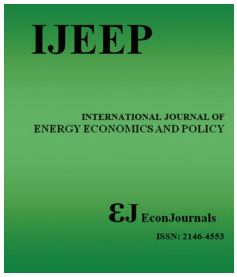

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2025, 15(2), 591-599.

Developing Managerial Strategies to Foster Energy-Saving Habits in Higher Education Institutions: A Focus on Organizational Culture and Energy Efficiency

Patricia A. Valenzuela[1], Francisco G. Salas[2]*, Efraín Solares[2], Eyran Diaz[2]

[1]TecNM/Instituto Tecnológico Superior de Lerdo, Mexico, [2]Faculty of Accounting and Management, Autonomous University of Coahuila, Mexico. *Email: francisco.salas@uadec.edu.mx

Received: 24 September 2024 **Accepted:** 17 January 2025 **DOI:** https://doi.org/10.32479/ijeep.18096

ABSTRACT

In the current context of increasing concern for sustainability and energy efficiency, higher education institutions face the challenge of implementing effective managerial strategies that promote energy-saving habits among their employees. This study investigates the relationships between energy-saving attitudes, environmental concern, awareness of energy-saving standards, and institutional energy-saving culture, and how these factors influence employees' energy-saving habits. Using Structural Equation Modeling (SEM), data from a sample of 165 employees in higher education institutions in northern Mexico were analyzed. The results reveal that attitudes towards energy-saving and knowledge of institutional standards have a significant positive effect on energy-saving habits. Additionally, organizational culture plays a crucial mediating role in the relationship between knowledge of energy-saving standards and energy-saving habits. This study provides valuable insights for policymakers in educational organizations, highlighting the importance of developing an organizational culture that fosters energy efficiency and sustainability. Practical implications include the need for continuous training programs and the implementation of policies that reinforce energy-saving behaviors, thereby contributing to reduced energy consumption and the achievement of institutional sustainability goals.

Keywords: Managerial Strategies, Organizational Culture, Energy-Saving Behavior, Sustainability in Higher Education
JEL Classifications: M10, M12

1. INTRODUCTION

Electrical energy is a fundamental source of energy not only in residential housing but also in every type of building to supply from lighting to air conditioning to domestic appliances. Nowadays, electrical energy is an indispensable resource for many human activities. However, it has been pointed out that energy consumption problems exist in many organizations, mainly due to the lack of environmental sensitivity of the employees or collaborators.

Conduct of buildings' occupants regarding electricity utilization is a very important factor in achieving savings in energy (Prafitasiwi et al., 2022). Some principal elements that impact the electricity utilization in edifices are social parameters such as occupants' behavior, lifestyle, and culture (Allouhi et al., 2015).

Roughly speaking, a habit can be considered as a significant factor that has an impact on behavior in relation to environmental matters. It can be described as more than just repeating former conducts, but also rests in a quantitative mental background (Aarts and Dijksterhuis, 2000). Furthermore, (Stern, 2011) emphasized the importance of streamlining procedures in order to enhance the rate of favorable responses from individuals, thus facilitating their adaptation to novel circumstances and ultimately cultivating a propensity for energy conservation.

Promoting energy efficiency in the framework of ecological buildings largely depends on the awareness of the buildings' occupants. According to (Chen and Chen, 2021), when enterprises promote energy-saving policies as well as education and awareness for employees, they will better value the importance of energy-saving and will cooperate effectively in environmentally friendly policies.

Many enterprises can be committed to promote energy-saving habits in their employees. Several research have pointed out relationships between factors positively related to energy-saving habits or energy-saving behavior in employees or workers. (Chen and Chen, 2021) investigates relationships between energy-saving attitudes, subjective norms, perceived behavioral control, energy-saving habits and energy-saving behavioral intentions in enterprise employees. In the article by (Fatoki, 2023) an investigation of attitude, subjective norm, perceived behavioral control and personal norm effect in intention and energy-saving behavior is reported. Other investigations such as (Mamun et al., 2022; Macovei, 2015; Gkargkavouzia et al., 2019) report the positive influence between personal norms, energy conservation intention and behavior. Moreover, investigation in (Macovei, 2015) reports students and faculty from a university in Romania as subjects of the study. However, to the best knowledge of the authors, there is a lack of investigations regarding the environmental consciousness in employees of higher education institutions, and how it can be translated to energy-saving habits. Universities and other educational institutions traditionally have been sources of ideas for social change, when addressing a great diversity of social problems. Academics are usually acknowledged as opinion leaders (Bardhan and Gower, 2020; Kumarasinghe et al., 2023). Moreover, they have great influence for the members of a society (Karataş, 2013).

In this research, due to the described importance of the roles of universities, professors, and other universities employees in our societies, we have decided to focus on studying the behaviors and attitudes of employees of higher education institutions, with the purpose of understanding the relationships between the above-mentioned factors, such as energy-saving standards and others, with the adoption of energy-saving habits.

The purpose of this research is to study the criteria adopted by the people to be aware of energy efficiency and their own energy performance in higher education institutions. By studying the relevant literature, a conceptual model of the relationship between several constructs that hypothetically affect the energy-saving habits in the workplace, was developed. These constructs are institutional energy-saving culture, attitude towards energy-saving, environmental concern, and knowledge on energy-saving standards. A survey was distributed to three groups of occupants of buildings in two public universities in Northern Mexico: teachers, management staff and maintenance staff. 165 answers were collected and analyzed to investigate the proposed model under a Structural Equations Model (SEM). The main findings of this research are the proof of the positive relationships between the proposed constructs and the energy-saving habits of people in the workplace.

