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Article

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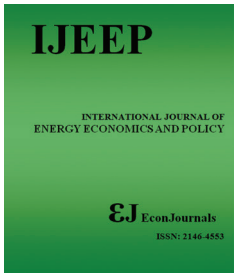

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Factors Affecting Households' Electricity-Saving Behaviour: A Perspective on Sustainable Development

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ABSTRACT

As technology continues to advance, the demand for electricity increases, and resources become scarcer, awareness of energy saving and related issues is increasingly important and has been the focus of scholarly research in recent times. This study investigates the key factors influencing households' electricity-saving behaviour in Ho Chi Minh City (HCMC), Vietnam, utilizing a convenience sampling approach. The research factors are attitude, social norms, personal moral norms, responsibility for energy-saving, degree of concern, policy, and social propaganda. These factors are expected to have an impact on perceived benefits and perceived behavioural control, which in turn are expected to positively influence the intention of HCMC householders to save electricity and engage in electricity-saving behaviours. The results show that most of the hypotheses are accepted. This study identifies the key factors mentioned above that play important roles, as well as the two further factors of perceived benefits and perceived behavioural control, in shaping intentions for electricity-saving and the impact on electricity-saving behaviours. However, this study found that the degree of concern and policy and social propaganda do not significantly affect perceived benefit, contrary to the initial hypotheses. This study provides evidence and offers insights to policymakers regarding the key factors that influence households' intentions to save electricity and their electricity-saving behaviours. Furthermore, this research lays the groundwork for scholars to develop a comprehensive understanding and conduct further in-depth studies aimed at proposing solutions to enhance awareness of electricity-saving among individuals and organisations. These efforts benefit the community and address environmental concerns, aligning with the UN's sustainable development goals.

Keywords: Energy-Saving Behaviours, Electricity Usage, Intention of Saving Electricity
JEL Classifications: Q40, Q41, Q43

1. INTRODUCTION

The Sustainable Development Goals (SDGs), as developed by the United Nations, are a worldwide framework designed to address urgent environmental, social, and economic issues. Duong et al. (2022) states that, over the past few decades, Vietnam has achieved remarkable global success in the development of its energy sector and should now align with the SDGs to drive positive change in the sector and contribute to overall sustainable development. Conserving energy contributes to environmental preservation and sustainability, and the efficient use of electricity is pivotal in this endeavour and aligns with sustainable development objectives. By actively participating in global initiatives to address climate change and prioritise energy conservation, we aim to foster the creation of a more sustainable society.

In the early years of the twenty-first century, Vietnam faced the impending threat of severe air pollution because of its rapid industrial and urban growth, particularly in its major cities (Nguyen et al., 2021; Ho et al., 2020; Nguyen et al., 2017), while Nguyen et al. (2021) states that Vietnam's energy resource management and utilization are inefficient. The country is also experiencing an energy deficit because of rising global oil prices and reduced hydroelectric power generation due to adverse

weather conditions; Vietnam grapples with challenges in ensuring a reliable energy supply during dry seasons, particularly amidst prolonged droughts, as insufficient rainfall impedes the generation of electricity from hydropower facilities. From 2010 to 2019, Vietnam witnessed a steady rise in electricity consumption, primarily driven by structural shifts within the different sectors of the economy (Nguyen et al., 2021) so energy conservation is now imperative as urban areas expand and energy demand rises. These objectives present a holistic strategy for communities and individuals to embrace renewable energy options, bolster energy efficiency, and transition urban environments into eco-conscious habitats. In addition, it is crucial to concentrate on the aspects of sustainable development in today's context. Therefore, by aligning these efforts with the SDGs, urban areas can mitigate the effects of climate change, improve air quality, and enhance the overall welfare of the residents.

According to Belaïd and Joumni, (2020), energy efficiency policies are principally aimed at the residential sector, due to the vast opportunities there for reducing energy consumption. Energy saving has recently become a critical issue for Vietnam, partly because of a growing population and a rapidly developing economy, which is driving up energy demand and efficient energy use is a crucial component of the plan to balance economic growth, energy security, and environmental preservation (Nguyen et al., 2022). Consequently, there is a growing significance placed on the importance of energy savings and efficiency (Duong et al., 2022). Therefore, saving electricity for individuals and households is a necessary and encouraged practice to contribute to budget savings for families. It is also a responsibility of each household towards society and environmental protection.

There are three main theoretical approaches that can be used to analyse household electricity-saving behaviour; examining the influence of economic considerations, focusing on technology, and examining psychological behaviour (Wang et al., 2018). Nguyen et al. (2021) indicates that lifestyle choices influence energy-saving actions in a positive way. Despite significant advancements in energy-saving technology and notable improvements in the energy efficiency of devices over the past decades, household electricity consumption continues to rise, so it is crucial to prioritize electricity-saving practices and propose solutions and implications for policymakers and scholars in future research. This study aims to determine the critical elements impacting the intention to save electricity and their subsequent impact on electricity-saving behaviours among urban families in HCMC, with the goal of boosting such intentions and behaviours.

