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Factors Influencing Consumers' Purchase of Energy-Efficient Appliances to Promote Sustainable Energy Consumption

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Abstract

This study investigates the factors that influence consumers' purchase of energy-saving appliances as a means to promote sustainable energy consumption. Drawing upon the Theory of Planned Behaviour (TPB) and incorporating environmental concern as an additional construct, this research examines the impact of attitude, subjective norms, perceived

behavioural control, and environmental concern on consumers' intention to purchase, and subsequently, their actual purchase behaviour. A quantitative research design was employed, and data were collected through a structured questionnaire from a sample of 396 consumers who had prior experience with energy-saving appliances. Structural Equation Modelling (SEM) using AMOS was conducted to validate the measurement and structural models. The results indicate that all four antecedent variables, which are attitude, subjective norms, perceived behavioural control, and environmental concern, significantly influence purchase intention, with attitude and environmental concern showing the strongest effects. Furthermore, purchase intention significantly predicts actual purchase behaviour. The model demonstrated good fit indices and satisfactory reliability and validity. This study contributes to the growing body of literature on pro-environmental consumer behaviour in a developing country and provides valuable insights for policymakers, marketers, and energy agencies seeking to promote sustainable consumption. However, the findings are limited to the Sarawak region and may not fully represent the broader Malaysian population. Future research is recommended to expand the scope to other states and consider additional moderating factors that may influence consumer behaviour in energy-efficient appliance adoption.

Keywords: Actual purchase, Energy saving appliances, Purchase intention, Sustainable energy consumption

1. Introduction

Energy-efficient appliances are pivotal in reducing carbon emissions and promoting sustainable energy consumption by improving energy efficiency and minimizing household waste. These appliances, ranging from LED lighting and energy-efficient refrigerators to HVAC systems and washing machines, are designed to use less electricity while maintaining or enhancing performance, directly contributing to environmental protection through reduced carbon emissions and energy conservation. The adoption of such technologies enables households to decrease their energy demand, thus lowering the pressure on national electricity grids and reducing greenhouse gas emissions from fossil-fuel-based power generation (Olatunde et al., 2024; Vérez et al., 2022). For example, transitioning from traditional incandescent light bulbs to LED lighting can lead to an estimated 20–30% reduction in household energy use (Sundah et al., 2024), illustrating the measurable impact of these technologies on sustainability. The implementation of energy-efficient technologies in households offers dual benefits, which are environmental protection and economic savings. Consumers who adopt these appliances often experience lower utility bills, which serves as a financial incentive in addition to the environmental motivations. Moreover, advanced appliance designs now integrate innovative features that ensure energy is used optimally without compromising user experience or product durability. This shift in household consumption practices is aligned with the broader global commitment to addressing climate change and achieving key environmental goals, particularly those articulated in the United Nations Sustainable Development Goals (SDGs). In this context, SDG 7 (Affordable and Clean Energy) and SDG 12 (Responsible Consumption and Production) emphasize the importance of transitioning to more sustainable energy consumption patterns and minimizing environmental degradation caused by inefficient resource use (Razali et al., 2022; Sharifuddin et al., 2022). The increased promotion and adoption of energy-saving appliances thus reflect a key strategy for nations, including Malaysia, to advance environmental sustainability and meet international climate commitments.

In Malaysia, encouraging the widespread adoption of energy-efficient appliances is seen as a critical component in the national sustainable development agenda. At the sub-national level, the Sarawak state government has demonstrated a strong commitment to environmental and energy transition goals through policy instruments such as the Post COVID-19 Development Strategy (PCDS) 2030. This strategy outlines Sarawak's vision of achieving a low-carbon and circular economy, emphasizing green growth, digital innovation, and climate resilience (Government of Sarawak, 2021). While PCDS 2030 does not explicitly address household energy-saving appliances, the accompanying Sarawak Sustainability Blueprint 2030 provides focused policy directions to support household-level energy efficiency. These include increasing public awareness on the use of energy-efficient appliances, enhancing the existing five-star energy labeling system to improve consumer knowledge, and implementing financial incentives to facilitate the adoption of green technologies (Sarawak Sustainability Blueprint 2030). These measures reflect a proactive approach to promoting sustainable consumption and empowering consumers to make environmentally conscious decisions. In addition, empirical evidence suggests that the Sarawak consumer market is showing