The remainder of this paper is structured as follows. In the next section, the literature review, as well as the development of hypotheses, are carried out. Then, the used methodology is provided, followed by the results and findings. A discussion of the findings is then developed, and finally some conclusions and suggestions are provided.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

In this section, we discuss the concepts studied in the relevant literature regarding institutional energy-saving culture, attitude on energy-saving, environmental concern, and knowledge on energy-saving standards.

2.1. Habits on Electrical Energy Saving

According to (Verplanken, 2018), habits can be defined as "memory-based propensities to respond automatically to specific cues, which are acquired by repetition of cue-specific behaviors in stable contexts". A habit is not simply the same as past behavior, but "repeating a behavior may lead to the formation of a habit" (Verplanken and Whitmarsh, 2021). Habits play a significant role in shaping individuals' behaviors, therefore, interventions designed to modify energy conservation practices must consider both habitual and deliberate energy usage (Kotsopoulos et al., 2023).

According to (Geller, 2002), "certain habits exhibit positive attributes while others may have negative implications, contingent upon their immediate and prolonged effects. In order to convert a habit that is detrimental to the environment into one that is beneficial for the environment, it is imperative to undergo three distinct phases of training: 1. Transforming an inadvertent habit that harms the environment (referred to as "unconsciously incompetent" behavior) into a proactive and beneficial self-directed conduct towards the environment. 2. Converting self-directed actions that are harmful to the environment (known as "consciously incompetent" behavior) into self-directed conduct that is productive for the environment. 3. Transitioning from environment-friendly self-directed conduct (termed as "consciously competent" behavior) to developing a habit that inherently protects the environment ("unconscious competence").

2.2. Environmental Concern

Environmental concern means a comprehension and a general awareness towards environmental issues (Schuitema et al., 2013). Environmental concern is a determinant factor for performing changes in current behavior towards the environment to a more environment friendly behavior (Daziano and Bolduc, 2013). However, environmental concern solely does not directly produce a more environmentally respectful behavior. (Hines et al., 1987) performed a meta-analysis to investigate the correlation between environmental consciousness and behaviors that support environmental preservation. They found a correlation coefficient between 0.23 and 0.35, which suggests, as it was pointed out above, that environmental concern does not influence strongly in a more environmentally respectful behavior. Nevertheless,

(Bamberg, 2003) suggested that environmental concern produces certain influence on the individual behavioral intention by means of standards, beliefs, and attitudes. Accordingly, in this research we assume that occupants' attitudes on energy-saving standards are positively influenced by their environment concerns.

2.3. Energy Saving Attitude

Environmental awareness can be perceived as a combination of environmental knowledge and the acknowledgment of environmental issues (Grob, 1995).

Such an attitude is produced by the degree of awareness about the environmental problems that threatens our planet, the integration of green energies in relation to the consumption behavior, the opportunities of local and central electricity markets, and how costs and consumption efficiency can be improved (Hackbarth and Löbbe, 2020). In recent studies, (Lo et al., 2014; Zhang et al., 2014) have revealed that positive attitudes towards energy-saving have a significant positive impact in employee's intentions to save energy.

2.4. Knowledge on Energy-Saving Standard

(Kaplan, 1991) pointed out that the degree of knowledge on a particular subject has a significant influence on the decision-making process. That is, usually people keep themselves far from situations in which they do not have sufficient knowledge to lead their behavior. Moreover, (Amyx et al., 1994; Corral-Verdugo, 1996; Mostafa, 2009) have shown that information frequently shapes pro-environmental beliefs, subsequently driving individuals towards engaging in conscientious environmental conduct. On the other hand, instrumenting environment protection programs could be hindered by a lack of environmental abilities and knowledge (Chan, 2011).

2.5. Energy-saving Culture in the Institution

Institutional culture describes the beliefs, practices, and social conduct of a business (leaders and employees) for specific events (Sovacool and Griffiths, 2020). According to studies, workers who work for an organization with a strong energy-saving culture are more likely to care about the environment and practice energy-saving habits (Chan et al., 2014). Energy-saving culture in any organization can be influenced by five factors: Energy activities (EA), energy climate (EC), injunction norm (IN), reward and penalty policy (RaPP), and company energy value (CEV) (Su et al., 2022). EA often includes conferences, training, and competitions about energy related knowledge (Suk et al., 2013). That can contribute to increasing employee's awareness on energy-saving and, in consequence, improve their energy-saving behavior (Han and Cudjoe, 2020). EC constitutes an environment to support individual autonomy, which can be created by means of publishing posters, visual aids, and slogans (Whitney et al., 2020). It communicates disapproval attitudes to certain behaviors (Bhanot, 2021), which can discourage inadequate actions and energy waste. RaPP has demonstrated effectiveness in numerous studies by influencing behaviors through an economic lens (Handgraaf et al., 2013). Finally, CEV allows us to evaluate if the energy-saving objective is reflected in the company development's philosophy (Xie et al., 2021).

2.6. Proposed Hypotheses

Based on the above established concepts, we propose the following research hypotheses:

H_1: An employee's energy saving attitude has a positive impact on the development of energy-saving practices within the workplace.

