

Factors Influencing Environmentally Sustainable Consumer Behavior – Extended Theory of Planned Behavior (TPB) in the Context of Haze Governance

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Abstract

The widespread adoption of energy-saving appliances has emerged as a key strategy for energy conservation and emission reduction in Pakistan under the simultaneous pressures of a lack of electricity and air pollution. On the other side, despite having an increased awareness about climate issues including haze, the translation of favorable attitudes and positive purchase intention into pro-environmental consumer behavior and the anti-haze properties of energy-efficient household appliances is explorable. The structural equation model and the hierarchical regression model were used to evaluate the 389 valid questionnaires. The initiative used non-probability purposive sampling to collect data. For the analysis of the structural model, SmartPLS-SEM 4.0.8.1 was employed. The findings demonstrate that haze pollution has encouraged urban residents in Pakistan to use energy-efficient appliances. Environmental concerns and perceived consumer effectiveness have a significant favorable impact on consumers' purchase intention of energy-efficient household appliances. Consumers' pro-environmental behavior is influenced by purchase intention, which is in itself shaped by subjective norms, attitudes perceived consumer effectiveness, and environmental concern. On the basis of the empirical findings, this research also suggests strategies to encourage consumers to purchase energy-efficient appliances.

Keywords: Theory of planned behavior, Energy efficient household appliances, Environmental concern, Perceived consumer effectiveness, Herd mentality theory of planned behavior, trust, price consciousness.

Global warming has accelerated concerns about environmental sustainability (Hameed et al., 2021a; Tan et al., 2017). Carbon dioxide emissions, automobile emissions, industrial pollutants, and particulate matter are major sources of air pollution (Li & Lin, 2016; Hameed & Khan, 2020). Aerosols harm health and climate. South Asia's urbanisation worsens air pollution. Aerosols appear as haze, smoke, and dust here. Aerosols are created naturally and artificially. South Asia's winter fog is caused by biomass burning, power plants, fossil fuels, gasoline vehicles, industries, household emissions and dust. In Pakistan and South Asia, winter fog with high aerosol concentrations endangers people. Unchecked economic growth has caused repeated haze/smog episodes in Pakistan in recent decades (Bulbul et al., 2018). Subsequently, haze pollution, a combination that comprises soot particles, carbon dioxide, and other harmful gases in the air, symbolizes environmental difficulties and its temporal and geographical consequences are considerably more widespread. Geographically, this is a cross-regional issue that could have an unquantifiable impact on future generations. Today, the burning issue of haze pollution has become a bottleneck in societal well-being (Zhang et al., 2018). The distributions of aerosols at the regional to global scale are examined using MODIS satellite retrieval data. Assessing aerosol optical/radiative properties, aerosol loading over a location, and confirming satellite data are all possible with the use of surface-based remote sensing data from networks like AERONET (Bibi et al., 2017).

Despite the fact that air pollution is a worldwide issue, cities in low- and middle-income countries are the most severely affected, with populations over 100,000 according to the latest WHO data (WHO, 2018). Pakistan has the most urbanised population in South Asia, despite being a low to middle-income class (77.42 million, or 36.37 percent of the urban population, with a 2.52 percent annual growth rate) (UNDP, 2019). According to Bilal et al. (2021), by 2030 air pollution will reduce life expectancy by more than 100 months.. Pakistan ranks third globally in terms of air pollution-related mortality, with 128,000 deaths per year (Government of Pakistan, F.D, 2019). Semi-arid cities

like Karachi and Lahore are prone to dust storms in the summer and severe smog in the winter from automotive and industrial emissions, household electrical appliances emissions, as well as from wood-burning for heat (Iftikhar et al., 2018). One method to reduce global warming risks is to promote domestic energy conservation (Waris & Hameed, 2020a). Using energy-efficient appliances helps reduce haze pollution (Winter & Lasch, 2016). Both direct and indirect energy uses in the households, such as electricity and gasoline, contribute to overall energy consumption (Abrahamse et al., 2007). The International Energy Agency's 2017 World Energy Outlook states that consumer energy demand is expected to hike by 32% by 2040, hence energy-efficient equipment must be encouraged in developing countries like Pakistan (Dortans et al., 2020).

In many developing nations, including Pakistan, pollution and other environmental difficulties have become serious problems. Studies by Zhao et al., (2019) and Song et al. (2019) show that reducing energy use and pollutant emissions lessens haze pollution. Energy-efficient equipment may significantly cut residential energy use, reducing neighbourhood haze pollution (Ma et al., 2013; Greaves et al., 2013).

In Pakistan, 85% of energy is used in households (Ali et al., 2019b). TVs, washing machines, and other household electronics contribute to airborne pollutants (Hua & Wang, 2019). As the middle-class increase in number and income, they buy more equipment. In turn, This raises energy consumption and motivates consumers to buy energy-efficient products (Waris & Hameed, 2020b). Pakistan is estimated to have contributed 304.85 million tonnes which represent 0.7% of CO₂, equivalent to global emissions, while India contributed 35% (Khan & Pervaiz, 2013). Consumer perceptions, financial readiness, and purchasing patterns are the main topics of current study on energy-saving appliances. Previous research have focused on low-carbon (Ding et al., 2017), green, and sustainable consumption (Wang and Wu, 2016). Most aren't explicitly tied to haze pollution, leaving a gap between the two.