encouraging signs of green awareness and readiness to adopt sustainable practices. Mahari et al. (2023) reported that there is growing green purchase intention among consumers in Sarawak, particularly regarding eco-labelled home electronics. However, despite these positive trends in environmental awareness and intention, the actual purchase and adoption rates of energy-efficient appliances remain relatively low across Malaysia, including Sarawak. Recent research conducted in Malaysia, found that while consumers generally express favorable attitudes and intentions toward adopting home energy efficiency measures, these intentions often do not translate into real purchasing behavior. This phenomenon commonly referred to as the intention behavior gap is widely acknowledged in the field of sustainable consumption and represents a persistent challenge to achieving large scale behavioral change (Frederiks et al., 2015; Hwang et al., 2025).

Indeed, while intention is a strong psychological predictor of behavior, the pathway from intention to actual behavior is often disrupted by external barriers. In the Malaysian context, studies have shown that the intention to purchase energy-efficient appliances is frequently hindered by high upfront costs, limited product availability in rural areas, and inadequate consumer awareness of government incentives (Jaaffar et al., 2023; Puspanathan & Suki, 2024). These factors contribute to the widening gap between what consumers intend to do and what they do when making purchasing decisions. This misalignment not only hinders progress toward energy efficiency targets but also reflects deeper structural and behavioral barriers that must be addressed through policy reform, consumer education, and targeted incentive programs. From a theoretical perspective, this research is guided by the Theory of Planned Behavior (TPB), which posits that an individual's behavior is influenced by their attitude toward the behavior, subjective norms, and perceived behavioral control. Within this framework, intention is seen as the immediate antecedent of behavior. However, in practice, real-world challenges often interfere with this theoretical pathway, leading to incomplete behavioral outcomes despite strong intentions. Therefore, understanding the factors that influence both consumer purchase intention and actual purchase behavior is essential for narrowing the intention-behavior gap and designing more effective sustainability interventions.

In particular, examining these dynamics in the context of Sarawak, an emerging and developing region with a unique policy landscape and consumer profile, offers valuable insights into regional sustainability implementation and behavioral adaptation. To address these gaps, this study investigates the key factors that influence both the purchase intention and actual purchase of energy-saving appliances among consumers in Sarawak, Malaysia. By exploring these dimensions, the study aims to provide a nuanced understanding of consumer behavior in the context of sustainable household energy use. The findings of this research are expected to inform policymakers, industry stakeholders, and sustainability advocates on how to develop strategies that not only raise awareness but also remove practical and psychological barriers to adoption. Ultimately, this research contributes to Malaysia's broader efforts to achieve its environmental sustainability goals and offers practical implications for enhancing the uptake of energy-efficient technologies in households.

2. Literature Review

2.1 Attitude

Attitude refers to an individual's overall positive or negative evaluation of performing a specific behavior. In the context of energy-saving appliances, a favorable attitude toward energy conservation and environmental protection serves as a key driver of purchase intention. A positive attitude toward energy-efficient appliances is consistently identified as a strong predictor of consumers' intention to purchase such products. This favorable disposition is often influenced by the recognition that reducing electricity consumption not only contributes to environmental sustainability but also aligns with personal values such as responsibility, mindfulness, and long-term cost savings (Zha et al., 2023; Lin & Dong, 2023). Attitudes have been shown to exert a direct and statistically significant influence on consumers' purchase intentions. Empirical evidence supports the notion that individuals who hold positive attitudes toward energy-efficient appliances are more likely to express a strong intention to purchase them (Puspanathan & Suki, 2024; Ali et al., 2021).

