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Ethical Practices on Energy Efficiency: Demographic Variations among Households in Selangor, Malaysia

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Abstract
Purpose: This study investigates the ethical practices concerning energy efficiency among households in Selangor, Malaysia, with a focus on demographic variations.
Design/methodology/approach: Utilising a comprehensive survey method, the research examines how variables such as gender, age, monthly household income, education level, and monthly electricity bill influence energy efficient behaviours.
Findings: The findings reveal significant differences in energy consumption patterns and ethical practices across various demographic groups. Male respondents show a high agreement with ethical practices in energy efficiency. Additionally, respondents with higher income and education levels are more proactive in adopting energy-saving practices. Furthermore, older adults and those with higher monthly electricity bills also demonstrate a strong commitment to ethical energy efficiency behaviours.

Research limitations/implications: The study highlights the need for further research to explore the underlying reasons for demographic differences in energy efficiency practices and to assess the long-term impact of educational initiatives and policy frameworks.
Practical implications: This research provides valuable insights for policymakers and stakeholders aiming to enhance energy efficiency and ethical practices among diverse household demographics in Selangor, Malaysia. Tailored educational initiatives and policy frameworks are essential for fostering a culture of sustainability.
Originality/value: The study underscores the importance of demographic-specific strategies to promote ethical energy consumption, suggesting that tailored approaches can significantly improve energy efficiency behaviours across different demographic groups.

Keywords: Ethical Practices, Energy Efficiency, Demographic, Household

Introduction

Energy efficiency has become a critical focus in the pursuit of sustainable development, driven by the global imperative to mitigate climate change and reduce greenhouse gas emissions. Ethical practices in energy efficiency encompass not only the technical and economic aspects but also the moral obligations to use energy resources cautiously and equitably. Studies from various countries highlight the significance of ethical considerations in energy consumption. For instance, a study in the United States underscored the role of ethical consumer behaviour in promoting energy efficiency, emphasising that households with higher awareness and ethical values tend to adopt more energy-efficient practices. (Stern, 2000)Similarly, in Europe, research has shown that ethical considerations significantly influence energy-saving behaviours, with demographic factors such as age, income, and education playing important roles (Gilg, Barr, & Ford, 2005). These findings suggest that ethical practices in energy efficiency are influenced by a complex interplay of demographic variables, necessitating a localised approach to understand these dynamics better.

In Malaysia, particularly in Selangor, demographic diversity offers a unique opportunity to investigate how ethical practices in energy efficiency vary among households. Malaysia's commitment to sustainability and energy conservation is evident in its national policies and initiatives, such as the Twelfth Malaysia Plan, which underscores the importance of energy efficiency for sustainable growth (Ministry of Economy, 2021). Implementing an energy efficiency policy is a central pillar of the Malaysian government’s energy strategy to reduce electricity demand strategy (Aktar, Alam, & Harun, 2022). Selangor's sustainability program focuses on several goals, including reducing carbon emissions, improving water use efficiency, and enhancing waste management. The target is to decrease the share of greenhouse gas emissions in the state's GDP by approximately 35% by 2025 compared to 2005 levels. The Rancangan Struktur Negeri (RSN) Selangor 2035 serves as a guiding framework for various indicators beyond carbon emissions, aligning with the vision of a smart, livable, and prosperous state (Rancangan Selangor Pertama, 2021). These initiatives demonstrate Selangor's commitment to sustainable development, energy efficiency, and addressing climate change challenges, contributing to the global efforts to achieve the Sustainable Development Goals and promote a more sustainable and resilient state.

Much of the existing research on energy efficiency and ethical practices is either global or focused on Western contexts. There is a significant gap in region-specific studies that consider the unique cultural, economic, and social contexts of Selangor (Wang et al., 2011). Additionally, numerous studies have explored energy efficiency and ethical practices; there is a dearth of comprehensive research focusing on how demographic factors influence these practices in Selangor. Previous research tends to focus on broad national trends or specific

sectors without examining demographic factors at the household level (Abrahamse & Steg, 2011). Past studies within Malaysia have indicated that demographic factors, including age, household size, income, and education level, significantly influence energy consumption patterns (Yusoff, Awang, & Sidik, 2021). While energy efficiency is widely discussed in the literature, the ethical dimensions, particularly how households perceive and practice ethical consumption of energy, are less frequently addressed. By exploring the ethical energy practices and demographic variations among households in Selangor, this study aims to fill the research gap, providing insights that could inform more targeted and effective energy efficiency programs that align with the ethical values and demographic characteristics of the population.

Literature Review

Energy efficiency

The incorporation of energy efficiency is regarded as a fundamental aspect of a comprehensive energy strategy. Concurrently developing both solutions is imperative for the stabilisation and mitigation of carbon dioxide and other harmful emissions. The importance of efficient energy consumption cannot be overstated, as it serves as a hindrance to the growth of energy demand. The provision of increased supplies of clean energy also has the potential to significantly reduce the reliance on fossil fuels (Gembicki, 2016).

Furthermore, the recognition of energy efficiency as the most efficient and cost-effective approach to attaining sustainable development goals is widely acknowledged worldwide. The Malaysian government has demonstrated a proactive approach towards the implementation of energy efficiency measures for buildings through the implementation of awareness campaigns, building legislation, and energy regulations. The energy policy of Malaysia prioritises a tripartite approach to effectively govern the country's energy resources, consumption, and ecological impact. The objective is to exercise judicious control over the management of energy supply and consumption, with the simultaneous goal of mitigating the environmental consequences of energy production.

Phrakhruopatnontakitti, Watthanabut, and Jermsittiparsert (2020), highlights that the 11th National Energy Efficiency Action Plan (NEEAP) for the period of 2016-2025 in Malaysia delineates the requisite strategies to achieve synchronised and economical energy generation and utilisation. The 11th NEEAP prioritises enhancing the adoption of energy-efficient technologies and promoting consumer conservation practices. The issue of energy efficiency has garnered significant attention from governments worldwide. Rinkinen, Shove, and Marsden (2020), emphasised that the concept of energy efficiency pertains to the reduction of energy consumption required to produce an equivalent quantity of a given commodity or service.