2. LITERATURE REVIEW

2.1. Theoretical Background

This research employed the theory of planned behaviour (TPB) as a framework to investigate how different factors influence the energy-saving behaviours of households. By building upon the theory of reasoned action, introduced by Fishbein and Ajzen (1977), the TPB offers a broader perspective and valuable insights into understanding and analysing energy-saving behaviours. Within the TPB framework, an individual's intention to partake in a particular action is shaped by three primary elements, namely their personal outlook on the behaviour, their interpretation of subjective norms, and the societal expectations they perceive from others. This research has applied the TPB theory to analyse and understand energy-saving behaviours among individual energy consumption in HCMC. The research investigates the collective influence of attitudes, social norms, personal moral norms, responsibility for energy-saving, degree of concern, policy and social propaganda, along with the mediating roles of perceived benefit and perceived behavioural control, on the intention to save electricity and influence electricity-saving behaviours among households in HCMC.

2.2. Electricity-Saving Behaviours

According to Duong et al. (2022), energy-saving behaviours refer to the actions and habits practiced in daily home routines that aim to decrease energy consumption during periods when it is unnecessary, thereby contributing to the saving of energy resources and reducing their depletion. Through adopting energy-conserving habits, individuals can play a part in fostering a sustainable future. These behaviours encompass alterations in both daily practices and overarching choices, applicable across scales from personal households to corporate entities and even entire nations.

According to Wang et al., (2018), the intention of residents to conserve electricity is positively and significantly influenced by their personal moral values, habits, and expected positive emotions. There are many energy-saving practices which cover all energy-intensive activities including lighting, cooking, air conditioning, and entertainment, as noted by Leighty and Meier (2011). Electricity-saving behaviours that are enacted by individuals and organisations can be described as conscious efforts to save energy in their households or within their organisational operations.

2.3. Attitude

While the term 'attitude' is commonly used in daily life and generally understood, it is vital that science educators provide a precise definition of such concepts for the sake of clarity. According to Belaïd and Joumni, (2020), there should be a comprehensive strategy that factors in the intricate nature of household habits and mindsets so we can understand the fundamental motives behind energy conservation actions and accomplish energy efficiency objectives. Encouraging positive attitudes towards energy consumption is essential for advancing energy conservation efforts and attaining environmental objectives.

Previous academic work focusing on pro-environmental behaviours, encompassing attitudes, values, and beliefs, have suggested that individuals with a favourable mindset and attitude tend to be more inclined to adopt pro-environmental intentions and behaviours (Lee and Tanusia, 2016). Attitudes that are significantly linked with specific environmental behaviours can impact those behaviours, not just at home, but also in the professional environment. Hence, attitudes are pivotal in promoting energy-saving at both an individual and organisational level; at best, they drive conscientious conduct and a communal obligation.

Individuals who have a favourable attitude towards environmental sustainability are more likely to make energy-saving lifestyle choices, while organizations that prioritize sustainability are more likely to use energy-saving measures.

H1a: There is a significant relationship between attitude and perceived benefit towards the intention to save electricity.

H1b: There is a significant relationship between attitude and perceived behavioural control towards the intention to save electricity.

2.4. Social Norms

According to Ajzen (1991), the perception of social community impact refers to the perceived societal pressure influencing whether one should partake in, or abstain from, a specific behaviour. The social norm is characterised by societal tendencies to accept or reject certain behaviours, thus outlining what is considered acceptable and unacceptable (Nguyen et al., 2021). The social norms surrounding electricity-saving are a crucial component of environmental preservation and the conservation of natural resources and plays a pivotal role in achieving financial savings and ensuring efficient electricity utilization for the nation.

Nguyen and Pham (2020) found that when individuals act in a particular way to save energy, like using lights only in active spaces, this can increase the likelihood that those around them will also engage in energy-saving behaviours. Sanctions can also be employed to uphold social norms and are often designed to trigger a range of negative emotional responses in those who breach them. When individuals act out of line, societal disapproval may result in feelings of embarrassment and a desire to remain inconspicuous. The influence of family, friends, and wider societal norms can shape an individual's anticipated standard of behaviour, as noted by Martinsson et al. (2011), while Barr et al., (2005) pointed out that actively engaging in social initiatives can significantly influence the acceptance of energy-conserving practices. Social norms play a pivotal role in electricity conservation by cultivating attitudes and behaviours that prioritise environmental and community concerns. Considering this analysis, the following hypotheses have been developed:

H2a: There is a significant relationship between social norms and perceived benefit on the intention to save electricity.

H2b: There is a significant relationship between social norms and perceived behavioural control on the intention to save electricity.

2.5. Personal Moral Norms

Bertoldo and Castro (2016) found that a personal moral norm motivates individuals to act, grounded in their sense of ethical duty. An individual's actions towards the environment are shaped by their personal moral values as well as societal norms (Wang et al., 2018). Therefore, people who strongly adhere to their personal moral principles might feel uneasy when they encounter behaviours that waste electricity or neglect conservation efforts as these actions go against their ethical beliefs. As a result, we can conclude that individuals with stronger moral conduct are more likely to prioritise energy conservation.

The higher an individual's personal ethical standards, the more likely they are to participate in environmentally-friendly behaviours; their personal ethical standards regarding the use of electricity are influenced by their values, beliefs, and moral considerations, ultimately encouraging behaviours aimed at conserving electricity. Therefore, individuals possessing strong personal ethics tend to exhibit a greater sense of accountability towards saving electricity in comparison to their counterparts. They perceive energy-saving as a civic obligation that everyone should participate in, with the goal of enhancing energy security and safeguarding the environment. Thus, building upon the preceding analysis and evidence, the hypotheses have been formulated:

H3a: There is a significant relationship between personal moral norms and perceived benefit towards the intention to save electricity.