H1: Attitude has a significant influence on purchase intention

2.2 Subjective Norms

Subjective norms, which refer to the perceived social pressure to engage or not engage in a particular behavior, also play a significant role in shaping consumer behavior. Consumers are more likely to adopt energy-saving appliances when they believe that important referent individuals such as family members, friends, or community members approve of such behavior (Zha et al., 2023). Social influence, encompassing peer pressure, societal expectations, and community norms, has been shown to enhance the adoption of energy-efficient appliances, particularly in sociocultural contexts where social networks and communal relationships heavily influence individual decision-making (Du & Vries, 2024; Dilotsotlhe & Inseng, 2020). In the Malaysian context, social norms have been found to exert considerable influence over consumers' intentions to purchase energy-saving appliances. For example, when individuals perceive that their peers and community members not only approve of but also use energy-saving appliances, they are more inclined to follow suit and form favorable purchase intentions (Harun et al., 2022; Alam et al., 2019).

H2: Subjective norms has a significant influence on purchase intention

2.3 Perceived Behavioural Control

Perceived behavioral control refers to an individual's perceived ease or difficulty in performing a particular behavior. It reflects the individual's belief in their capacity to execute the behavior successfully and is considered a critical determinant in behavioral decision-making processes. In the context of energy-saving appliances, perceived behavioral control plays a pivotal role, as consumers are more likely to engage in such purchases if they believe they possess the necessary resources, information, and competence to make informed decisions (Zha et al., 2023; Lin & Dong, 2023). This construct becomes especially relevant when considering potential barriers such as cost, product availability, and ease of access, all

of which can significantly impact a consumer's ability to adopt energy-efficient technologies. Empirical findings have consistently demonstrated that perceived behavioral control serves as a significant predictor of both the intention to purchase and actual purchase behavior in Malaysia, further emphasizing its influence on sustainable consumer choices (Al-Kumaim et al., 2021).

H3: Perceived behavioural control has a significant influence on purchase intention

2.4 Environmental Concern

Environmental concern is widely recognized as a critical factor influencing consumers' intention to purchase energy-saving appliances. It often reinforces other decision-making factors, as individuals who are more environmentally conscious tend to perceive greater benefits in using energy-efficient products and are more likely to experience a moral obligation to adopt such technologies (Puspanathan & Suki, 2024; Hua & Wang, 2019). Consumers with heightened awareness of pressing environmental issues such as climate change, air pollution, and resource depletion are more inclined to engage in pro-environmental behaviors, which include the adoption and purchase of energy-saving appliances. Empirical studies indicate that consumers exhibiting higher levels of environmental concern are more likely to perceive energy-efficient appliances as both useful and valuable, thereby enhancing their intention to purchase them (Elangovan et al., 2024; Lin & Dong, 2023). Furthermore, in the Malaysian context, environmental concern has been found to significantly influence not only the intention to purchase but also actual purchasing behavior, underscoring its importance in promoting sustainable consumption (Nadeem et al., 2024; Chan et al., 2023).

H4: Environmental concern has a significant influence on purchase intention

2.5 Purchase Intention

Purchase intention plays an important role in connecting what people think with what they actually do. It reflects a person's willingness or plan to buy a product, and under the right conditions, this intention can lead to actual buying behaviour. In other words, purchase intention shows how likely a consumer is to make a purchase based on their thoughts, feelings, and beliefs about the product (Alviyendra & Pardede, 2024; Shafiq et al., 2024). On the other hand, actual purchase behaviour refers to the real act of buying a product. It is the visible result of the consumer's decision-making process and is influenced not only by their intention but also by practical factors such as product availability, price, trust in the brand, and convenience (Cui et al., 2024; Amanda & Marsasi, 2024). Empirical evidence grounded in the Theory of Planned Behaviour (TPB) consistently demonstrates that a higher degree of purchase intention significantly increases the likelihood of actual adoption, particularly in the context of sustainable consumption such as the purchase of energy-efficient appliances (Fatoki, 2020; Cui et al., 2024; Guo & You, 2023).

H4: Purchase intention has a significant influence on actual purchase

3. Methodology

This study adopted a quantitative research design to investigate the factors influencing consumers' purchase of energy-saving appliances in the context of promoting sustainable energy consumption. A cross-sectional survey approach was employed, wherein data were collected from respondents at a single point in time. This design is appropriate for identifying behavioral patterns and empirically testing hypothesized relationships among variables. The target population comprised consumers residing in Sarawak, who had prior experience purchasing energy-saving appliances. These individuals were selected due to their relevance to the study's focus on environmentally conscious purchasing behavior. A non-probability convenience sampling method was employed, owing to its practicality and accessibility in engaging respondents in public and residential settings.

