasing behavior of energy-efficient products is one of the most important behaviors in reducing energy consumption (Ha and Janda, 2012). Some studies have shown that buying and using energy-efficient devices can help reduce energy consumption (Ali et al., 2019; Hua and Wang, 2019). When product quality is more environmentally friendly, the intention to save energy among users is higher (Nguyen and Hoang, 2022). Recent studies have demonstrated the influence of energy-efficient product quality on energy-saving behavioral intentions (Yue et al., 2013; Trotta, 2018; Zhang et al., 2018; Si-Dai et al., 2021; Thanh Nguyen et al., 2021). Therefore, the research hypothesis H5 is proposed as follows: *Product quality positively influences the energy-saving intentions of youth.*

Table 1: Interpretation of factors in the research model

Factor	Observed variable name	Scale	Reference resources
Personal Moral Norms	PMN1: Saving energy is the duty of every citizen.	Likert 1-5	Zhang et al. (2018), Nga (2022)
	PMN2: Energy-saving lifestyle protects the environment.	Likert 1-5	
	PMN3: Saving energy is subject to my moral obligation.	Likert 1-5	
	PMN4: I will feel unhappy if I do not save energy in my life.	Likert 1-5	
Subjective Norms	SN1: My family members want me to use less energy.	Likert 1-5	Tan et al. (2017), Wang et al. (2018)
	SN2: My friends want me to save energy.	Likert 1-5	
	SN3: I save energy because the community around me does the same.	Likert 1-5	
	SN4: People who are important to me advise me to save energy.	Likert 1-5	
Perceived Behavioral Control	PBC1: I understand what I have to do to save energy.	Likert 1-5	Wang et al. (2018), Hao et al. (2022)
	PBC2: I think it is not too difficult to reduce energy use.	Likert 1-5	
	PBC3: Whether I save energy or not is entirely up to me.	Likert 1-5	
	PBC4: I am confident that I can save energy if I want to.	Likert 1-5	
Attitude	AT1: Saving energy is important to reduce CO2 emissions.	Likert 1-5	Wang et al. (2018), Hao et al. (2022)
	AT2: Saving energy contributes to improving the air environment.	Likert 1-5	
	AT3: Saving energy is essential.	Likert 1-5	
	AT4: Quality of life will be improved if energy saving is practiced.	Likert 1-5	
Product Quality	PQ1: I am more interested in energy-saving products.	Likert 1-5	Thanh Nguyen et al. (2021), Nguyen and Hoang (2022)
	PQ2: I always prioritize products with energy-saving labels.	Likert 1-5	
	PQ3: Energy-saving products that both bring efficiency and ensure the quality of life.	Likert 1-5	
Energy Policies	EP1: Energy policy plays an important role in motivating and encouraging me to save energy.	Likert 1-5	Thanh Nguyen et al. (2021), Nguyen and Hoang (2022)
	EP2: I save energy because of policies and regulations related to energy saving.	Likert 1-5	
	EP3: I save energy because of being taught how to use energy efficiently.	Likert 1-5	
Energy-saving Intention	EI1: I will practice saving energy in the future.	Likert 1-5	Wang et al. (2018), Hien and Chi (2020), Nga (2022)
	EI2: I am ready to respond to propaganda campaigns to call for energy saving.	Likert 1-5	
	EI3: I will make efforts to save energy in work and daily life.	Likert 1-5	
	EI4: I am willing to save energy in work and daily life.	Likert 1-5	

2.2.6. The relationship between energy policies and energy-saving intentions

According to Considine (1994), policies are actions taken by the government, utilizing power and resources to promote a prioritized value. Social policies and regulations impact the formation and changes in energy-saving behavioral intentions (Wang et al., 2011). According to Nguyen and Hoang (2022), appropriate energy policies enhance the intention to engage in energy-saving behaviors. Several studies have demonstrated the positive impact of energy policies on energy-saving intentions (Abrahamse and Steg, 2009; Manjunath et al., 2014; Zhang et al., 2020; Hien and Chi, 2020; Yue et al., 2020; Thanh Nguyen et al., 2021; Fu et al., 2021). Therefore, the research hypothesis H6 is proposed as follows: *Energy policies positively influence the energy-saving intentions of youth.*

Based on the literature overview and the research hypotheses proposed, the research model of factors influencing the energy-saving intentions of youth (Figure 1) is proposed as follows:

3. RESEARCH METHODOLOGY

3.1. Research Scale

The research measures were adjusted through qualitative research to be more appropriate in the research context (Table 1). The adjusted research measures are as follows: The measure for personal moral norms includes 4 observed variables inherited from the study by Zhang et al. (2018) and Nga (2022). The measure for subjective norms consists of 4 observed variables inherited from the study by Tan et al. (2017) and Wang et al. (2018). The

measure for perceived behavioral control includes 4 observed variables inherited from the study by Wang et al. (2018) and Hao et al. (2022). The measure of attitude includes 4 observed variables inherited from the study by Wang et al. (2018) and Hao et al. (2022). The measure for product quality includes 3 observed variables inherited from the study by Thanh Nguyen et al. (2021) and Nguyen and Hoang (2022). The measure for government policies includes 3 observed variables inherited from the study by Thanh Nguyen et al. (2021) and Nguyen and Hoang (2022). The measure for energy-saving intentions includes 4 observed variables inherited from the study by Wang et al. (2018), Hien and Chi (2020), and Nga (2022).

3.2. Data and Analytical Methods

Quantitative analysis methods were used: (i) Testing the reliability of the measures using Cronbach's Alpha coefficient; (ii) Exploratory Factor Analysis (EFA) to assess the convergent and discriminant validity of the measures; (iii) Confirmatory Factor Analysis (CFA) to assess the suitability of the data to the model; (iv) Structural Equation Modeling (SEM) to test the research hypotheses.

According to Nguyen (2011), the sample size required for a study depends on various factors such as the data analysis method and the necessary reliability. When using SEM, a sample size of 100 to 200 observations is considered sufficient to achieve reliability (Hoyle, 1995). However, the sample size should be a minimum of 200 observations (Hoelter, 1983). In this study, stratified random sampling was used to collect data. The stratification criteria included geographical location and demographic characteristics. The survey was conducted from March 2023 to April 2023 in 5

Table 2: Evaluate scale reliability

Observed variable	Factor loading	Cronbach's alpha	Composite reliability	Average variance extracted
Personal moral norms		0.875	0.876	0.638
PMN1	0.695			
PMN2	0.819			
PMN3	0.795			
PMN4	0.824			
Subjective norms		0.886	0.887	0.663
SN1	0.824			
SN2	0.854			
SN3	0.802			
SN4	0.707			
Perceived Behavioral Control		0.872	0.874	0.635
PBC1	0.843			
PBC2	0.830			
PBC3	0.856			
PBC4	0.599			
Attitude		0.871	0.871	0.629
AT1	0.763			
AT2	0.761			
AT3	0.786			
AT4	0.829			
Product Quality		0.856	0.857	0.666
PQ1	0.780			
PQ2	0.823			
PQ3	0.817			
Energy Policies		0.818	0.821	0.605
EP1	0.636			
EP2	0.831			
EP3	0.822			
Energy-saving Intention		0.918	0.919	0.738
EI1	0.739			
EI2	0.744			
EI3	0.903			
EI4	0.862			

provinces/cities: Ho Chi Minh City, Can Tho City, Binh Thuan Province, Dong Thap Province, and Kien Giang Province. The total number of survey questionnaires obtained was 265, and after excluding the unsuitable ones (lacking reliability), a total of 263 valid survey questionnaires were used to test the research hypotheses. The demographic characteristics of the research sample included 54.37% living in urban areas and 45.63% living in rural areas. The gender distribution in the survey sample was nearly equal (52.47% male and 47.53% female). In terms of education level, the respondents included high school graduates (59.32%), college graduates (8.36%), and university graduates (32.32%). In terms of occupation, the highest proportion was office workers (28.83%), followed by students (22.81%), public sector employees (22.81%), and other occupations.

4. RESEARCH RESULTS AND DISCUSSION

4.1. Evaluate Scale Reliability

Based on the results of the measure validation, all measures were found to be reliable. Based on Table 2, the Cronbach's Alpha coefficients for the measures exceeded the requirement of 0.8 (Nunnally and Bernstein, 1994), ranging from 0.818 to 0.918. The composite reliability of the measures also met the requirement, with coefficients >0.8 and ranging from 0.821 to 0.919 (Fornell and Larcker, 1981; Hair et al., 1998). Furthermore, all factor loading coefficients were >0.5, and the extracted variance exceeded

0.5 (Fornell and Larcker, 1981; Hair et al., 1998). Therefore, these results indicate that the measures in the research model demonstrate reliability and achieve internal consistency.