The National Energy Policy (NEP) 2022-2040 and the Energy Efficiency and Conservation Act (EECA) 2023 emphasise the importance of energy efficiency in achieving Malaysia's low-carbon goals. The NEP outlines a roadmap to increase the share of renewable energy, improve energy efficiency savings, and reduce reliance on coal. While the EECA involves energy audits and sets performance standards for large energy consumers, aiming to systematically reduce energy wastage and improve energy management practices across sectors (Global Compliance News, 2024; Green Quarter, 2024). The energy efficiency practices in Malaysia are gaining significant importance as the country seeks to balance its rapid economic growth with environmental sustainability (Salleh, Chatri, & Huixin, 2024). The residential sector has witnessed substantial efforts to promote energy-efficient appliances and lighting solutions. Initiatives encourage homeowners to replace outdated, inefficient appliances with newer, energy-saving models (Berretta et al., 2021). Light-emitting diode (LED) bulbs and compact fluorescent lamps (CFLs) are promoted as replacements for incandescent bulbs, along with the

use of natural lighting, dimmers, and motion sensors to reduce electricity consumption. Shen et al. (2020) discovered that enhancing insulation and sealing gaps in homes helps maintain indoor temperatures, thereby reducing the need for excessive heating or cooling. The present study defines energy efficiency as the judicious and economical use of energy to maintain daily life, achieve a comfortable standard of living, and promote overall well-being (McAndrew, Mulcahy, Gordon, & Russell-Bennett, 2021).

Understanding Ethical Behaviour in Energy Efficiency

Experts have increasingly highlighted the importance of a psychologically behaviour-oriented approach to meeting energy savings targets (Ahmad, Ahmad, & Siddique, 2023). Ethical behaviour in energy efficiency refers to the conscientious efforts made by individuals to reduce energy consumption and improve efficiency in their daily lives. This behaviour is influenced by various factors, including awareness, personal values, and socioeconomic conditions. People who have a good awareness of environmental issues, for example, are more likely to practise energy conservation. Since carbon emissions have made energy consumption a significant contributor to climate change, researchers and policymakers have focused on energy-saving behaviour and household expenditure. (Basaglia et al., 2023). Energy-saving behaviour falls under the category of pro-environmental behaviour, which is defined as altruistic, friendly, and contributive behaviour towards environmental conservation (Welsch, 2023). In addition, energy-saving behaviours are those that lower total energy consumption, which includes fuel and electricity use (Berardi, 2017). As a result, a variety of factors might affect a household's or an individual's energy-saving behaviour.

The energy-saving behaviour of every citizen plays a crucial role in achieving sustainability. To combat this rising energy consumption tendency, energy conservation is critical in all countries throughout the world. The regular usage of electronic gadgets and machinery such as televisions, refrigerators, and other appliances increases energy consumption, emphasising the importance of adopting energy-saving behaviours by both individuals and companies. Khan and Halder (2016) It purports that domestic energy consumption is closely related to the consumer’s energy-saving awareness, which is also related to selecting or choosing new efficient appliances. The efficient consumption of electricity contributes to the security of sufficient supply, energy saving, and reduction of consumption costs. Electrical energy saving through behaviour change, even without capital cost, could be a great option to meet the increasing demand, rather than increased electrical energy generation (Baidoo et al., 2024). Individuals engage in electricity-saving practices to reduce overall electrical usage (Fatoki, 2020). Hence, a behavioural change is requisite to achieving energy conservation at the individual level and thus, consumers can reduce their energy use by adopting environmental values, attitudes, and norms that encourage pro-environmental behaviour. This shift towards environmentally friendly activities may result in a decrease in overall energy consumption.

Demographic Factors Influencing Energy Efficiency Behaviour

Socio-demographic factors, including income, household composition, age, and gender, have been thoroughly studied in previous research to understand their impact on energy-saving behaviour (Ding et al., 2020; Sardianou, 2007). Households are diverse electricity consumers, using varying amounts of electricity for different purposes at different times of the day. McLoughlin (2013) and Yohanis, Mondol, Wright, and Norton (2008) demonstrate that both the overall level and the hourly patterns of electricity consumption differ significantly among different categories of residential customers. Another study highlights the significant impact of socio-demographic factors like gender, race, marital status, and home ownership on waste

minimisation behaviours, providing a broader context of how demographic attributes influence sustainability practices (Ali, Ullah, Akbar, Akhtar, & Zahid, 2019).
Additionally, incorporating Maqasid Syariah's knowledge into energy efficiency practices introduces a unique perspective by aligning energy awareness with Islamic principles, thus promoting a holistic approach to sustainable energy usage (Kandar, Muszaffarsham, Husini, Norwawi, & Khairi, 2023). These findings collectively underscore the importance of understanding and leveraging demographic and cultural factors to enhance ethical practices in energy efficiency.

Gender

Gender roles influence how women and men perceive and address energy-related issues differently (Tarhini, Hone, & Liu, 2014). Anfinsen and Heidenreich (2017), confirm that variations in energy-consuming practices, energy source preferences, and shifts in energy availability are influenced by gender differences.
Numerous studies emphasise the significance of gender-specific practices in electricity consumption. Ellegård and Palm (2015), highlight the different domestic activities performed by men and women, resulting in varied energy usage patterns. Clancy and Roehr (2003) note women's often-assumed responsibility for reducing electricity consumption associated with household electric appliances.
Despite some inconsistencies in empirical findings, Frederiks, Stenner, and Hobman (2015) suggest that there is generally no significant difference in energy consumption between genders. However, Tjørring, Jensen, Hansen, and Andersen (2018) emphasise the importance of the gender attribute in the utilisation of electrical appliances, with women being primary users of household devices like washing machines and dryers, underscoring their pivotal role in promoting flexible electricity consumption.