H_2: An employee's knowledge on energy-saving institutional standards influences positively on his energy-saving habits in the workplace.

Moreover, we propose the following hypotheses regarding mediating relationships:

H_3: An employee's knowledge on energy-saving standards is a significant mediator of energy-saving culture developed by the institution in the energy-saving habits in the workplace.

H_4: An employee's attitude on energy-saving is a significant mediator of his environmental concern in the energy-saving habits in the workplace.

Proposed hypotheses and theoretical model are shown in Figure 1.

3. METHODOLOGY

The purpose of this research is to determine the possible relationships between concern, attitude, culture developed by the institution and knowledge on energy-saving standards in developing energy-saving habits in employees in higher education institutions.

An online questionnaire was developed on the Google Forms platform to facilitate data collection, as online data collection is widely recognized for its appropriateness, efficiency, cost-effectiveness, and ability to reduce inaccuracies and incomplete responses (Dutot et al., 2019). The constructs of the study were defined and measured in the works indicated in Table 1.

Each aspect (consisting of various components) was evaluated utilizing a Likert scale spanning from 1 to 5, with 1 denoting absolute disagreement and 5 denoting absolute concurrence. Every participant was presented with a concise overview of the research's goals prior to commencing the survey and was informed that their involvement was entirely voluntary. The participants were

Figure 1: Proposed theoretical model

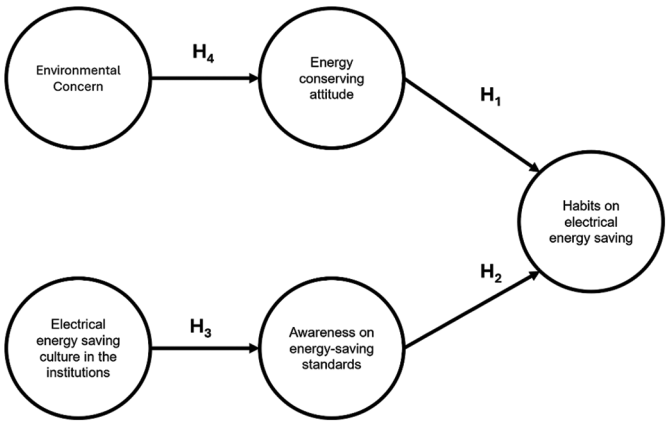

Table 1: Constructs, their respective items, and references

Construct	Item	References
Energy-saving attitude	1. I am aware of the importance of reducing electrical energy consumption in my workplace.	Wang et al., 2016
	2. I believe that my individual contribution can make a significant difference in reducing electricity consumption.	Su et al., 2022
	3. I feel motivated to adopt energy-saving practices in my daily work routine.	Bock et al., 2005; Jareemit and Limmeechokchai, 2017
	4. I am aware of the negative consequences of excessive consumption of electrical energy for the environment.	Gao et al., 2017; Su et al., 2022
Environmental concern	1. I am concerned of the environmental impact of excessive electrical energy consumption in my workplace	Su et al., 2022
	2. I am concerned of the rising of costs of electricity for the university due to high consumption	Su et al., 2022
	3. I am concerned about the depletion of natural resources associated with electricity generation.	Bock et al., 2005; Wang et al., 2016
	4. I am concerned about the impact of excessive electricity consumption on climate change.	Su et al., 2022
	5. I am concerned with our responsibility as an educational institution to promote sustainable electricity consumption practices.	Su et al., 2022
Awareness on energy-saving standards	1. I am aware of the main high electrical energy consumption equipment and devices in my workplace.	Su et al., 2022
	2. I am familiar with energy efficiency measures that can be carried out in my workplace.	Su et al., 2022
	3. I am informed about the most economical electricity rates and consumption schedules.	Bock et al., 2005; Wang et al., 2016
	4. I am aware of the measures that the institution has implemented to reduce its electricity consumption.	Su et al., 2022
Habits on electrical energy saving	1. I always turn off the lights when I leave an empty room.	Wu et al., 2015; Zhang et al., 2014
	2. Whenever possible, I use low consumption electrical equipment.	Hau and Kang, 2016; Phipps et al., 2015
	3. I take advantage of natural daylight instead of turning on artificial lights during the day.	Wu et al., 2015; Zhang et al., 2014
	4. I turn off electrical equipment when not using them.	Hau and Kang, 2016; Phipps et al., 2015
	5. I keep an adequate environmental temperature in my workplace to avoid excessive usage of air conditioning equipment.	Hau and Kang, 2016; Phipps et al., 2015
Electrical energy saving culture in the institutions	1. Do you believe that the institution makes efforts to measure and monitor electricity consumption in their facilities permanently?	Su et al., 2022
	2. Do you think the institution offers incentives to reward employee's energy-saving behaviors?	Su et al., 2022
	3. Do you think the institution imposes sanctions to energy wasting behaviors?	Su et al., 2022
	4. Have you noticed if the institution promotes energy-saving using posters, advertising, or visual aids?	Su et al., 2022
	5. Do you consider that the institution organizes activities such as conferences or training courses to promote a culture of energy care?	Su et al., 2022

assured that their information would be handled with the utmost confidentiality and would solely be utilized for research purposes. Prior to the main study, a trial run was carried out involving 20 individuals to confirm the questionnaire's comprehensibility (Escobar-Perez and Cuervo-Martinez, 2008). As a result, based on the provided feedback, several small changes were made to the questionnaire, such as in terminology, which improved the final readability of the questionnaire.