H3b: There is a significant relationship between personal moral norms and perceived behavioural control towards the intention to save electricity.

2.6. Responsibility

One determinant of consumers' energy-saving practices, both within and outside the household, is their understanding of their obligation to save energy, often characterized as a sense of ethics or duty that one experiences during energy consumption (Gärling et al., 2003). The initial definitions underscore the fact that social responsibility pertains to moral values, ethics, and norms guiding consumer actions and the responsibilities they feel regarding the acquisition, usage, and disposal of goods and services (Hoffmann-Burdzińska et al., 2022). Some individuals may feel a strong personal responsibility to save energy based on their values or beliefs, which may drive them to switch off lights when they are unnecessary, opt for energy-efficient appliances, and minimize air conditioning usage. Saving electricity not only reduces the likelihood of an energy crisis but also aids environmental protection by curbing emissions from electricity generation, thereby mitigating the effects of climate change. Drawing from the analyses provided above, and considering the given facts, I have formulated the following hypotheses:

H4a: There is a significant relationship between responsibility for energy-saving and perceived benefit in the intention to save electricity.

H4b: There is a significant relationship between responsibility for energy-saving and perceived behavioural control in the intention to save electricity.

2.7. Degree of Concern

The level of interest can be compared to the attention given to environmental issues concerning electricity-saving. According to Duong et al. (2022), the recognition of the need for energy-saving significantly influences an individual's drive to save energy, with this impact primarily manifested through the level of concern. Just as we consider the environmental implications of our actions, similar emphasis should be placed on the saving of electricity, which includes developing an understanding of the sources of our electricity, recognizing the environmental impact of excessive electricity usage, and taking steps to reduce our consumption. The level of attention given to saving electricity reflects how much people value using energy responsibly and mindfully. Demonstrating one's concern for energy saving

involves various actions, including switching off lights when not needed, maximising the efficiency of appliances, and engaging in community-driven energy-saving initiatives, all of which reduces individual carbon footprints and contributes to the larger global initiative of sustainable living and resource management. The hypotheses are therefore formulated as follows:

H5a: There is a significant relationship between the degree of concern in saving electricity and perceived benefit in the intention to save electricity.

H5b: There is a significant relationship between the degree of concern in saving electricity and perceived behavioural control in the intention to save electricity.

2.8. Policy and Social Propaganda

Policy and social propaganda designed to drive individual energy savings, specifically for electricity, is an essential part of the broader push towards sustainability and environmental conservation. Policy is the mechanism through which a government utilises its authority and resources to endorse and advance a valued priority (Considine, 1994), while according to Nelson (1996), propaganda is a type of persuasive communication that uses well-constructed one-way communications to sway the target audience's emotions, attitudes, beliefs, and behaviours. Encouraging individuals to save electricity requires a multifaceted approach, including public awareness initiatives, incentive schemes, regulatory measures, educational campaigns, community involvement, smart metre installation, public infrastructure investments, collaboration with private entities, behavioural nudges, and strategic long-term planning. These endeavours are aimed at increasing awareness, motivating energy-efficient practices, and fostering a sustainable mindset within society.

Wang et al. (2011) states that individual's energy-saving habits are shaped and changed by the implementation of social policies and regulations. The key is to emphasise the personal and environmental benefits of saving electricity, making it clear that small changes can have a significant impact. This approach can help to foster a culture of energy conservation, reducing energy waste and promoting the transition to a more sustainable society. Considering the impact of policy and propaganda on household energy-saving behaviour, the following hypotheses have been formulated:

H6a: There is a significant relationship between policy and social propaganda and perceived benefit towards the intention to save electricity.

H6b: There is a significant relationship between policy and social propaganda and perceived behavioural control towards the intention to save electricity.

2.9. Perceived Benefit

Perceived benefit, according to Orbell et al. (1996), is the understanding of how engaging in a certain action can lead to beneficial outcomes. The perceived benefit from saving electricity encompasses the advantages individuals foresee from incorporating energy-saving practices into their daily routines. These benefits may include immediate or long-term advantages such as financial savings, environmental preservation, and a sense of personal fulfilment derived from responsible action.

As a cognitive emotion, perceived benefit influences behaviour in a positive way (Tsujikawa et al. 2016); indeed, when an individual acknowledges the potential benefits or positive consequences of their actions, they are more inclined to participate in that behaviour. It is a powerful motivator and can be particularly effective in shaping behaviours related to sustainability and social responsibility. For instance, recognising the benefits of saving energy, such as lower utility bills, environmental preservation, and promoting sustainability, can inspire individuals to adopt energy-efficient practices in their daily lives.

Banfi et al., (2008), demonstrated that consumers greatly appreciate the advantages of conserving energy in terms of both individual savings and benefits impacting the environment. The financial incentive of lower utility bills positively influence residents' electricity-saving habits. When households recognize these benefits, they are likely to develop an appreciation for energy efficiency, thus fostering a positive attitude towards energy-saving practices. Based on this analysis and evidence, the hypothesis is formulated as follows:

H7: There is a significant relationship between perceived benefit and the intention to save electricity.