According to the results of the examination in Table 3, the correlations between the latent constructs achieve discriminant values. The smallest square root of the average variance extracted (AVE) value on the diagonal is 0.778 (0.778–0.859). Meanwhile, the largest correlation value between the latent constructs below the diagonal is 0.664 (0.360–0.644). This means that the largest correlation value between the latent constructs is smaller than the smallest square root of the AVE values on the diagonal ($0.664 < 0.778$) (Fornell and Larcker, 1981).

4.2. Test Research Hypotheses

According to the results of the SEM in Table 4, all the model fit indices are acceptable. For example, $\chi^2/df = 1.399$, P-value = 0.000, GFI = 0.903, TLI = 0.969, CFI = 0.974, and RMSEA = 0.039 (Anderson and Gerbing, 1988). This indicates that the research model fits the market data. Based on Table 4, all the research hypotheses are accepted with a confidence level of 99%.

4.3. Discussion

Hypothesis H1: Personal moral norms have a positive influence on the intention to save energy among young people. The estimated result in Table 4 shows a positive relationship between personal

moral norms and the intention to save energy, with a standardized estimate coefficient of 0.187 and a statistically significant p-value of 0.003. The research findings indicate that higher personal moral norms promote environmentally friendly behaviors, while lower personal moral norms hinder environmental protection behaviors (Wang et al., 2019). Furthermore, individuals with higher personal moral norms are more likely to have an intention to save energy (Nguyen and Hoang, 2022). This result aligns with previous studies proposed by Klöckner (2013), Gao et al. (2017), Schaffner et al. (2017), Shi et al. (2017), Ru et al. (2018), Wang et al. (2018), Hien and Chi (2020), and Fu et al. (2021).

Hypothesis H2: Subjective norms have a positive impact on the intention to save energy among young people. This hypothesis is supported based on the examination of the standardized estimate coefficient of 0.170 and a statistically significant p-value of 0.007. This indicates that subjective norms can exert a strong impact on the intention to save energy and reduce energy consumption (Webb et al., 2013; Goldstein et al., 2008). It suggests that family members, friends, and important others have a positive influence on the intention to save energy among young people. In the field of energy conservation, this research finding aligns with previous studies proposed by Zhang et al. (2013), Chen et al. (2017), Ding et al. (2019), Bonan et al. (2020), Hien and Chi (2020), Xu et al. (2020), Chen and Chen (2021), Tverskoi et al. (2021), Si-Dai et al. (2021), and Hao et al. (2022).

Hypothesis H3: Perceived behavioral control positively influences the intention to save energy among young people. The examination

result in Table 4 reveals a positive relationship between perceived behavioral control and the intention to save energy, with a standardized estimate coefficient of 0.211 and a statistically significant p-value of 0.000. If individuals feel capable and possess sufficient knowledge and skills to save energy, they are more likely to form the intention to save energy (Nga, 2022). In the field of energy conservation, this research finding is consistent with studies proposed by Zhang et al. (2014), Wang et al. (2018), Chen and Chen (2021), Fu et al. (2021), Wang et al. (2021), Ahmad et al. (2022), Hao et al. (2022), and Nguyen and Hoang (2022).

Hypothesis H4: Attitude has a positive influence on the intention to save energy among young people. This hypothesis is accepted based on the examination of the standardized estimate coefficient of 0.214 and a statistically significant p-value of 0.000. The research finding indicates that attitude is the strongest factor affecting the intention to save energy among young people. Individuals with a positive attitude toward energy conservation are more likely to form the intention to engage in energy-saving behaviors (Hao et al., 2022). This finding supports the assertion that attitude is the most influential factor in shaping behavioral intentions (Verplanken and Orbell, 2003). Furthermore, the result aligns with previous studies proposed by Wang et al. (2011), Zhang et al. (2014), Chen et al. (2017), Wang et al. (2018), Ding et al. (2019), Hien and Chi (2020), Chen and Chen (2021), Hao et al. (2022), Nguyen and Hoang (2022), and Bao et al. (2023).