A total of 396 valid responses were obtained, which meets the minimum sample size requirement for Structural Equation Modelling (SEM) using AMOS. Data were collected using a structured questionnaire comprising closed-ended items adapted from previously validated instruments in the literature. The questionnaire included demographic characteristics and constructs such as attitude, subjective norms, perceived behavioural control, environmental concern, purchase intention, and actual purchase (Hossain, Fekete-Farkas, & Nekmahmud, 2022). All items were measured using a seven-point Likert scale, ranging from 1 ("strongly disagree") to 7 ("strongly agree"), to allow for greater response sensitivity and variability.

4. Findings and Discussion

4.1 Result of Confirmatory Factor Analysis

To assess the construct validity and reliability of the measurement model, Confirmatory Factor Analysis (CFA) was performed using Structural Equation Modelling (SEM). The evaluation of model fit was based on three categories of fit indices: absolute fit, incremental fit, and parsimonious fit, in accordance with established guidelines (Awang, 2015). The measurement model was tested to determine whether the observed data adequately reflected the proposed latent constructs.

Absolute fit indices include the Chi-Square statistic (χ^2) and the Root Mean Square Error of Approximation (RMSEA). The Chi-Square value was statistically significant ($\chi^2 = 0.000$), which is not uncommon given the sensitivity of χ^2 to large sample sizes. The RMSEA value of 0.062 falls within the acceptable threshold of <0.08, indicating a reasonable approximation of the population covariance structure. Thus, the absolute fit of the model is deemed acceptable. Furthermore, the incremental fit indices, specifically the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), were used to assess model improvement over a baseline model. The CFI value of 0.945 and the TLI value of 0.934 both exceed the minimum recommended value of 0.90, signifying a good fit of the model. These results support the claim that the measurement model adequately captures the underlying latent constructs. In terms of parsimonious fit, the ratio of Chi-Square to degrees of freedom (χ^2/df) was computed. The resulting value of 2.527 is well below the conservative threshold of 5.0, indicating that

the model achieves a balance between explanatory power and model complexity.

All fit indices are presented in Table 1 and collectively demonstrate that the measurement model meets the criteria for acceptable fit across all categories. Hence, the model is statistically sound and suitable for further testing of the structural model and hypotheses.

Table 1. Fit Indices for Measurement Model

Type	Index	Measurement Model Indexed Value	Remarks
Absolute Fit Measures	Discrepancy Chi Square	0.000	Achieved
	Root Mean Square Error of Approximation (RMSEA)	0.062	Achieved
Incremental Fit Measures	Comparative Fit Index (CFI)	0.945	Achieved
	Tucker-Lewis Index (TLI)	0.934	Achieved
Parsimonious Fit Measures	Chi Square/Degree of Freedom (Chisq/df)	2.527	Achieved

Figure 1 illustrates the full structural model, capturing the standardized path coefficients among the latent constructs and their respective observed variables.