2.10. Perceived Behavioural Control

In the context of saving electricity, perceived behavioural control refers to a person's belief in their capacity to use energy-saving techniques while taking into consideration their knowledge of their circumstances and the resources at their disposal. According to Nguyen and Pham (2020), if someone sees energy-saving actions as meaningful, beneficial, and advantageous for lowering carbon emissions, they are likely to maintain a positive attitude and be motivated to participate in electricity-saving behaviours. Perceived behavioural control encompasses an individual's confidence in their ability to execute a specific behaviour. This view affects individual trust in their ability to implement energy-saving behaviours, considering elements like financial considerations, societal ramifications, and environmental consciousness.

Perceived behavioural control involves acknowledging the resources available and the capacity to utilise them when engaging in a specific behaviour. When individuals perceive themselves as having ample resources, their sense of control over their actions typically increases (Nguyen and Pham, 2020). So, if someone feels confident in their ability to swap out traditional light bulbs for energy-efficient ones, remember to switch off lights upon leaving a room, or utilise appliances in a manner that saving energy, they possess a strong sense of perceived behavioural control. This belief could potentially impact their behaviour positively, encouraging them to participate in actions that saving electricity. Therefore, the hypothesis has been developed utilising both the observed fact and the analysis provided above:

H8: There is a significant relationship between perceived behavioural control and the intention to save electricity.

2.11. Intention of Saving Electricity

Energy, including electricity, is an essential necessity for daily life. Energy-saving awareness involves recognising the significance of conserving energy and adopting practices to do so. The

intention to conserve energy is a crucial determinant of energy-saving behaviour within households, as suggested by Wang et al. (2018). The driver of behaviour is behavioural intention, which is influenced by attitude towards the behaviour and subjective norms, both of which function as drivers that lead an individual to exhibit a particular behaviour (Nguyen et al., 2022). It can be readily observed that as the favourable attitude and subjective norms increase, so does the intention leading to energy-saving behaviour.

A person's preparedness or intention to engage in particular activities is indicated by their behavioural intention, which includes the motivating elements influencing their actions (Nguyen et al., 2022). The objective of a behaviour is considered an intermediate precursor to the behaviour itself. It is common in consumer behaviour research to treat intention and behaviour as closely related, or even as a single entity. If they are distinguished, their connection is often seen as tightly linked. Considering this observation and analysis, the following hypothesis has been formulated:

H9: There is a significant relationship between the intention to save electricity and electricity-saving behaviours.

3. METHODOLOGY

This study explores the key factors influencing electricity-saving behaviour among households in Ho Chi Minh City (HCMC), Vietnam, using a convenience sampling method. A total of 437 data samples were selected for analysis. Additionally, in this study, the conceptual framework utilises established scales (with some adjustments) to fit my research context. The constructs under investigation are latent variables, and they are evaluated using scales consisting of multiple items.

The measurement of scales of attitude was adapted from Wang et al. (2018) and consists of ATT1, ATT2, and ATT3. The social norms variable was adapted from Zhang et al. (2018) and consists of SNO1, SNO2, and SNO3. The personal morals norm was adapted by Wang et al. (2018) and consists of PMN1, PMN2, and PMN3. The variable of responsibility for energy-saving was adapted by Duong et al. (2022) and consists of RES1, RES2, and RES3. The degree of concern in saving electricity energy was adapted by Duong et al. (2022) and the scales of measurement are DCO1, DCO2, and DCO3. The policy and social propaganda scale was adapted by Zhang et al. (2018) and consists of PSP1 and PSP2, and I contributed PSP3. The measure of perceived benefit was adapted by Nguyen and Pham (2020) and consists of PBE1, PBE2, PBE3, and PBE4. The scale for perceived behavioural control was adapted by Wang et al. (2018) and consists of PBC1, PBC2, and PBC3. The measure for intention to save electricity was adapted by Wang et al. (2018) and consists of ISE1, ISE2, and ISE3. Finally, the electricity-saving behaviour scale was adapted by Wang et al. (2018) and consists of ESB1, ESB2, and ESB3. In addition, I use a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), and data analysis is conducted using SmartPLS software. The data underwent thorough scrutiny, with appropriate measures taken to select suitable samples; those lacking information or providing careless responses were excluded.

There were 437 data samples inputted and analysed for this study, of which 52.9% was collected from males, 42.1% from females, and 5.0% from other genders. The target for surveying were individuals aged 18-over 51 years old, with qualifications ranging from Certificate to Doctorate level. Sampling for the survey was conducted using a convenient method. The demographic details are shown in Table 1.

4. FINDINGS

The first stage of the PLS-SEM analysis involved assessing the measurements. Table 2 presents the Cronbach's alpha coefficients, composite reliabilities, and average variances extracted from the statistical data, offering insights into the dataset under examination.

According to the data in Table 2, all the variables have Cronbach's alpha values exceeding 0.7, which meets the statistical threshold; all the CR scores were above 0.7, and all the AVE values surpassed 0.5, indicating convergence across all scales.

Henseler et al. (2015) states that discriminant validity is established when all HTMT ratio values are <0.9, as is the case in Table 3, confirming discriminant validity and satisfying the specified statistical criteria. This study also conducted SEM analysis with 5000 bootstrap samples; and the results are presented in Figure 2 and Table 4.