To obtain answers, the questionnaire was distributed by email. The target population in this research was 165 employees in higher education institutions. Demographic data of target population is shown in Table 2.

Table 2: Demographics of target population

Position	Sex	Age range	Quantity
123 academic staff	93 women	From 20 to 30 years	20
40 administrative staff	72 men	From 31 to 40 years	52
2 maintenance staff		From 41 to 50 years	57
		From 51 to 60 years	27
		More than 61 years	9

3.1. Measurement Model

he collected answers from respondents were analyzed using SmartPLS 4, with a PLS-SEM Model. The structural equations model was divided in two stages: during the preliminary stage, an evaluation of the measurement framework was carried out in order to gauge the dependability and accuracy of the collected data. Subsequently, in the subsequent phase, the proposed relationships were scrutinized through the structural model. The developed model for the first stage is shown in Figure 2.

In order to assess the dependability and accuracy of constructs, calculations were performed for Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE). Results of computing these coefficients are shown in Table 3. Full names of

Figure 2: Measurement model

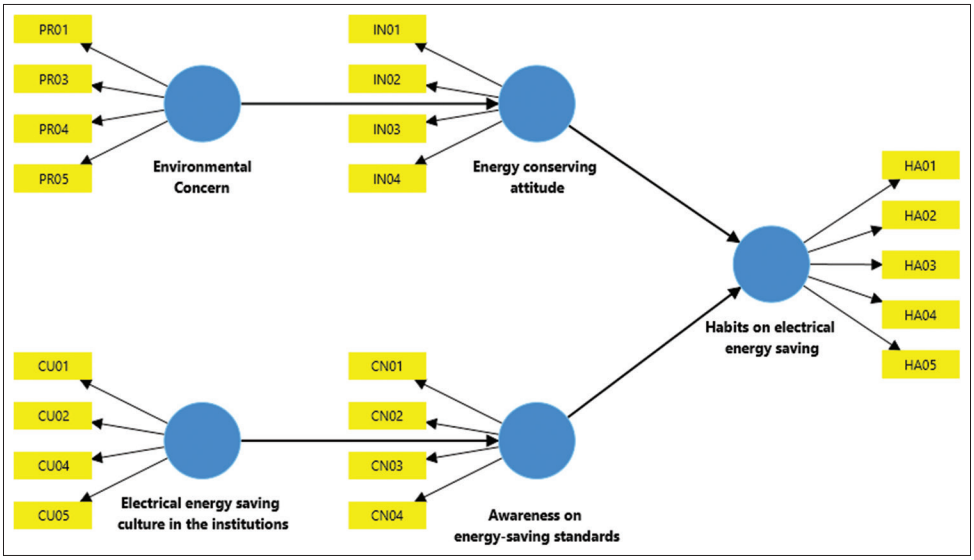

Table 3: Data for testing reliability and validity of constructs

Construct	Cronbach's alpha (CA)	Composite Reliability ρ_a (CR)	Average variance extracted (AVE)
Habits	0.794	0.802	0.548
Concern	0.897	0.898	0.765
Attitude	0.777	0.787	0.600
Awareness	0.780	0.810	0.598
Culture	0.860	0.873	0.703

constructs were shortened for briefness. It can be noticed that the values of CA and CR for all constructs are >0.7 as recommended by (Hair et al., 2017) in all cases. Moreover, obtained values of AVE for all constructs are >0.5 as recommended by (Fornell and Larcker, 1981).

Factor loadings (FL) and variance inflation factors (VIF) for each item of constructs are shown in Table 4. It can be noticed that all factorial loadings are >0.7, which is the lower value suggested by (Hair et al., 2017), except in item HA03 which factor loading is 0.683. However, it was included in this analysis due to the following reasons: It is very close to the threshold of 0.7, and it is important to maintain the validity of the construct (Wang et al., 2015). VIF was considered to analyze the collinearity problem. It was found that all VIF values are smaller than 5 (Table 4), which indicates that variance of the common method is not a problem in this research (Becker et al., 2015; Mason and Perreault, 1991).

Discriminant validity, as delineated by the extent to which a construct diverges from another (Hair et al., 2014), was established as all interdimensional correlations proved to be less than the square root of the average variance extracted (AVE) (Fornell and Larcker, 1981). Notice that, in Table 5, construct names were shortened for briefness.

3.2. Structural Model

To validate the structural model, the significant relationships between endogenous and exogenous variables were examined. To assess the significance of path coefficients, an analysis involving 5,000 re-samples through a bootstrapping technique was conducted (Hair et al., 2021). Results of structural evaluation are shown in Figure 3. It can be observed that all proposed hypotheses have significant relationships and the model's general adjustment after bootstrapping allowed significant values. Moreover, the three endogenous variables exhibit substantial R^2 values, as it can be observed in Figure 3. According to (Cohen, 1988), the magnitude of the effect size (f^2) in a structural model signifies the extent to which exogenous constructs impact endogenous constructs.

f^2 values for each relationship from exogenous to endogenous constructs are shown in Table 6. It can be noticed in Table 6 that all f^2 values are larger than zero.