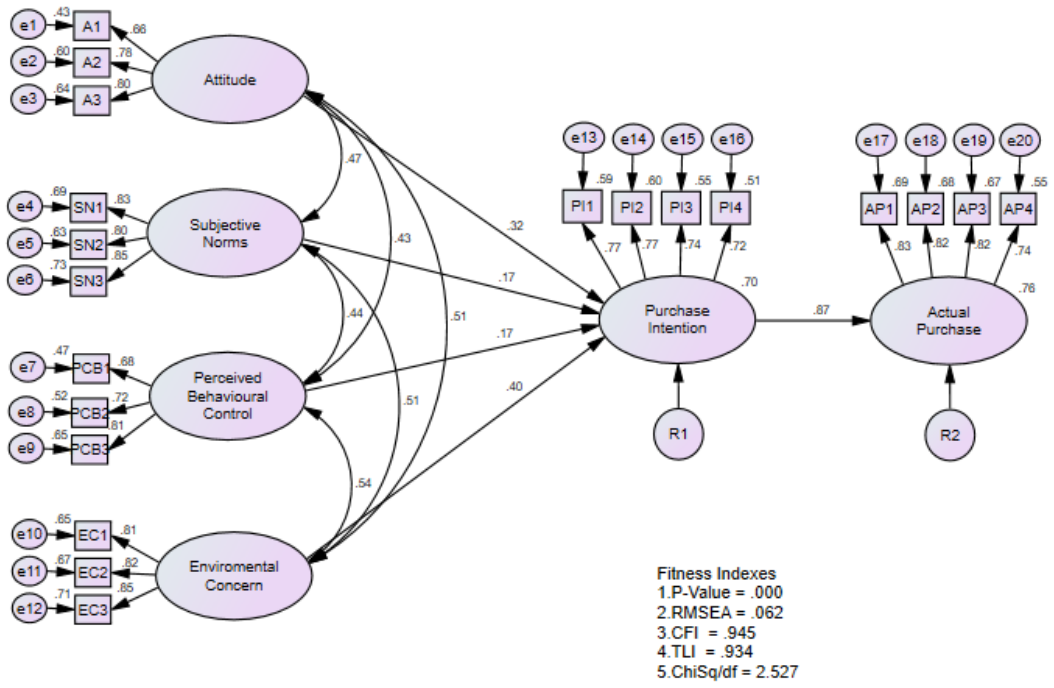

Figure 1. Standardized path coefficients between constructs in the structural model

The model reveals significant and positive paths from Attitude, Subjective norms, Perceived behavioural control, and Environmental concern toward Purchase intention, which in turn significantly predicts Actual purchase behavior. Apart from the path coefficients, the squared multiple correlations (R^2 values) offer insight into the model's explanatory power. The R^2 value for Intention to Purchase (R1) is 0.70, indicating that 70% of the variance in intention to purchase is explained by the four antecedent variables. This demonstrates a strong predictive relationship and suggests that Attitude, Subjective norms, Perceived behavioural control, and Environmental concern are substantial determinants of consumers' purchase intentions toward energy-efficient appliances. Similarly, the R^2 value for Actual purchase (R2) is 0.76, indicating that 76% of the variance in actual purchase behavior is accounted for by Purchase intention. This supports the mediating role of intention in bridging psychological determinants and behavioural outcomes, consistent with theoretical expectations from the theory of planned behaviour.

4.2 Reliability and Validity

To ensure the robustness of the measurement model, the reliability and convergent validity of the constructs were rigorously evaluated using factor loadings, Composite Reliability (CR), and Average Variance Extracted (AVE). These measures are crucial for establishing the internal consistency and validity of latent constructs within Structural Equation Modelling (SEM), as recommended by Awang, (2015); Hair et al., (2010).

Table 2. Summary of Convergent Validity

Construct	Factor Loading	AVE	CR	Convergent Validity CR > 0.6 AVE > 0.5
Attitude		0.561	0.792	Yes
A1	0.66			
A2	0.78			
A3	0.80			
Subjective Norms		0.683	0.866	Yes
SN1	0.83			
SN2	0.80			
SN3	0.85			
Perceived Behavioural Control		0.550	0.785	Yes
PCB1	0.68			
PCB2	0.73			
Environmental Concern		0.684	0.866	Yes
EC1	0.81			
EC2	0.82			
EC2	0.85			
Purchase Intention		0.563	0.837	Yes
PI1	0.77			
PI2	0.77			
PI3	0.74			
PI4	0.72			
Actual Purchase		0.645	0.879	Yes
AP1	0.83			
AP2	0.82			
AP3	0.82			
AP4	0.74			

All item-level factor loadings exceeded the minimum recommended threshold of 0.60, which indicates that the indicators are sufficiently correlated with their respective latent constructs. The factor loadings ranged from 0.66 to 0.85 across all constructs. Specifically, the items for Attitude loaded between 0.66 and 0.80, while the loadings for Subjective Norms were between 0.80 and 0.85. The factor loadings for Perceived Behavioural Control ranged from 0.68 to 0.81, and those for Environmental Concern ranged from 0.81 to 0.85. Similarly, Purchase Intention items demonstrated loadings between 0.72 and 0.77, and the items for Actual Purchase loaded between 0.74 and 0.83. These values reflect satisfactory indicator reliability, supporting the unidimensionality of each construct.