Figure 2 presents the SEM diagram for this study, illustrating the relationships among the paths analysed. The statistical results shown in Table 4 indicate that most paths are statistically significant, with P-values below 0.05. The two exceptions are the DCO -> PBE ($\beta = 0.010$, $P = 0.776$) and PSP -> PBE paths ($\beta = 0.065$, $P = 0.060$), which have $P > 0.05$ and are therefore not statistically significant.

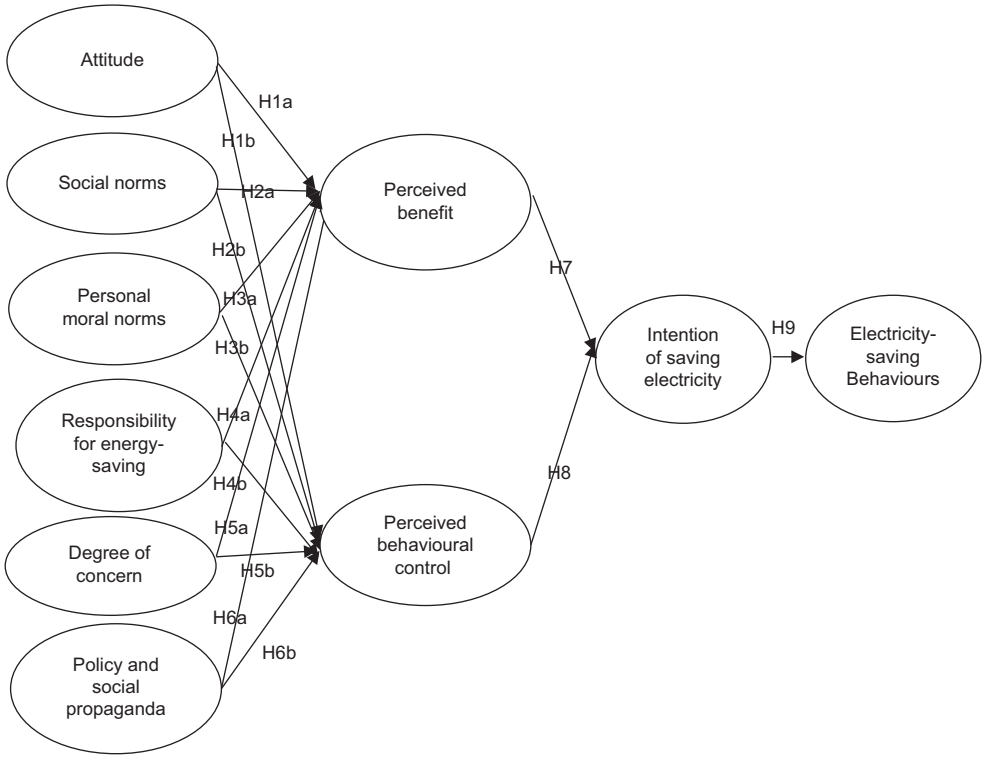
Additionally, the measuring scales employed in this investigation show significant reliability, according to my findings, which are based on the statistical data from Table 4 and Figure 2. Furthermore, the research model has value in elucidating the correlations among the variables that are being studied. All hypotheses are supported, except for DCO -> PBE and PSP -> PBE, as their $P > 0.05$ and are therefore rejected.

In conclusion, ATT has a positive effect on PBE ($\beta = 0.239$, $P < 0.05$) and on PBC ($\beta = 0.194$, $P < 0.05$). SNO shows a positive effect on PBE ($\beta = 0.279$, $P < 0.005$) and on PBC ($\beta = 0.204$, $P < 0.05$). PMN shows a significant relationship with PBE ($\beta = 0.269$, $P < 0.05$) and with PBC ($\beta = 0.181$, $P < 0.05$). RES has a positive relationship with PBE ($\beta = 0.311$, $P < 0.05$) and with PBC ($\beta = 0.228$, $P < 0.05$). DCO has no significant effect on PBE ($\beta = 0.010$, $P = 0.776 > 0.05$) but does have a positive effect on PBC ($\beta = 0.086$, $P < 0.05$). PSP has no significant effect on PBE ($\beta = 0.065$, $P = 0.060 > 0.05$) but does have a significant relationship with PBC ($\beta = 0.220$, $P < 0.05$). PBE shows a significant relationship with ISE ($\beta = 0.343$, $P < 0.005$) and PBC shows a significant relationship with ISE ($\beta = 0.458$, $P < 0.05$). Finally, ISE has a positive effect on ESB ($\beta = 0.758$, $P < 0.05$).

Table 1: Demographic profile

Demographic variables	Frequency	Percentage	Valid percentage	Cumulative percentage
Gender				
Male	231	52.9	52.9	52.9
Female	184	42.1	42.1	95.0
Other	22	5.0	5.0	100.0
Total	437	100.0	100.0	
Age				
18-30	89	20.4	20.4	20.4
31-40	161	36.8	36.8	57.2
41-50	138	31.6	31.6	88.8
51 and over	49	11.2	11.2	100.0
Total	437	100.0	100.0	
Qualification				
Certificate	70	16.0	16.0	16.0
Diploma	119	27.2	27.2	43.2
Bachelor	192	43.9	43.9	87.1
Master	42	9.6	9.6	96.7
Doctorate	14	3.3	3.3	100.0
Total	437	100.0	100.0	
Family situation				
Living alone	67	15.3	15.3	15.3
Married with no children, or not living with their children	90	20.6	20.6	35.9
Two-generation family	169	38.7	38.7	74.6
Three- or four- generation family	111	25.4	25.4	100.0
Total	437	100.0	100.0	

Figure 1: The conceptual framework of this study.