It can be noticed in Table 6 that all f 2 values are larger than zero. Furthermore, to test predictive relevance of the model, values of Stone-Geisser's Q2 (measure of redundancy with cross-validity for each endogenous construct) were obtained by means of algorithm PLSpredict/CVPAT in SmartPLS. Obtained values, which are shown in Table 7, were larger than zero, which demonstrates that all constructs have predictive relevance.

Finally, in order to assess research hypotheses pertaining to the significance of pathways, standardized path coefficients β and determination coefficients R^2 were derived from endogenous constructs in the research framework, as illustrated in Figure 3.

4. DISCUSSION

To carry out the analysis of the Structural Equations Model (SEM), standardized path coefficients as well as *t* values and P values were computed. Results for hypothesis H1 and H2 are summarized in Table 8.

H_1: The results indicate that employees' attitudes towards energy-saving have a significant positive impact on their energy-saving habits ($\beta = 0.479$ with t-value = 3.048 and $P < 0.05$). This suggests that employees who are more aware of the importance of reducing energy consumption and feel

Figure 3: Results of structural evaluation of the model

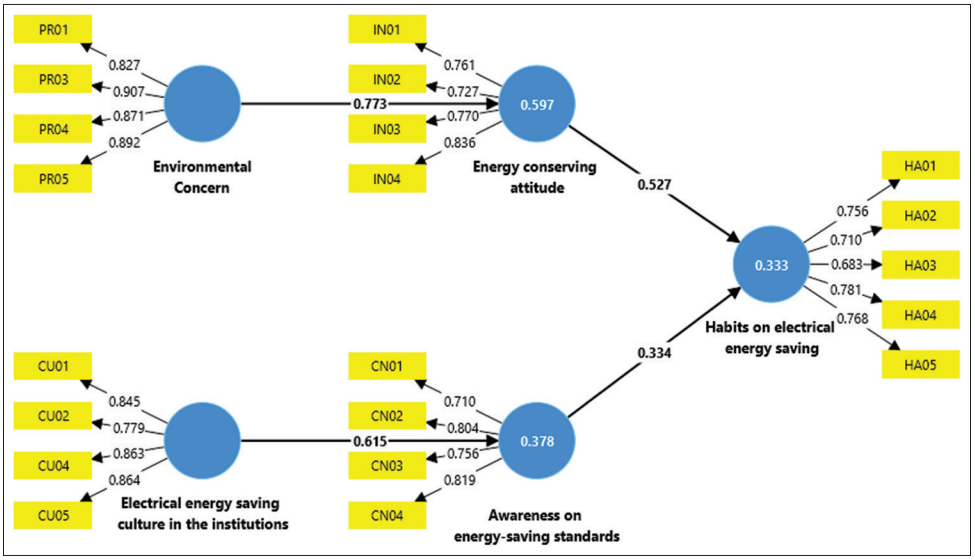

Table 4: Factor loadings and variance inflation factors of constructs

Item	Habits on electrical energy saving	Environmental Concern	Energy conserving attitude	Awareness on energy-saving standards	Electrical energy saving culture in the institutions	VIF
HA01	0.756					1.818
HA02	0.710					1.737
HA03	0.683					1.393
HA04	0.781					1.718
HA05	0.768					1.600
PR01		0.827				1.882
PR03		0.907				3.341
PR04		0.871				2.644
PR05		0.892				2.964
IN01			0.761			1.554
IN02			0.727			1.432
IN03			0.770			1.658
IN04			0.836			1.836
CN01				0.710		1.502
CN02				0.804		1.771
CN03				0.756		1.478
CN04				0.819		1.474
CU01					0.845	1.841
CU02					0.779	1.727
CU04					0.863	2.411
CU05					0.864	2.496

Table 5: Discriminant validity according to Fornell and Larcker criterion

	Habits	Concern	Attitude	Awareness	Culture
Habits	0.771				
Concern	0.510	0.875			
Attitude	0.527	0.773	0.774		
Awareness	0.334	0.181	0.196	0.774	
Culture	0.296	0.146	0.190	0.615	0.838

Table 6: Effects of relationships of the structural model

Relationships Between Exogenous and Endogenous Constructs	f^2
Energy-saving attitude ⇒ Energy-saving habits	0.331
Knowledge on energy-saving standards ⇒ Energy-saving habits	0.083
Energy-saving culture in the institution ⇒ Knowledge on energy-saving standards	0.607
Environmental concern ⇒ Energy-saving attitude	1.482

Table 7: Stone-Geisser'2 Q2

Item	Q^2 Predictor
IN01	0.316
IN02	0.250
IN03	0.207
IN04	0.437
CN01	0.059
CN02	0.147
CN03	0.208
CN04	0.383
HA01	0.152
HA02	0.137
HA03	0.062
HA04	0.117
HA05	0.111

motivated to adopt energy-saving practices are more likely to develop energy-saving habits.

Table 8: Summary of results of the structural equations model for hypothesis H1 and H2

Hypotheses	Coefficient	T-value	P-value	Results
H_1: Attitude ⇒ Saving habits	0.479	3.048	<0.05	Supported
H_2: Knowledge ⇒ Saving habits	0.240	3.061	<0.05	Supported

H_2: The knowledge of energy-saving standards also positively influences energy-saving habits ($\beta = 0.240$ with t-value = 3.061 and $P < 0.05$). Employees who are informed about energy-efficient measures and institutional policies are more likely to engage in energy-saving behaviors.