Age

Research has shown that electricity consumption in households tends to increase with the age of the occupants (Estiri & Zagheni, 2019). This trend is particularly noticeable in families with more adolescents, as teenagers frequently use information technology devices, such as mobile phones, which consume significant amounts of energy (Bartusch, Odlare, Wallin, & Wester, 2012; Brounen, Kok, & Quigley, 2012; Jones, Goodman, & Kobor, 2015; Kelly, McDonald, & Wallis, 2022). Additionally, a considerable portion of household electricity is used by individuals aged 60-70 years. Many of these individuals are retirees who spend more time at home, leading to higher energy use for heating and cooling (Damari & Kissinger, 2024; Zhou & Teng, 2013). According to Yohannes, Wondafrash, Abera, and Girma (2011), the age of family members influences household electricity consumption, and electricity consumption is relatively high when the age of the family member is 50–65. Electricity consumption is relatively lower when the age of a family member is less than 50 years old or over 65 years old.

Monthly household income

Household income represents another socio-demographic aspect that could influence intentions and actions toward energy conservation. Numerous research papers have observed a trend wherein individuals with greater income levels demonstrate a tendency to utilise more energy (Trotta, Franci, Burgess, & Hellinger, 2020; Wan et al., 2021). Nonetheless, research also indicates that households with greater income are inclined to engage in energy-saving initiatives, adopt energy-efficient measures, or demonstrate a willingness to undertake behaviours aimed at conserving household energy (Bhattacharjee & Reichard, 2011; Tan et al.,

2018). Gatersleben, Steg, and Vlek (2002) and Holloway, Yamamoto, Suzuki, and Mindnich (2008) stated that households with higher incomes tend to possess and utilise a greater number of electrical appliances compared to those with lower incomes, resulting in potential disparities in energy consumption. Additionally, increased total income can empower households to invest in one-time energy efficiency initiatives, such as installing solar panels, enhancing insulation, or adopting energy-saving devices, all of which contribute to conserving energy. According to Sardianou (2007), income is a major socioeconomic variable that significantly influences household decisions to conserve energy or use energy-efficient appliances. Zaman (2015)further indicates a positive correlation between household electricity consumption and income levels, suggesting that higher-income households are more inclined to conserve energy or opt for energy-efficient appliances.

Education level

Residents' awareness of consumption and their behaviours are influenced by their education levels and social environment. Education significantly shapes residents' knowledge, decision-making behaviours, and awareness, albeit indirectly. Furthermore, knowledge has the potential to shape behaviour through attitudes (Never et al., 2022). As education levels rise, individuals gain more environmental knowledge and awareness. Consequently, as their environmental and low-carbon awareness increases, residents are more likely to adopt low-carbon lifestyles.

Mills and Schleich (2014), discovered that individuals with higher education levels are more likely to adopt energy-efficient technologies and implement energy-saving practices in their homes. Bartiaux and Gram-Hanssen (2005), identified a significant reduction in household electricity consumption as education levels increased. The family members with a higher degree of education consumed less electricity than the family members with a lower education level.

Jia, Guo, and Wei (2021), contend that people with a low level of education tend to have low income and thus are less likely to afford the large upfront costs of energy-efficient equipment. For another, people with a median or high level of education tend to have higher levels of income and thus are less sensitive to the benefit of energy savings from energy-efficient equipment. In the end, there is no significant difference in the adoption of energy-efficient equipment among people with different levels of education. A significant increase in the average acceptance of energy-saving measures is found among people with high environmental concerns compared with people with low environmental concerns.

Monthly electricity bills

The research on ethical practices in energy efficiency and demographic variations among households in Selangor, Malaysia, reveals diverse insights into consumer behaviour and the influencing factors. For instance, the study on residential consumers in Kajang, Selangor, emphasises that bill consciousness is a strong predictor of efficiency behaviour, indicating that financial awareness drives energy-saving actions (Aziz et al., 2021).

To raise awareness of their consumption, people can receive feedback in different formats and frequencies. Among these, electricity bills stand out as the most prevalent form of feedback for electricity users. Information feedback (including detailed electricity bills, self-reading meters, or in-home displays) is considered to be an important tool for future utility demand-side management. Feedback mechanisms can play a pivotal role in reducing a household's electricity consumption through various channels, potentially impacting residents' habitual behaviours, such as turning off lights or unplugging appliances (de Bekker, Cremers, Norbu, Flynn, & Robu, 2023; Jacucci et al., 2009). Additionally, it can influence residents' decisions

regarding appliance purchases by encouraging the replacement of energy-consuming appliances with more efficient alternatives (Fischer, 2008).

Method

This study employs a quantitative research design using a survey method to investigate ethical practices in energy efficiency among households in Selangor, Malaysia. The survey approach is chosen for its effectiveness in collecting large amounts of data from a diverse population, allowing for statistical analysis of demographic influences on energy efficiency behaviours. The target population for this study comprises households in Selangor, Malaysia. A sample of 500 residents from different types of houses in the Petaling district was selected. Petaling was chosen due to its higher electricity bills compared to other districts in Selangor, indicating significant energy consumption patterns that are relevant to this study. A stratified random sampling technique was employed to ensure the sample is representative of various demographic segments within Petaling. This approach ensures that key demographic variables such as gender, age, monthly household income, educational level and monthly electricity bill are proportionally represented in the sample.

A structured questionnaire was developed to collect data on household energy efficiency practices and ethical considerations related to energy consumption. The questionnaire included sections on demographic information and ethical practices towards adopting energy-efficient practices. The questionnaire was pre-tested with a small group of residents to ensure clarity and reliability. The survey was distributed both online and through face-to-face interviews to accommodate residents with varying access to digital tools and to ensure a high response rate. Descriptive statistics were calculated to summarise the demographic characteristics of the sample and their attitudes towards energy consumption behaviours. Crosstab analysis was employed to identify the differences in adopting ethical energy efficiency practices according to demographic factors.