5. DISCUSSION

According to Nguyen et al. (2022), saving electricity is an issue for today and in the future as power usage rises, threatening national energy security. High-efficiency energy use is an essential component of the plan to balance economic growth, energy security, and environmental preservation. This study explores the electricity-saving behaviour in HCMC households by developing a research framework of variables that influence energy-saving behaviour in metropolitan households.

The findings highlight that urban-dwelling individuals have perceptions regarding their intention to save electricity and the associated behaviours. In reference to the noteworthy correlation between attitude and the perceived benefits of saving electricity, the outcomes of this research demonstrate that attitude (ATT)

exerts a positive influence on perceived benefits (PBE) (β = 239, P < 0.05), thereby supporting H1a and suggesting that households in HCMC that have a favourable attitude toward electricity saving and recognizing tangible benefits are more inclined to express a robust intention to save electricity. Moreover, individuals from HCMC households who recognise the advantages of electricity-saving behaviour and possess a positive attitude towards it are more inclined to follow through on their objectives and engage in energy-saving behaviours in their everyday lives. Rational electricity-saving practices will also help HCMC families to reduce their monthly costs and, in addition to the financial advantages, saving energy also helps to reduce greenhouse gas emissions, mitigating global warming and protecting the environment. Finally, individuals from HCMC households with energy-saving awareness help to raise communal awareness of environmental conservation, thereby enhancing the sustainability of the living environment and protecting natural resources.

Table 2: Cronbach's alpha coefficients, composite reliabilities, and average variances extracted

Variables	Cronbach's alpha	rho_A	Composite reliability	AVE
AAT	0.803	0.803	0.884	0.717
DCO	0.751	0.758	0.857	0.667
ESB	0.865	0.865	0.917	0.787
ISE	0.870	0.873	0.921	0.795
PBC	0.860	0.862	0.914	0.781
PBE	0.857	0.859	0.903	0.700
PMN	0.815	0.821	0.890	0.730
PSP	0.807	0.814	0.886	0.721
RES	0.759	0.762	0.862	0.676
SNO	0.776	0.776	0.870	0.691

AVE: Average variance extracted

Wang et al. (2018) found a favourable correlation between a person's attitude and their perception of their capacity to control behaviour regarding the intent to save electricity. This shows that individuals who have a positive attitude to saving electricity are also more likely to think that they can control how much electricity they use, which makes them more determined to save electricity. My findings reveal that attitude (ATT) positively influences perceived behavioural control (PBC) (β = 0.194, P < 0.05), thereby supporting H2a which posits that a significant association between attitudes and perceived behavioural control would imply that households in HCMC that have positive attitudes

Table 3: Heterotrait-Monotrait ratios

Variables	AAT	DCO	ESB	ISE	PBC	PBE	PMN	PSP	RES
AAT									
DCO	0.240								
ESB	0.442	0.342							
ISE	0.548	0.382	0.873						
PBC	0.561	0.473	0.589	0.791					
PBE	0.675	0.403	0.564	0.746	0.770				
PMN	0.365	0.412	0.360	0.439	0.572	0.667			
PSP	0.207	0.499	0.369	0.450	0.556	0.429	0.408		
RES	0.464	0.421	0.452	0.621	0.649	0.742	0.466	0.440	
SNO	0.526	0.271	0.361	0.508	0.562	0.680	0.354	0.243	0.362