4.1. Measurement of Mediating Effects

Results for hypotheses H_3 and H_4 regarding mediating relationships are summarized in Table 9.

Table 9: Summary of the structural equations model for hypotheses H_3 and H_4

Hypotheses	T-value	P-value	Results
H_3: Culture ⇒ Knowledge ⇒ Saving habits	2.987	<0.05	Supported
H_4: Concern ⇒ Attitude ⇒ Saving habits	2.456	<0.05	Supported

Such results are interpreted as follows:

H_3: Organizational culture plays a crucial mediating role in the relationship between knowledge of energy-saving standards and energy-saving habits ($t = 2.987$, $P < 0.05$). A strong energy-saving culture within the institution enhances the effectiveness of knowledge on energy-saving standards in promoting energy-saving habits.

H_4: Environmental concern significantly influences employees' attitudes towards energy-saving ($t = 2.456$, $P < 0.05$). Employees who are more concerned about the environmental impact of excessive energy consumption are more likely to develop positive attitudes towards energy-saving.

It can be observed, by means of statistical analysis, that individual concern about the environment correlates positively with an employee's attitude on energy-saving, which allows him to be willing to create appropriate habits in energy use. Moreover, results also demonstrate that culture created by the organization influences positively in employee's knowledge about energy-saving standards and, in turn, it influences in creating adequate energy use habits in the workplace. In order to efficiently mitigate adverse effects and safeguard the environment, organizations must not only implement energy-conserving technologies but also provide education to their staff and encourage the adoption of energy-efficient practices. These strategies hold the potential to cultivate energy-saving mindsets and awareness within employees, ultimately resulting in enhanced financial efficiency and beneficial outcomes for their professional goals. In addition, these kinds of actions will produce positive effects in employees, who will be also influenced to develop intelligent electricity use habits in their workplace. Results found by (Chan, 2011) suggest that pro-ecological behavior, which is often driven by environmental knowledge, as well as the environmental awareness and concern, are important factors to predict hotels employees' intentions to implement ecological actions and practices. Moreover, they suggest that selecting employees with adequate knowledge, awareness, concern, and behavior regarding environment, as well as providing continuous training on environmental training to personnel are possible solutions to improve environmental performance and perception of a hotel. Based on such results, it is possible to suggest continuous training on electricity saving standards as well as having leaders that exhibit environmental awareness and knowledge, to achieve that employees develop energy-saving habits in their institutions. Additionally, it is crucial for organizations to offer training sessions to their employees on the implementation of energy-efficient practices to reduce the emission of carbon dioxide into the atmosphere. The promotion of practices that conserve energy has proven to be a successful method in decreasing overall energy usage. These measures, in turn, can improve employees' energy-saving awareness and attitude, boost economic efficiency, and have positive effects in job objectives, which will also positively influence employees in developing energy-saving habits (Chen and Chen, 2021).

5. CONCLUSION

The purpose of this research is to determine the possible relationships between concern, interest, culture developed by the institution and knowledge on energy-saving standards in developing energy-saving habits in employees in higher education institutions. In order to accomplish this goal, the approach outlined by (Chen and Chen, 2021) was utilized, gathering data via a web-based survey administered to 165 individuals employed in public higher education institution facilities.

The collected answers from respondents were analyzed using SmartPLS 4, with a PLS-SEM Model. The structural equations model was bifurcated into two primary phases: Initially, an evaluation of the measurement model was carried out to gauge the dependability and authenticity of the collected data. Following this, the structural model was employed to analyze the hypothesized relationships (Ashraf et al., 2021).

Hypotheses proposed in this work allow us to prove that it is necessary to understand which factors influence employees' attitude and knowledge about energy-saving to be in a better position to develop energy-saving habits in an efficient way.

The results suggest that policy makers in educational institutions should focus on enhancing employees' awareness and knowledge of energy-saving practices. This can be achieved through continuous training programs and clear communication of energy-saving standards and policies. By fostering a culture that values energy efficiency, institutions can effectively encourage employees to adopt energy-saving habits.

The mediating role of organizational culture underscores the need for institutions to develop and maintain a strong energy-saving culture. This involves not only implementing energy-saving measures but also promoting values and behaviors that support sustainability. Activities such as workshops, seminars, and visual aids can help reinforce the importance of energy-saving and create a supportive environment for behavior change.

The positive relationship between environmental concern and energy-saving attitudes indicates that addressing employees' environmental concerns can be an effective strategy to promote energy-saving behaviors. Institutions should highlight the environmental benefits of energy-saving practices and how individual actions contribute to broader sustainability goals.

The practical implications of this study include the need for targeted interventions that address both the cognitive and cultural aspects of energy-saving. Institutions should consider implementing reward and recognition programs to incentivize energy-saving behaviors and penalize energy wastage. Additionally, integrating energy-saving goals into the institution's strategic plan can ensure long-term commitment to sustainability.

It is suggested to consider carrying out a study that evaluates the relationship between the degree of maturity in the implementation of energy management systems based on the ISO 50001 standard and its relationship with the development of energy saving habits in personnel who work in public universities. Future research should explore the impact of specific interventions on energy-saving behaviors and investigate the role of other factors such as technological advancements and financial incentives. Longitudinal studies could provide deeper insights into the sustainability of energy-saving habits over time.

REFERENCES

Aarts, H., Dijksterhuis, A. (2000), The Automatic Activation of goal-directed behaviour: The case of travel habit. Journal of Environmental Psychology, 20(1), 75-82.