Findings

Respondent Profile

The respondents' demographic profile indicates a varied sample, with a majority of males with 340 respondents (68.0%) and a significant proportion falling between the age range of 36-59 years, with 293 respondents (58.6%). The majority of participants are married, with 330 respondents (66.0%) and work full-time, 407 respondents (81.4%). The education levels exhibit variation, with 149 respondents (29.8%) of individuals possessing diplomas and 77 respondents (15.4%) holding PhD/Master's degrees.

The income distribution data reveal that 246 respondents (49.2%) of individuals make less than RM 5,250 per month. Additionally, the majority of households are quite small, with 255 respondents (51.0%) consisting of 1-3 persons. The majority of the average electricity bill ranges from RM 250 to RM 500, representing 235 respondents (47.0%) of the total. There are many different housing options available, with terrace houses accounting for the majority of residents (88 respondents, or 17.6%), flat houses coming in second with 59 respondents (11.8%), and affordable houses coming in third with 56 respondents (11.2%).

Table 1: Respondent Profile

Characteristics		Frequency	Percentage (%)
Gender	Male	340	68.0
	Female	160	32.0
Age	18-35	182	36.4
	36-59	293	58.6
	60 and above	25	5.0
Status	Single	116	23.2
	Married	330	66.0
	Single parent	54	10.8
Education Level	Professional	23	4.6
	Diploma	149	29.8
	PhD/Master	77	15.4
	Degree	81	16.2
	Others	170	34.0
Employment Status	Full-time employee	407	81.4
	Self-employed	60	12.0
	Others	33	6.6
Monthly Household Income	Below RM5,250	246	49.2
	RM5,250 - RM11,820	190	38.0
	More than RM11,820	64	12.8
Number of Households	1-3 people	255	51.0
	4-6 people	198	39.6
	More than 6 people	47	9.4
Average Electricity Bill	Below RM250	109	21.8
	RM250 - RM500	235	47.0
	RM501 - RM750	98	19.6
	RM751- RM1000	27	5.4
	More than RM1000	31	6.2
Type of house	Bungalow	39	7.8

	Terrace	88	17.6
	Semi-D	51	10.2
	Condominium	51	10.2
	Low-cost house	56	11.2
	Low-cost flat house	51	10.2
	Townhouse	43	8.6
	Flat house	59	11.8
	Cluster house	29	5.8
	Village house	33	6.6

Exploratory Factor Analysis

The study utilises Exploratory Factor Analysis (EFA) to identify clusters of items that exhibit sufficient variation to justify their grouping as a factor. An exploratory component analysis, namely Principal Component Analysis with Varimax rotation, was performed on the items measuring ethical practices (EP). EP has 8 items; EP1, EP2, EP3, EP4, EP5, EP6, EP7, and EP8. These questions are adapted from Abbas (1988), Hashi (2011), and Hardiono (2020). Table 2 below summarizes all of the items used in this study.

Table 2: Measurement Item

Variable	Item Code	Items	Scale
Ethical practices	EP1	We believe good ethics in using energy economically benefit the household.	1"strongly disagree" and 5 "strongly agree"
	EP2	We believe that prioritizing public benefit through energy saving is a good ethic. (Ex. carpool, use public transport, etc.)	
	EP3	We encourage family members to optimize the usage of energy.	
	EP4	We believe a responsible attitude in energy usage encourages low carbon emissions.	
	EP5	We encourage our family members to use energy wisely.	
	EP6	We encourage our family members to use energy responsibly.	
	EP7	We encourage our family members to use energy modestly.	
	EP8	We encourage our family members to use electricity as needed.	

For factor loadings, the minimum suppressed factor should be above 0.50 (Joseph, William, Barry, & Rolph, 2014). From Table 3 below, two items are removed, which are EP2 (0.446) and EP6 (0.402). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) is 0.839, exceeding the recommended value of 0.600. The Bartlett's Test of Sphericity for all variables

also reached statistical significance ($p < 0.001$), which implied that the variables are highly correlated enough to support the factorability of the correlation matrix. Both results indicate that the collected data were suitable for the factor analysis.

Table 3: Exploratory Factor Analysis (EFA)

Variable	**Item Code**	**Factor Analysis**	**KMO**	**Bartlett's Test of Sphericity**
Ethical Practice (EP)	EP1	0.776	0.839	$\chi 2$ (10) = 1476.136, p< 0.001
	EP2	**0.446**		
	EP3	0.739		
	EP4	0.702		
	EP5	0.730		
	EP6	**0.402**		
	EP7	0.850		
	EP8	0.759		

The reliability of a particular instrument focuses on the consistency and dependability of the scores (McMillan, 2014). Cronbach's Alpha has been used to identify the reliability coefficient and consistency of questionnaire items (Hashim et al., 2020). An alpha index value of 0.60 or above is acceptable for the instrumentation scale, which has 10 items or more (Pallant, 2013). The Cronbach Alpha for this study is 0.842, which means that the collected data on all variables is reliable.

Cross-Tabulation Analysis

The section presents the findings for the relationship between demographic factors and ethical practices using cross-tabulation data. Ethical practices (EP) are measured across six different parameters (EP1, EP3, EP4, EP5, EP7, and EP8). The responses are categorised into five levels: Highly Disagree, Disagree, Slightly Disagree, Agree, and Highly Agree. Cross-tabulation analysis of each demographic factor with ethical practices can be seen in Tables 4 to 8.