Hypothesis H5: Product quality has a positive effect on the intention to save energy among young people. The estimated result in Table 4 shows a positive relationship between product quality and the intention to save energy, with a standardized estimate coefficient of 0.165 and a statistically significant P-value of 0.006. The research findings affirm that if energy-saving products have better quality, are easily identifiable with energy-saving labels, and provide effective usage, the intention to save energy among young people will be higher. When product quality is more environmentally friendly, it increases the intention to save energy among users (Nguyen and Hoang, 2022). In the field of energy conservation, this result is similar to studies proposed by Yue et al. (2013), Trotta (2018), Zhang et al. (2018), Si-Dai et al. (2021), and Thanh Nguyen et al. (2021).

Hypothesis H6: Energy policies have a positive influence on the intention to save energy among young people. This hypothesis is accepted based on the examination of the standardized estimate coefficient of 0.167 and a statistically significant P-value of 0.004. This demonstrates a positive relationship between energy policies and the intention to save energy among young people. The

Figure 1: Proposed research model

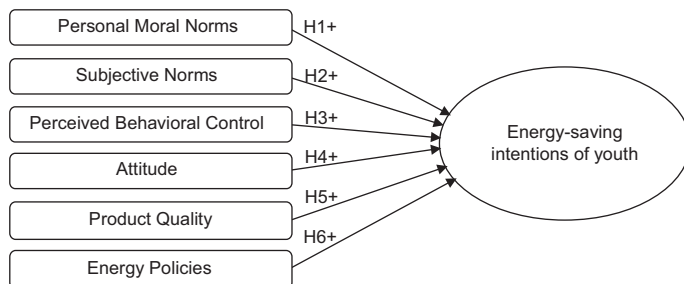


Table 3: Correlation matrix between latent constructs

	PQ	AT	SN	PBC	EP	PMN	EI
PQ	0.816						
AT	0.499	0.793					
SN	0.415	0.484	0.814				
PBC	0.521	0.453	0.483	0.797			
EP	0.411	0.438	0.439	0.360	0.778		
PMN	0.439	0.518	0.590	0.388	0.454	0.799	
EI	0.603	0.644	0.628	0.609	0.564	0.628	0.859

Table 4: Test research hypotheses

Relationship	Unstandardized			Standardized estimated value	Significance	Hypothesis
	Estimated value	Standard error	Critical ratio			
EI <-- PMN	0.204	0.070	2.926	0.187	0.003	H1: Accepted
EI <-- SN	0.181	0.067	2.700	0.170	0.007	H2: Accepted
EI <-- PBC	0.226	0.063	3.581	0.211	0.000	H3: Accepted
EI <-- AT	0.242	0.069	3.500	0.214	0.000	H4: Accepted
EI <-- PQ	0.196	0.072	2.743	0.165	0.006	H5: Accepted
EI <-- EP	0.202	0.069	2.903	0.167	0.004	H6: Accepted

research finding confirms that energy policies are an important tool for reducing energy consumption (Yuan et al., 2009; Dos Santos et al., 2013). When energy policies are appropriate, they contribute to enhancing the intention to engage in energy-saving behaviors (Nguyen and Hoang, 2022). This finding aligns with studies proposed by Abrahamse and Steg (2009), Manjunath et al. (2014), Zhang et al. (2020), Hien and Chi (2020), Yue et al. (2020), Thanh Nguyen et al. (2021), and Fu et al. (2021).

5. CONCLUSION

The study applied an extended TPB model to demonstrate the factors influencing the intention to save energy among young people in Vietnam. The research findings have indicated that the intention to save energy among young people is predicted by attitudes towards energy saving, perceived behavioral control, subjective norms, personal moral norms, product quality, and energy policies. Among these factors, attitudes towards energy saving have the strongest influence on the intention to save energy among young people.

Identifying the factors influencing the intention to save energy among young people contributes to providing a scientific basis for suggesting policy implications to promote energy-saving programs and environmental protection among young people. However, alongside the achieved results, the study also has some limitations: Firstly, this research focused only on intention and did not examine the actual energy-saving behavior of young people. Therefore, future research could explore the actual energy-saving behavior of young people to gain a better understanding of this behavior. Secondly, the income data used to test the research model may have limitations in terms of sample size and representativeness. Thus, future studies should increase the sample size and expand the survey area to enhance the representativeness of the research population.

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