Figure 2: An SEM diagram for this study

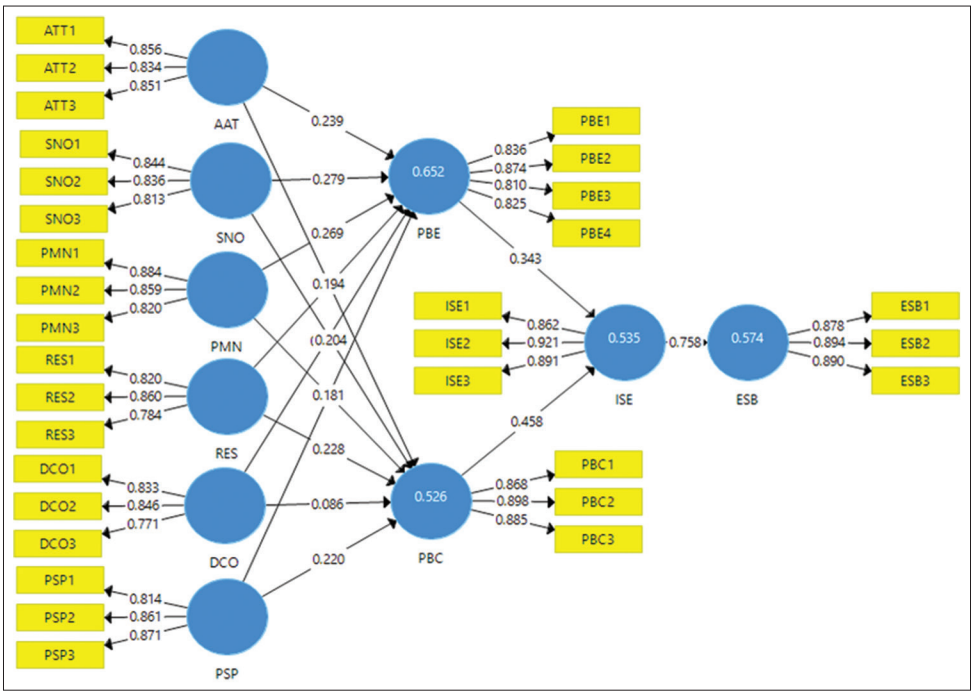


Table 4: Means, standard deviation, t-statistics, and P-values

Paths	Original sample (O)	Sample mean (M)	SD	T statistics (|O/SD|)	P
AAT -> PBC	0.194	0.194	0.035	5.475	0.000
AAT -> PBE	0.239	0.240	0.035	6.772	0.000
DCO -> PBC	0.086	0.087	0.042	2.036	0.042
DCO -> PBE	0.010	0.011	0.037	0.285	0.776
ISE -> ESB	0.758	0.758	0.027	27.692	0.000
PBC -> ISE	0.458	0.460	0.046	9.909	0.000
PBE -> ISE	0.343	0.342	0.045	7.610	0.000
PMN -> PBC	0.181	0.181	0.038	4.815	0.000
PMN -> PBE	0.269	0.271	0.034	7.822	0.000
PSP -> PBC	0.220	0.220	0.040	5.521	0.000
PSP -> PBE	0.065	0.065	0.034	1.884	0.060
RES -> PBC	0.228	0.229	0.041	5.550	0.000
RES -> PBE	0.311	0.310	0.032	9.760	0.000
SNO -> PBC	0.204	0.204	0.037	5.551	0.000
SNO -> PBE	0.279	0.278	0.034	8.093	0.000

SD: Standard deviation, PBE: Perceived benefits

towards electricity-saving behaviour are more likely to believe in their capacity to control their electricity-saving behaviours. This heightened sense of control leads to a stronger desire for electricity-saving, resulting in a higher likelihood of HCMC households participating in electricity-saving behaviours.

With reference to the noteworthy association found between social norms and the perceived benefits linked to saving electricity, I found that SNO has a positive effect on PBE ($\beta = 0.279$, $P < 0.05$), thereby validating H2a and indicating a strong correlation between social norms and the perceived benefits of saving electricity. Therefore, the results point to a favourable association between social norms and perceived benefit that might lead to a concerted effort by HCMC households to save energy. Individuals within the household are more likely to internalise these norms and behave appropriately when society promotes the necessity of electricity-saving and emphasises the benefits associated with such behaviour. This can result in an overall increase in electricity-saving intentions and behaviours. Consequently, the media might consider utilising advertising to encourage people to view electricity-saving as a positive social norm, not only at home but also in public.

People's willingness to save electricity is also significantly influenced by their ethical standards (Nguyen et al. (2022). Ethical standards shape how individuals perceive right and wrong, and they frequently influence the choices individuals make in various aspects of their lives, such as their interactions with others, professional conduct, and attitudes towards the environment and resources such as electricity. A significant correlation between social norms and perceived behavioural control regarding the intention to save electricity is revealed by the results of this study which indicate that SNO positively influences PBC ($\beta = 0.204$, $P < 0.05$), thereby supporting H2b. If enough social norms within the social environment promote electricity-saving among the population, it will result in the proliferation of such practices. When there is a social norm emphasising energy conservation, individuals are more likely to act accordingly because they may feel a sense of social pressure if they fail to do so, and a sense of autonomy in energy-saving practices will also develop. Thus, it is imperative for local authorities to enhance initiatives promoting electricity-saving, engaging each household to recognise the significance of saving electricity in terms of societal benefits and environmental protection. This also underscores the ethical responsibility of everyone to participate in electricity-saving practices.

In relation to the connection between personal moral standards and the perceived benefit concerning the intention to save electricity, there is a significant relationship between PMN and PBE ($\beta = 0.269$, $P < 0.05$), thereby supporting H3a. Similarly, H3b is also supported as PMN exhibits a significant relationship with PBC ($\beta = 0.181$, $P < 0.05$). Individuals and households should be conscious of their energy consumption and consider it as a personal standard of modern behaviour and responsibility towards the environment and society, aiming for sustainable development. According to Wang et al. (2018), there is a positive and significant correlation between residents' intention to save electricity and the positive anticipated emotions associated with personal moral norms, which suggests that when individuals experience stronger positive emotions linked to their personal moral beliefs, their intention to save electricity rises. Saving energy helps to reduce emissions from power plants and other energy sources, leading to improved air quality and a decreased risk of health issues related to air pollution. Individuals from HCMC households should use electricity-saving labelled devices, regularly clean and maintain their appliances, unplug them when not in use, and control the use of electrical devices, especially when they are not at home.