The analysis of ethical practices (EP1, EP3, EP4, EP5, EP7, EP8) across genders reveals distinct differences in responses between males and females. As in Table 4, Males consistently show higher agreement levels with ethical practices than females. For example, in EP1, 78.2% of males agreed compared to 54.4% of females. This trend is consistent across all ethical practices, with males generally having a higher percentage of agreement. Females exhibit higher levels of slight disagreement and disagreement. For instance, in EP8, 21.25% of females slightly disagreed compared to 10.00% of males. In some cases, females also show higher levels of strong disagreement. Females show a higher percentage of "Highly Agree" responses for some practices, such as EP5 and EP7. It shows that males are more likely to agree with the ethical practices presented, indicating a generally positive or less critical stance. Females are more likely to express reservations, with higher percentages of disagreement and slight disagreement, suggesting more critical evaluations or different perspectives on these practices. The findings are similar with previous study by Dhandra and Park (2018), Haski-Leventhal,

Pournader, and Leigh (2022), and Lasthuizen and Badar (2023) which highlight that women frequently prioritize relational and empathetic considerations in ethical reasoning, which can lead to more cautious evaluations of ethical practices compared to men.

Table 4: Cross-tabulation analysis of gender with ethical practices

Item	Decision	Gender				Total
		Male		Female		
		N	%	N	%	
EP 1	Highly Disagree	7	2.06	5	3.13	12
	Disagree	4	1.18	7	4.38	11
	Slightly Disagree	24	7.06	34	21.25	58
	Agree	266	78.2	87	54.4	353
	Highly Agree	39	11.5	27	16.9	66
Total		340	100.00	160	100.00	500
EP3	Highly Disagree	4	1.18	3	1.88	7
	Disagree	3	0.88	5	3.13	8
	Slightly Disagree	22	6.47	30	18.75	52
	Agree	265	77.9	91	56.9	356
	Highly Agree	46	13.5	31	19.4	77
Total		340	100.00	160	100.00	500
EP4	Highly Disagree	4	1.18	5	3.13	9
	Disagree	4	1.18	5	3.13	9
	Slightly Disagree	27	7.94	32	20.00	59
	Agree	260	76.5	89	55.6	349
	Highly Agree	45	13.2	29	18.1	74
Total		340	100.00	160	100.00	500
EP5	Highly Disagree	6	1.76	8	5.00	14
	Disagree	3	0.88	4	2.50	7
	Slightly Disagree	19	5.59	29	18.13	48
	Agree	269	79.1	78	48.8	347
	Highly Agree	43	12.6	41	25.6	84
Total		340	100.00	160	100.00	500
EP7	Highly Disagree	1	0.29	2	1.25	3
	Disagree	3	0.88	4	2.50	7
	Slightly Disagree	28	8.24	32	20.00	60
	Agree	264	77.6	87	54.4	351
	Highly Agree	44	12.9	35	21.9	79
Total		340	100.00	160	100.00	500
EP8	Highly Disagree	3	0.88	1	0.63	4
	Disagree	8	2.35	11	6.88	19
	Slightly Disagree	34	10.00	34	21.25	68

	Agree	252	74.1	79	49.4	331
	Highly Agree	43	12.6	35	21.9	78
Total		340	100.00	160	100.00	500

The cross-tabulation analysis examines the relationship between age groups (18-35, 36-59, and 60 and above) and responses to six ethical practices (EP1, EP3, EP4, EP5, EP7, and EP8) (Refer to Table 4). Across all ethical practices, a general trend is observed where agreement (both "Agree" and "Highly Agree") increases with age. Younger participants (18-35) tend to have higher percentages of slight disagreement, while older participants (60 and above) show a stronger tendency to agree.

The analysis suggests a clear trend where older age groups exhibit stronger agreement with ethical practices, while younger age groups show higher levels of slight disagreement. This may indicate a correlation between age and ethical perceptions, with ethical agreement strengthening as individuals age.

Previous research consistently demonstrates that older individuals tend to exhibit stronger ethical beliefs compared to younger individuals, supporting the findings. Kendrick, Steckley, and Lerpiniere (2008) found that ethical beliefs and behaviours tend to solidify and strengthen with age, with older adults more likely to adhere to established ethical standards and principles. Tabatabaei (2016), noted that ethical perceptions evolve over time, with older age groups generally exhibiting stronger ethical convictions due to increased life experience and a refined understanding of ethical principles.

Table 5: Cross-tabulation analysis of age with ethical practices

Item	**Decision**	**Age**						**Total**
		18-35		**36-59**		**60 and above**		
		N	**%**	**N**	**%**	**N**	**%**	
EP1	Highly Disagree	7	3.85	5	1.71	0	0.00	12
	Disagree	6	3.30	5	1.71	0	0.00	11
	Slightly Disagree	29	15.93	28	9.56	1	4.00	58
	Agree	107	58.8	223	76.1	23	92.0	353
	Highly Agree	33	18.1	32	10.9	1	4.0	66
Total		182	100.00	293	100.00	25	100.00	500
EP3	Highly Disagree	4	2.20	3	1.02	0	0.00	7
	Disagree	4	2.20	4	1.37	0	0.00	8
	Slightly Disagree	24	13.19	28	9.56	0	0.00	52
	Agree	113	62.1	221	75.4	22	88.0	356
	Highly Agree	37	20.3	37	12.6	3	12.0	77
Total		182	100.00	293	100.00	25	100.00	500
EP4	Highly Disagree	5	2.75	4	1.37	0	0.00	9
	Disagree	5	2.75	4	1.37	0	0.00	9
	Slightly Disagree	32	17.58	27	9.22	0	0.00	59
	Agree	100	54.9	227	77.5	22	88.0	349
	Highly Agree	40	22.0	31	10.6	3	12.0	74