Allouhi, A., El Fouih, Y., Kousksou, T., Jamil, A., Zeraouli, Y., Mourad, Y. (2015), Energy consumption and efficiency in buildings: Current status and future trends. Journal of Cleaner Production, 109, 118-130.

Amyx, D.A., DeJong, P.F., Lin, X., Chakraborty, G., Wiener, J.L. (1994), Influencers of purchase intentions for ecologically safe products: An exploratory study. Marketing Theory and Applications, Proceedings of the 1994 American Marketing Association Winter Educators Conference, 5, 341-347.

Ashraf, M.A., Khan, M.N., Chohan, S.R., Khan, M., Rafique, W., Farid, M.F., Khan, A.U. (2021), Social Media improves students' academic performance: Exploring the role of social media adoption in the open learning environment among international medical students in China. HealthcarePapers, 9(10), 1272.

Bamberg, S. (2003), How does environmental concern influence specific environmentally related behaviors? A new answer to an old question. Journal of Environmental Psychology, 23(1), 21-32.

Bardhan, N., Gower, K. (2020), Student and faculty/educator views on diversity and inclusion in public relations: The role of leaders in bringing about change. Journal of Public Relations Education, 6(2), 102-141.

Becker, J.M., Ringle, C.M., Sarstedt, M., Völckner, F. (2015), How collinearity affects mixture regression results. Marketing Letters, 26(4), 643-659.

Bhanot, S.P. (2021), Isolating the effect of injunctive norms on conservation behavior: New evidence from a field experiment in California. Organizational Behavior and Human Decision Processes, 163, 30-42.

Bock, G.W., Zmud, R., Kim, Y.G., Lee, J.N. (2005), Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social-psychological forces, and organizational climate. The Mississippi Quarterly, 2005, 87-111.

Chan, E.S.W. (2011), Implementing environmental management systems in small- and medium-sized hotels: Obstacles. Journal of Hospitality and Tourism Research, 35(1), 3-23.

Chan, E.S.W., Hon, A.H.Y., Chan, W., Okumus, F. (2014), What drives employees' intentions to implement green practices in hotels? The role of knowledge, awareness, concern and ecological behaviour. International Journal of Hospitality Management, 40, 20-28.

Chen, C.H.V., Chen, Y.C. (2021), Assessment of enhancing employee engagement in energy-saving behavior at workplace: An empirical study. Sustainability: Science Practice and Policy, 13(5), 2457.

Cohen, J. (1988), Statistical Power Analysis for the Behavioral Sciences. London: Routledge.

Corral-Verdugo, V. (1996), A structural model of reuse and recycling in Mexico. Environment and Behavior, 28(5), 665-696.

Daziano, R.A., Bolduc, D. (2013), Incorporating pro-environmental preferences towards green automobile technologies through a Bayesian hybrid choice model. Transportmetrica A: Transport Science, 9(1), 74-106.

Dutot, V., Bhatiasevi, V., Bellallahom, N. (2019), Applying the technology acceptance model in a three-countries study of smartwatch adoption. The Journal of High Technology Management Research, 30(1), 1-14.

Escobar-Perez, J., Cuervo-Martinez, A. (2008), Validez de contenido y juicio de expertos: Una aproximación a su utilización (in Spanish). Avances En Medicion, 6, 27-36.

Fatoki, O. (2023), Antecedents of workplace energy sacing behaviour: An integration of the theory of planned behaviour and norm activation model. International Journal of Energy Economics and Policy, 13(4), 394-403.

Fornell, C., Larcker, D.F. (1981), Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39-50.

Gao, L., Wang, S., Li, J., Li, H. (2017), Application of the extended theory of planned behavior to understand individual's energy saving behavior in workplaces. Resources, Conservation and Recycling, 127, 107-113.

Geller, E.S. (2002), The challenge of increasing proenvironment behavior. Handbook of Environmental Psychology, 2(396), 525-540.

Gkargkavouzia, A., Halkosb, G., Matsiori, S. (2019), Environmental behavior in a private-sphere context: Integrating theories of planned behavior and value belief norm, self-identity and habit. Resources, Conservation and Recycling, 148, 145-156.

Grob, A. (1995), A structural model of environmental attitudes and behaviour. Journal of Environmental Psychology, 15(3), 209-220.

Hackbarth, A., Löbbe, S. (2020), Attitudes, preferences, and intentions of German households concerning participation in peer-to-peer electricity trading. Energy Policy, 138, 111238.

Hair, J., Hollingsworth, C.L., Randolph, A.B., Chong, A.Y.L. (2017), An updated and expanded assessment of PLS-SEM in information systems research. Industrial Management and Data Systems, 117(3), 442-458.

Hair, J.F. Jr., Hult, G.T.M., Ringle, C.M., Sarstedt, M. (2021), A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). United States: SAGE Publications.

Hair, J.F. Jr., Sarstedt, M., Hopkins, L., Kuppelwieser, V.G. (2014), Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. European Business Review, 26(2), 106-121.

Han, M.S., Cudjoe, D. (2020), Determinants of energy-saving behavior of urban residents: Evidence from Myanmar. Energy Policy, 140, 111405.

Handgraaf, M.J.J., Van Lidth de Jeude, M.A., Appelt, K.C. (2013), Public praise vs. private pay: Effects of rewards on energy conservation in the workplace. Ecological Economics: The Journal of the International Society for Ecological Economics, 86, 86-92.