Composite Reliability (CR) was then assessed to examine the internal consistency of the constructs. CR values above 0.70 are considered acceptable, reflecting adequate reliability.

All six constructs achieved CR values well above this threshold, ranging from 0.785 to 0.879. More precisely, CR values were 0.792 for Attitude, 0.866 for Subjective Norms, 0.785 for Perceived Behavioural Control, 0.866 for Environmental Concern, 0.837 for Purchase Intention, and 0.879 for Actual Purchase. These findings confirm that the measurement items consistently represent their corresponding latent variables.

Average Variance Extracted (AVE) was calculated for each construct. An AVE value of 0.50 or higher indicates that the construct explains more than half of the variance in its indicators, which is the recommended minimum for establishing convergent validity. The AVE values in this study ranged from 0.550 to 0.684, exceeding the required threshold for all constructs. For instance, AVE for Attitude was 0.561, Subjective Norms was 0.683, Perceived Behavioural Control was 0.550, Environmental Concern was 0.684, Purchase Intention was 0.563, and Actual Purchase was 0.645. These results demonstrate that a substantial amount of variance in the observed variables is captured by their corresponding constructs. The factor loadings indicate strong item reliability, while the CR and AVE values provide evidence of internal consistency and convergent validity, respectively.

Table 3. Summary of Discriminant Validity

Construct	A	SN	PCB	EC	PI	AP
Attitude (A)	**0.749**					
Subjective Norms (SN)	0.395	**0.826**				
Perceived Behavioural Control (PCB)	0.339	0.362	**0.742**			
Environmental Concern (EC)	0.438	0.440	0.447	**0.827**		
Purchase Intention (PI)	0.519	0.472	0.466	0.609	**0.750**	
Actual Purchase (AP)	0.577	0.490	0.450	0.568	0.716	**0.803**

To assess the distinctiveness of each latent construct within the measurement model, discriminant validity was evaluated using the Fornell-Larcker criterion (Fornell & Larcker, 1981). Discriminant validity refers to the extent to which a construct is truly distinct from other constructs in the model, both conceptually and empirically. The Fornell-Larcker approach requires that the square root of the Average Variance Extracted (AVE) for each construct exceeds its bivariate correlations with any other construct. As shown in Table 3, the square root of AVE for each construct is positioned along the diagonal of the matrix in bold font, while the inter-construct correlations occupy the off-diagonal cells. The square root of AVE values is as follows: Attitude (0.749), Subjective Norms (0.826), Perceived Behavioural Control (0.742), Environmental Concern (0.827), Purchase Intention (0.750), and Actual Purchase (0.803). Each of these values is greater than the corresponding inter-construct correlations, thereby satisfying the Fornell-Larcker criterion.

The square root of AVE for Attitude (0.749) is higher than its correlations with Subjective Norms (0.395), Perceived Behavioural Control (0.339), Environmental Concern (0.438),

Purchase Intention (0.519), and Actual Purchase (0.577). Similarly, the square root of AVE for Subjective Norms (0.826) exceeds its correlations with all other constructs, including Purchase Intention (0.472) and Actual Purchase (0.490). This pattern holds consistently across all constructs, confirming that each construct shares more variance with its indicators than with any other construct in the model. Therefore, the findings provide strong support for discriminant validity, indicating that the latent constructs are empirically distinct. This result affirms the measurement model's structural integrity and justifies proceeding to the analysis of the structural model. Establishing discriminant validity is critical in confirming that the constructs measure unique dimensions of the theoretical framework and enhances confidence in the validity of subsequent path relationships tested in the model.

4.3 Result of SEM Path Analysis

To test the hypothesised relationships among constructs, a structural equation modelling (SEM) approach was employed. The statistical significance of each hypothesised path was assessed using the standardised regression coefficient (Estimate), critical ratio (C.R.), and corresponding p-values. A path is considered statistically significant if the p-value is less than 0.05, following established guidelines (Awang, 2015; Awang et al., 2018; McLean et al., 2020).