Total		182	100.00	293	100.00	25	100.00	500
EP5	Highly Disagree	8	4.40	6	2.05	0	0.00	14
	Disagree	5	2.75	2	0.68	0	0.00	7
	Slightly Disagree	23	12.64	25	8.53	0	0.00	48
	Agree	106	58.2	219	74.7	22	88.0	347
	Highly Agree	40	22.0	41	14.0	3	12.0	84
Total		182	100.00	293	100.00	25	100.00	500
EP7	Highly Disagree	15	8.24	12	4.10	0	0.00	27
	Disagree	5	2.75	1	0.34	0	0.00	6
	Slightly Disagree	33	18.13	31	10.58	0	0.00	64
	Agree	103	56.6	219	74.7	21	84.0	343
	Highly Agree	26	14.3	30	10.2	4	16.0	60
Total		182	100.00	293	100.00	25	100.00	500
EP8	Highly Disagree	3	1.65	1	0.34	0	0.00	4
	Disagree	11	6.04	8	2.73	0	0.00	19
	Slightly Disagree	32	17.58	36	12.29	0	0.00	68
	Agree	101	55.5	208	71.0	22	88.0	331
	Highly Agree	35	19.2	40	13.7	3	12.0	78
Total		182	100.00	293	100.00	25	100.00	500

As in Table 6 below, the cross-tabulation analysis reveals that education level significantly influences respondents' agreement with ethical practices. Generally, higher education levels (PhD/Master and Professional) exhibit higher levels of agreement with ethical practices. The Diploma and Degree groups show more variation in their responses, with higher percentages in the 'Disagree' and 'Slightly Disagree' categories. These findings highlight the importance of educational background in shaping ethical perspectives and practices. This is supported by a 2023 report by UNESCO, which highlights that higher education plays a significant role in shaping ethical perspectives and practices. It emphasizes that individuals with advanced degrees are more likely to engage in ethical behavior and support ethical standards due to their broader knowledge base and critical thinking skills developed through higher education (UNESCO, 2023).

Table 6: Cross-tabulation analysis of education level with ethical practices

Item	**Decision**	**Education**										**Total**
		Professional		**Diploma**		**PhD/ Master**		**Degree**		**Others**		
		N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
EP1	Highly Disagree	0	0.00	5	3.36	0	0.00	2	2.47	5	2.94	12
	Disagree	0	0.00	6	4.03	0	0.00	4	4.94	1	0.59	11
	Slightly Disagree	0	0.00	21	14.09	2	2.60	19	23.46	16	9.41	58
	Agree	20	87.0	89	59.7	71	92.2	47	58.0	126	74.1	353
	Highly Agree	3	13.0	28	18.8	4	5.2	9	11.1	22	12.9	66

Total		23	100.00	149	100.00	77	100.00	81	100.00	170	100.00	500
EP3	Highly Disagree	0	0.00	2	1.34	0	0.00	2	2.47	3	1.76	7
	Disagree	0	0.00	5	3.36	0	0.00	0	0.00	3	1.76	8
	Slightly Disagree	0	0.00	18	12.08	1	1.30	19	23.46	14	8.24	52
	Agree	20	87.0	93	62.4	68	88.3	48	59.3	127	74.7	356
	Highly Agree	3	13.0	31	20.8	8	10.4	12	14.8	23	13.5	77
Total		23	100.00	149	100.00	77	100.00	81	100.00	170	100.00	500
EP4	Highly Disagree	0	0.00	4	2.68	0	0.00	3	3.70	2	1.18	9
	Disagree	0	0.00	4	2.68	0	0.00	1	1.23	4	2.35	9
	Slightly Disagree	0	0.00	22	14.77	2	2.60	18	22.22	17	10.00	59
	Agree	21	91.3	88	59.1	71	92.2	48	59.3	121	71.2	349
	Highly Agree	2	8.7	31	20.8	4	5.2	11	13.6	26	15.3	74
Total		23	100.00	149	100.00	77	100.00	81	100.00	170	100.00	500
EP5	Highly Disagree	0	0.00	5	3.36	1	1.30	3	3.70	5	2.94	14
	Disagree	0	0.00	4	2.68	0	0.00	0	0.00	3	1.76	7
	Slightly Disagree	0	0.00	15	10.07	2	2.60	17	20.99	14	8.24	48
	Agree	21	91.3	90	60.4	67	87.0	48	59.3	121	71.2	347
	Highly Agree	2	8.7	35	23.5	7	9.1	13	16.0	27	15.9	84
Total		23	100.00	149	100.00	77	100.00	81	100.00	170	100.00	500
EP7	Highly Disagree	0	0.00	14	9.40	0	0.00	6	7.41	7	4.12	27
	Disagree	0	0.00	3	2.01	0	0.00	2	2.47	1	0.59	6
	Slightly Disagree	0	0.00	26	17.45	3	3.90	19	23.46	16	9.41	64
	Agree	20	87.0	89	59.7	68	88.3	43	53.1	123	72.4	343
	Highly Agree	3	13.0	17	11.4	6	7.8	11	13.6	23	13.5	60
Total		23	100.00	149	100.00	77	100.00	81	100.00	170	100.00	500
EP8	Highly Disagree	0	0.00	2	1.34	0	0.00	1	1.23	1	0.59	4
	Disagree	0	0.00	6	4.03	0	0.00	4	4.94	9	5.29	19
	Slightly Disagree	0	0.00	31	20.81	2	2.60	19	23.46	16	9.41	68
	Agree	20	87.0	83	55.7	66	85.7	44	54.3	118	69.4	331
	Highly Agree	3	13.0	27	18.1	9	11.7	13	16.0	26	15.3	78
Total		23	100.00	149	100.00	77	100.00	81	100.00	170	100.00	500

The analysis reveals a trend where higher income levels are associated with a greater likelihood of agreement with ethical practices. This trend is consistent across all six ethical practices measured. Respondents with higher income levels (more than RM11,820) exhibit the highest agreement rates, with the majority agreeing or highly agreeing with each ethical practice.

In contrast, respondents with lower income levels (below RM5,250) show a broader distribution of responses, including higher rates of disagreement and slight disagreement. However, even within this income group, a majority still agree with the ethical practices. The middle-income group (RM5,250 - RM11,820) falls between the two extremes, generally showing high levels of agreement but with more variability than the highest income group.