Hau, Y.S., Kang, M. (2016), Extending lead user theory to users' innovation-related knowledge sharing in the online user community: The mediating roles of social capital and perceived behavioral control. International Journal of Information Management, 36(4), 520-530.

Hines, J.M., Hungerford, H.R., Tomera, A.N. (1987), Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. The Journal of Environmental Education, 18(2), 1-8.

Jareemit, D., Limmeechokchai, B. (2017), Understanding resident's perception of energy saving habits in households in Bangkok. Energy Procedia, 138, 247-252.

Kaplan, S. (1991), Beyond Rationality: Clarity-based Decision Making. United Kingdom: Oxford University Press.

Karataş, A. (2013), The role of faculties of education in increasing sustainable environmental awareness of society. European Journal of Sustainable Development, 2(4), 233.

Kotsopoulos, D., Bardaki, C., Papaioannou, T.G. (2023), Determinants of employees' personal and collective energy consumption and conservation at work. Sustainability: Science Practice and Policy, 15(6), 4913.

Kumarasinghe, P.J., Huang, Q., Rathnayake, N. (2023), The perspectives of university academics on their intention to purchase green smartphones in Sri Lanka. Interdisciplinary Journal of Information, Knowledge, and Management, 18, 369-385.

Lo, S.H., Peters, G.J.Y., van Breukelen, G.J.P., Kok, G. (2014), Only reasoned action? An interorganizational study of energy-saving behaviors in office buildings. Energy Efficiency, 7, 761-775.

Macovei, O.I. (2015), Applying the theory of planned behavior in predicting pro-environmental behaviour: The case of energy conservation. Acta Universitatis Danubius. Œconomica, 11(4), 15-32.

Mamun, A.A., Hayat, N., Masud, M.M., Yang, Q., Salameh, A.A., Salleh, M.F.M. (2022), Energy conservation behaviour among the malaysian youth: A Study under the premises of value-belief-norm model. Frontiers in Energy Research, 10, 902619.

Mason, C.H., Perreault, W.D. Jr. (1991), Collinearity, power, and interpretation of multiple regression analysis. Journal of Marketing Research, 28(3), 268-280.

Mostafa, M.M. (2009), Shades of green: A psychographic segmentation of the green consumer in Kuwait using self-organizing maps. Expert Systems with Applications, 36(8), 11030-11038.

Phipps, D.L., Beatty, P.C.W., Parker, D. (2015), Standard deviation? The role of perceived behavioural control in procedural violations. Safety Science, 72, 66-74.

Prafitasiwi, A.G., Rohman, M.A., Ongkowijoyo, C.S. (2022), The occupant's awareness to achieve energy efficiency in campus building. Results in Engineering, 14, 100397.

Schuitema, G., Anable, J., Skippon, S., Kinnear, N. (2013), The role of instrumental, hedonic and symbolic attributes in the intention to adopt electric vehicles. Transportation Research Part A: Policy and Practice, 48, 39-49.

Sovacool, B.K., Griffiths, S. (2020), The cultural barriers to a low-carbon future: A review of six mobility and energy transitions across 28 countries. Renewable and Sustainable Energy Reviews, 119, 109569.

Stern, D.I. (2011), The role of energy in economic growth. Annals of the New York Academy of Sciences, 1219(1), 26-51.

Su, S., Li, J., Yuan, J., Tang, M., Wang, E., Ding, Y. (2022), How can energy saving culture of a company influence energy behaviors and consumptions in its offices? A simulation and optimization model. Journal of Building Engineering, 58, 105011.

Suk, S., Liu, X., Sudo, K. (2013), A survey study of energy saving activities of industrial companies in the Republic of Korea. Journal of Cleaner Production, 41, 301-311.

Verplanken, B., editor. (2018), Introduction. In: Psychology of Habit. Cham: Springer. p4.

Verplanken, B., Whitmarsh, L. (2021), Habit and climate change. Current Opinion in Behavioral Sciences, 42, 42-46.

Wang, S., Fan, J., Zhao, D., Yang, S., Fu, Y. (2016), Predicting consumers' intention to adopt hybrid electric vehicles: Using an extended version of the theory of planned behavior model. Transportation, 43(1), 123-143.

Wang, Y., Chen, Y., Benitez-Amado, J. (2015), How information technology influences environmental performance: Empirical evidence from China. International Journal of Information Management, 35(2), 160-170.

Whitney, S., Dreyer, B.C., Riemer, M. (2020), Motivations, barriers and leverage points: Exploring pathways for energy consumption reduction in Canadian commercial office buildings. Energy Research and Social Science, 70, 101687.

Wu, J.H., Cheng, C.M., Cheng, P.J. (2015), Behavioral intention toward urban eco-land performance assessment models using TPB tests. Journal of Business Research, 68(4), 771-776.

Xie, C., Ding, H., Zhang, H., Yuan, J., Su, S., Tang, M. (2021), Exploring the psychological mechanism underlying the relationship between organizational interventions and employees' energy-saving behaviors. Energy Policy, 156, 112411.

Zhang, Y., Wang, Z., Zhou, G. (2014), Determinants of employee electricity saving: The role of social benefits, personal benefits and organizational electricity saving climate. Journal of Cleaner Production, 66, 280-287.