Table 4. The Regression Path Coefficient and its Significance

Relationship			Estimate	S.E.	C.R.	P	Result
Purchase Intention	←	Attitude	0.329	0.059	5.553	***	Significant
Purchase Intention	←	Subjective Norms	0.123	0.037	3.29	0.001	Significant
Purchase Intention	←	Perceived Behavioural Control	0.159	0.051	3.117	0.002	Significant
Purchase Intention	←	Environmental Concern	0.312	0.046	6.723	***	Significant
Actual Purchase	←	Purchase Intention	1.099	0.074	14.935	***	Significant

As presented in Table 4, all hypothesised relationships within the structural model were found to be statistically significant. Specifically, Attitude was found to exert a significant positive effect on Purchase Intention ($\beta = 0.329$, C.R. = 5.553, $p < 0.000$), suggesting that consumers who hold favourable attitudes towards energy-efficient appliances are more likely to form strong purchase intentions. Subjective Norms also significantly predicted Purchase Intention ($\beta = 0.123$, C.R. = 3.290, $p = 0.001$), indicating that social pressure or perceived expectations from others influence consumer intention to adopt energy-saving appliances.

Similarly, Perceived Behavioural Control demonstrated a significant effect on Purchase Intention (β = 0.159, C.R. = 3.117, p = 0.002), suggesting that individuals who feel confident in their ability to purchase and use such products are more inclined to intend to purchase them. Environmental Concern also had a significant positive impact on Purchase Intention (β = 0.312, C.R. = 6.723, p < 0.000), reinforcing the notion that environmentally aware consumers are more motivated to engage in sustainable consumption behaviour.

Finally, the strongest effect was observed from Purchase Intention to Actual Purchase (β = 1.099, C.R. = 14.935, p < 0.000), indicating a robust translation of intention into behaviour. This finding is consistent with the Theory of Planned Behaviour, which posits that behavioural intention is the most proximal predictor of actual behaviour.

In sum, the path analysis provides empirical support for all the proposed hypotheses, affirming the theoretical relationships among the constructs. The results highlight the importance of individual attitudes, perceived social influences, personal efficacy, and environmental values in shaping consumer purchase intentions and actual purchase behaviour regarding energy-efficient products. These findings underscore the predictive strength of the model and validate its applicability in understanding sustainable consumption behaviour.

5. Conclusion

This study set out to examine the key factors influencing consumers' purchase intention and actual purchase of energy-saving appliances in the context of promoting sustainable energy consumption in Sarawak. Grounded in the Theory of Planned Behaviour and extended with the construct of environmental concern, the findings provide robust empirical support for the proposed model. The structural equation modelling results confirm that attitude, subjective norms, perceived behavioural control, and environmental concern significantly influence consumers' intention to purchase energy-efficient appliances. Among these, attitude and environmental concern emerged as the most influential predictors. Furthermore, purchase intention was found to have a strong and significant effect on actual purchase behaviour, reinforcing the predictive validity of the model. These findings offer important theoretical and practical contributions. Theoretically, the study extends existing literature on pro-environmental behaviour by validating an integrated behavioural model that incorporates both psychological and environmental factors within a developing regional context. Practically, the study highlights the need for policymakers, energy authorities, and marketers to develop targeted communication strategies that foster positive consumer attitudes, raise environmental awareness, and reduce perceived barriers to adoption. Such initiatives could accelerate the transition towards energy-efficient consumption in line with national sustainability goals. Despite its contributions, this study is not without limitations. The research was geographically confined to Sarawak, and thus the findings may not be generalisable to other regions in Malaysia. Cultural, economic, and infrastructural differences across states could influence consumer behaviour differently. Future research is encouraged to replicate and extend this study within the broader Malaysian context to provide a more holistic understanding of the behavioural drivers influencing sustainable consumption nationwide. Moreover, longitudinal studies could explore changes in behaviour over time and

the long-term impact of policy interventions or market incentives. In conclusion, this study advances the understanding of the motivational and contextual factors that drive consumer engagement with energy-saving technologies. By identifying the pathways through which psychological and environmental considerations shape purchasing decisions, the research provides a valuable foundation for promoting behavioural change and supporting Malaysia's broader sustainable development agenda.

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