My findings on the association between RES and PBE regarding the intention to save electricity reveal a positive relationship, with a beta coefficient of 0.311 and a significance level of $P < 0.05$; therefore, H4a is accepted. H4b is also supported as RES shows a positive relationship with PBC ($\beta = 0.228$, $P < 0.05$). Hence, there exists a significant relationship between responsibility for energy-saving and PBC concerning the intention to save electricity. Based on the research results, the management recommendations suggest that utilising electricity efficiently and economically is the obligation and responsibility of each individual and family in HCMC. It should be voluntarily embraced to yield benefits for both individuals and the community. Individuals within a

household consider saving electricity as a standard behaviour. Saving not only benefits individuals and families financially but also raises awareness about environmental protection. Specifically, this behaviour can be achieved by promoting the proper use of electricity, turning off electrical devices when not in use, such as lights, fans, TVs, etc. Saving electricity is a commendable behaviour, and everyone should join hands in this effort not just for a green environment but also for the benefit of society.

The results indicate that there is no significant effect of DCO on PBE ($\beta = 0.010$, $P = 0.776 > 0.05$); therefore, H5a is rejected. However, DCO does have a positive effect on PBC ($\beta = 0.086$, $P < 0.05$) in support of H5b. Therefore, local authorities and the media should promote awareness of energy conservation to remind individuals and families to be conscious of saving electricity.

According to research by Nguyen et al. (2022), the most significant and successful method to boost people's knowledge about saving power and modifying their electricity-saving behaviour is through regular education and propaganda. The results from my study indicate that PSP has no significant effect on PBE ($\beta = 0.065$, $P = 0.060 > 0.05$), so H6a is rejected. Additionally, PSP shows a significant relationship with PBC ($\beta = 0.220$, $P < 0.05$). Therefore, hypothesis H6b is accepted. Raising awareness about the potential risks associated with excessive electricity consumption and introducing measures to mitigate them can facilitate the implementation of appropriate mechanisms and policies designed to encourage residents to confidently embrace energy-saving practices. This way, the perception and behaviour of households in HCMC towards energy-saving and efficiency can be positively influenced, fostering a more sustainable and responsible approach to energy consumption.

According to my findings, there is a positive correlation between perceived benefit and intention to save electricity, as evidenced by the statistically significant relationship between PBE and ISE ($\beta = 0.343$, $P < 0.05$). Thus, H7 is accepted. Perceived behavioural control exhibits a notable correlation with the intention to conserve electricity, as evidenced by the significant link detected between PBC and ISE ($\beta = 0.458$, $P < 0.05$), thereby validating H8. This suggests that having positive intentions to save electricity can lead to a significant influence on actual behaviour. Drawing from the TPB, strong intentions often reliably forecast actual behaviour, while external factors also contribute to whether these intentions are effectively translated into action. Nguyen and Pham (2020) emphasise the importance of perceived behavioural control in influencing residents' intentions to conserve electricity and propose offering guidance, such as instructions on efficient electricity usage, simple manuals, and educational initiatives on energy sources, to improve their capacity to regulate their behaviour concerning energy consumption.

Finally, this research investigates the influence of the intention to save electricity on electricity-saving behaviours, uncovering a positive impact; ISE shows a significant association with ESB ($\beta = 0.758$, $P < 0.05$), in support of H9. It is more likely that individuals who intend to save electricity are going to do so and make saving electricity a habit, which is essential for demonstrating responsibility in reducing costs and safeguarding the environment. Another study by Nguyen and Pham (2020) found that the intent to save energy greatly influences energy-saving behaviour. Therefore, individuals within the household should pay attention to saving electricity as it will cultivate habits, influence other family members, and gradually create a culture of saving electricity among other individuals in households throughout HCMC. This is a practical and humane action, demonstrating citizens' responsibility to the community through concrete electricity-saving actions.

6. CONCLUSION

This study tests the key factors of attitude, social norms, personal moral norms, responsibility for energy-saving, degree of concern, policy and social propaganda, and the roles of perceived benefit and perceived behavioural control that impact the intention to save electricity, and electricity-saving behaviours, among households in HCMC. This research model demonstrates significant explanatory power in illustrating the connections among the variables studied. The majority of the hypotheses are accepted, except for the relationships between DCO -> PBE (H5a) and PSP -> PBE (H6a), which are rejected due to their P-values exceeding 0.05. From a management perspective, raising awareness among citizens and households in HCMC about electricity-saving should be seen as an individual standard; when practiced outside, it becomes a social norm.

This study has identified core factors and developed a model of electricity-saving behaviour for households in HCMC from which solutions and rational policies can be proposed to enhance awareness of electricity-saving and to encourage electricity-saving practices. Local media and the authorities should implement community programmes that promote electricity-saving practices so that electricity-saving can be seen as a commendable, humanitarian act to protect the environment, contributing to sustainable social development.

While this work reveals exciting results with significant theoretical and practical consequences, it is critical to recognise and address several shortcomings that require acknowledgement and potential resolution in future research. The study was conducted with limitations in terms of time and financial resources, which led to certain constraints on the results. First, the data collected was relatively limited, and for future research, a larger sample should be considered to represent a more diverse population. Second, this study has not validated the income differences among households concerning their awareness of electricity-saving; future research should classify households based on their income status and test for differences in electricity-saving behaviours between low-income, middle-income, and high-income households, and explore potential underlying factors that have not been investigated in this study, such as electricity prices, public awareness campaigns, and environmental factors, to expand the research model.

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