As in Table 7, it can be concluded that higher income groups consistently show stronger agreement with ethical practices, suggesting that economic stability may influence ethical behaviour positively. This trend highlights the potential impact of socioeconomic factors on ethical decision-making and behaviour.

Supporting this conclusion, Kraus, Piff, Mendoza-Denton, Rheinschmidt, and Keltner (2012), and Piff, Kraus, and Keltner (2018) found that individuals from higher socioeconomic backgrounds were more likely to engage in ethical behavior compared to those from lower socioeconomic backgrounds. The study suggested that economic security provides individuals with the resources and psychological comfort to adhere to ethical norms and practices.

Table 7: Cross-tabulation analysis of monthly household income with ethical practices

Item	**Decision**	**Monthly household Income**						**Total**
		Below RM5,250		**RM 5,250 - RM 11,820**		**More than RM 11,820**		
		N	**%**	**N**	**%**	**N**	**%**	
EP1	Highly Disagree	11	4.47	1	0.53	0	0.00	12
	Disagree	10	4.07	1	0.53	0	0.00	11
	Slightly Disagree	38	15.45	18	9.52	2	3.08	58
	Agree	151	61.4	143	75.7	59	90.8	353
	Highly Agree	36	14.6	26	13.8	4	6.2	66
Total		246	100.00	189	100.00	65	100.00	500
EP3	Highly Disagree	6	2.44	1	0.53	0	0.00	7
	Disagree	5	2.03	3	1.59	0	0.00	8
	Slightly Disagree	37	15.04	13	6.88	2	3.08	52
	Agree	158	64.2	142	75.1	56	86.2	356
	Highly Agree	40	16.3	30	15.9	7	10.8	77
Total		246	100.00	189	100.00	65	100.00	500
EP4	Highly Disagree	7	2.85	2	1.06	0	0.00	9
	Disagree	6	2.44	3	1.59	0	0.00	9
	Slightly Disagree	41	16.67	16	8.47	2	3.08	59
	Agree	151	61.4	140	74.1	58	89.2	349

	Highly Agree	41	16.7	28	14.8	5	7.7	74
Total		246	100.00	189	100.00	65	100.00	500
EP5	Highly Disagree	8	3.25	5	2.65	1	1.54	14
	Disagree	7	2.85	0	0.00	0	0.00	7
	Slightly Disagree	33	13.41	12	6.35	3	4.62	48
	Agree	154	62.6	137	72.5	56	86.2	347
	Highly Agree	44	17.9	35	18.5	5	7.7	84
Total		246	100.00	189	100.00	65	100.00	500
EP7	Highly Disagree	20	8.13	7	3.70	0	0.00	27
	Disagree	6	2.44	0	0.00	0	0.00	6
	Slightly Disagree	44	17.89	17	8.99	3	4.62	64
	Agree	144	58.5	143	75.7	56	86.2	343
	Highly Agree	32	13.0	22	11.6	6	9.2	60
Total		246	100.00	189	100.00	65	100.00	500
EP8	Highly Disagree	3	1.22	1	0.53	0	0.00	4
	Disagree	12	4.88	7	3.70	0	0.00	19
	Slightly Disagree	53	21.54	14	7.41	1	1.54	68
	Agree	137	55.7	138	73.0	56	86.2	331
	Highly Agree	41	16.7	29	15.3	8	12.3	78
Total		246	100.00	189	100.00	65	100.00	500

Based on the cross-tabulation analysis provided in Table 8, there are discernible variations in attitudes towards ethical practices across different ranges of monthly electricity bills. The distribution of responses varies for each ethical practices, suggesting potential correlations between electricity expenditures and ethical beliefs. Respondents with higher monthly electricity bills tend to exhibit stronger agreement towards ethical practices. There is a noticeable shift from 'Disagree' or 'Slightly Disagree' towards 'Agree' and 'Highly Agree' attitudes as average electricity bills increase. The findings show a trend where individuals facing higher electricity bills may be more inclined towards positive ethical stances. This is as highlighted by Dubois, Rucker, and Galinsky (2015) and Tabatabaei (2016), where higher levels of consumption, reflected in higher electricity bills, can lead to a heightened sense of responsibility and ethical behavior. Individuals who spend more on utilities may perceive themselves as part of a more affluent and socially responsible group, influencing their ethical attitudes and actions positively.

Table 8: Cross-tabulation analysis of monthly electricity bill with ethical practices

Item	Decision	Monthly Electricity Bill										Total
		Below RM 250		RM 250 - RM 500		RM 501 - RM 750		RM 751- RM 1000		More than RM 1000		
		N	%	N	%	N	%	N	%	N	%	
EP1	Highly Disagree	6	5.50	4	1.70	0	0.00	2	7.41	0	0.00	12
	Disagree	3	2.75	7	2.98	0	0.00	1	3.70	0	0.00	11
	Slightly Disagree	17	15.60	22	9.36	7	7.14	6	22.22	6	19.35	58
	Agree	59	54.1	185	78.7	83	84.7	13	48.1	13	41.9	353
	Highly Agree	24	22.0	17	7.2	8	8.2	5	18.5	12	38.7	66
Total		109	100.00	235	100.00	98	100.00	27	100.00	31	100.00	500
EP3	Highly Disagree	2	1.83	4	1.70	0	0.00	1	3.70	0	0.00	7
	Disagree	1	0.92	5	2.13	0	0.00	1	3.70	1	3.23	8
	Slightly Disagree	17	15.60	19	8.09	4	4.08	5	18.52	7	22.58	52
	Agree	59	54.1	189	80.4	86	87.8	14	51.9	8	25.8	356
	Highly Agree	30	27.5	18	7.7	8	8.2	6	22.2	15	48.4	77
Total		109	100.00	235	100.00	98	100.00	27	100.00	31	100.00	500
EP4	Highly Disagree	5	4.59	2	0.85	1	1.02	0	0.00	1	3.23	9
	Disagree	2	1.83	3	1.28	0	0.00	4	14.81	0	0.00	9
	Slightly Disagree	20	18.35	23	9.79	2	2.04	8	29.63	6	19.35	59
	Agree	51	46.8	190	80.9	84	85.7	10	37.0	14	45.2	349
	Highly Agree	31	28.4	17	7.2	11	11.2	5	18.5	10	32.3	74
Total		109	100.00	235	100.00	98	100.00	27	100.00	31	100.00	500
EP5	Highly Disagree	4	3.67	4	1.70	2	2.04	1	3.70	3	9.68	14
	Disagree	2	1.83	5	2.13	0	0.00	0	0.00	0	0.00	7
	Slightly Disagree	17	15.60	15	6.38	4	4.08	8	29.63	4	12.90	48
	Agree	54	49.5	192	81.7	83	84.7	9	33.3	9	29.0	347
	Highly Agree	32	29.4	19	8.1	9	9.2	9	33.3	15	48.4	84
Total		109	100.00	235	100.00	98	100.00	27	100.00	31	100.00	500
EP7	Highly Disagree	0	0.00	1	0.43	1	1.02	0	0.00	1	3.23	3
	Disagree	3	2.75	2	0.85	0	0.00	2	7.41	0	0.00	7
	Slightly Disagree	16	14.68	27	11.49	6	6.12	5	18.52	6	19.35	60
	Agree	55	50.5	186	79.1	83	84.7	11	40.7	16	51.6	351
	Highly Agree	35	32.1	19	8.1	8	8.2	9	33.3	8	25.8	79
Total		109	100.00	235	100.00	98	100.00	27	100.00	31	100.00	500
EP8	Highly Disagree	0	0.00	2	0.85	2	2.04	0	0.00	0	0.00	4
	Disagree	5	4.59	8	3.40	1	1.02	3	11.11	2	6.45	19

	Slightly Disagree	21	19.27	30	12.77	4	4.08	6	22.22	7	22.58	68
	Agree	48	44.0	180	76.6	81	82.7	13	48.1	9	29.0	331
	Highly Agree	35	32.1	15	6.4	10	10.2	5	18.5	13	41.9	78
Total		109	100.00	235	100.00	98	100.00	27	100.00	31	100.00	500

Discussion and Conclusion

The effect of ethical practices on energy efficiency is very much affected by the behaviours of the users when consuming the energy. The consumption of energy within a household often displays a complex pattern due to variations in the demography within each household. This study attempted to find plausible explanations for the patterns of household energy usage by considering demographic factors like gender, age, monthly household income, education level and monthly electricity bills.

The results from cross-tabulating gender with ethical practices indicate distinct behaviours between male and female respondents. Males are found to have more inclination towards ethical practices compared to females in energy consumption, consistent with the findings by Ellegard and Palm (2015) and Tjorring et al. (2018) but contradicting the findings by Frederick et al. (2015). In this study, the respondents' ages are grouped into (18–35), (36–59) and above 60 years old. These age groups can easily be demarcated into different generations, namely Generation Z, Generation Y, and Generation X, and even Baby Boomers. Generational differences are clearly reflected in the way the respondents perceive ethical practices. A clear correlation is found between age and ethical perceptions. For example, the results suggest that older generations subscribe to higher ethical practices in energy efficiency probably due to the culture and environment they are in which, in turn, influence their energy consumption (Damari & Kissinger, 2018). Past studies seem to imply positive correlation between monthly household income and energy efficiency consumption (Wan C. et al. 2018; Trotta, G. 2018) enabled by their ability to invest in energy efficiency appliances and equipment like installation of solar panels, enhancing insulation, etc. Similar outcome is found in this study.

Likewise, the level of education of the respondents is found to affect their action towards ethical perspectives and practices where those possessing postgraduate or professional qualification are more willing to engage in ethical practices as compared to those having a diploma or an undergraduate degree. Respondents from the lower education level may be hindered from engaging in energy efficient practices due to their lack of exposure to the benefits of energy efficient appliances (Paco and Lavrador, 2017). Since lower education may be equated with low income level, consumers within this group could be prevented from purchasing cost-efficient equipment (Jun-Jun, et al., 2018) even if they are aware of the benefits. Another notable finding from this study is the correlation between the amount of the monthly bill on households' attitudes towards ethical practices in energy consumption. Respondents who are paying a higher-than-average electricity bill are found to display a higher awareness of and positive attitude towards ethical practices. Mat and Harun (2019) suggested that consumers who are concerned about the monthly amount spent on electricity bills possess a higher level of financial awareness which encourages them to engage in energy-saving behaviour.

As observed from the correlation analysis, no one single demographic factor can explain the influence on ethical practices in energy consumption. Instead, it is the intricacies of these demographic factors that further exacerbate the effect of ethical practices on energy efficiency, especially when perceptual measures are used. For example, the intrinsic characteristics of a different gender would invariably cause a male respondent to have a different perception of ethical practices from that of a female respondent; as found in this study where males are more inclined to go for a higher level of agreement. Likewise, each of the other factors like age,

monthly household income, education level and monthly electricity bills individually and interactively, can explain the level of correlation between them.

This study focuses only on the correlation between demographic factors and ethical practices in energy efficiency. Therefore, the results presented here are limited to its predetermined scope. For more comprehensive findings, future studies can undertake to test the direct and indirect effects of a set of other plausible variables on energy consumption behaviours. Such studies can also include differences within and between groups of consumers, for example, specific housing types and sizes, specific electricity bills grouping, specific income groups, as guided by the literature.

In general, it can be concluded from the findings of this study that, whatever the situation is, the behaviour and attitude of the consumers are strongly shaped by their gender, age, income bracket, monthly electricity bills, and level of education.

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