In order to examine consumer intentions to buy energy-efficient appliances, this research integrates the theory of planned behaviour (TPB) with psychographic constructs like environmental concern (EC) and perceived consumer effectiveness (PCE), both of which are significant determinants of consumer intention to buy environmentally friendly products (Sun et al., 2019; Hameed et al., 2021c). The focus will be on consumer buying intentions in relation to haze pollution, and what elements affect customers' decisions to buy energy-efficient household appliances for haze pollution mitigation and reduction? It aims to provide a comprehensive insight into consumer behavior when purchasing energy-efficient household equipment. This study also intends to help the authorities to reduce environmental pollution by managing household appliance manufacturing and sales through the implementation of effective strategies which is exactly in accordance with the UN sustainable development goals.

The following is the breakdown of this article's structure: Theoretical exposition and research hypotheses, are presented in section 2. In section 3 of the paper, methods used for analysis are described. In section 4, the data analysis and key findings are given. In the section 5, we concentrate on the analysis of the key findings and suggest some policy implications.

Literature Review and Hypothesis Development

Theoretical Exposition

Fundamentally, the TPB contends that the more behavioural intentions, the more likely it is that a specific activity will be carried out. Psychologists frequently utilize TPB to anticipate future conduct. Proposed by Ajzen (1991) after Ajzen and Fishbein proposed TRA, a widely used theory of reasoned action (1980). People's conduct is influenced by their behavioral aim, subjective norm, attitude, and perceived behavioral control toward specific activities (Ajzen, 1991). TPB considers behaviour the result of behavioural intention's effect on attitudes, subjective norms, and perceived behavioural control. The TPB has been utilised in a variety of pro-environmental behaviour studies, including those pertaining to low-consumption appliances (Tan et al., 2017; Li et al., 2019; Ali et al., 2019a; Hameed et al., 2021a). The TPB provides a framework for analysing behavioural decision determinants. Individual behaviour is the result of behavioural intentions, whereas behavioural intentions depend on a person's attitude toward their behaviour, their perception of the behavior's control, and their own personal norms (Hameed & Khan, 2020). Attitude is the favourable or negative judgement of an activity (Verma & Chandra, 2018). Subjective norms are based on past experiences and behavioural patterns. Perceived behavioural control shows how much people believe they can regulate their conduct. According to TPB, individuals with a positive environmental attitude have normative support for engaging in pro-environmental conduct. Because of favourable perception

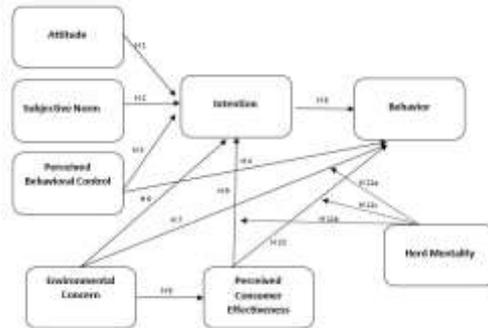
and/or past experiences, they quickly get associated with strong intentions for behavior (Liobikiene et al., 2016; Alzubaidi et al., 2021).

Nevertheless, despite widespread support, the paradigm has attracted a number of criticisms. The main criticism is that more variables need to be included in order to improve its capacity to predict and explain (Davies et al., 2002; Wang et al., 2014). Consequently, a number of studies (Al Mamun et al., 2018; Kaffashi & Shamsuddin, 2019; Waris & Hameed, 2020a; Waris & Hameed, 2020b) have proposed integrating new factors that are theoretically capable of influencing intentions in order to enhance the explanatory power of the TPB. Low-energy use and fewer emissions from energy-efficient equipment might significantly reduce haze levels. It's an action that helps the planet. However, research on how people's self-control affects their adoption of eco-friendly practises like using energy-efficient equipment is still in its infancy. The PCE is typically defined as a measure of the subjects' value judgement in their capacity to comprehend the effects of problems with environmental resources, and it is consistent with the idea of internal locus of control. The social learning theory (Rotter, 1954), the idea of self-efficacy, and social cognitive theory are where the internal and external locus of control concept first appeared. Conventionally, EC is a unidimensional construct spanning from uninterested to worried about the environment as a measure of new environmental paradigm. Furman (1998) claimed that EC can encourage people to change their behaviour and social practises to help the environment.

Researching how haze pollution affects urbanites' use of energy-efficient appliances using the TPB plus additional variables is, thus, both important and meaningful. This research includes environmental concern, perceived consumer effectiveness, and theoretical concepts like haze governance and herd mentality. With models that explain and empirically demonstrate their ability to enhance the use of energy efficient household appliances and sustainable consumption patterns in Pakistan, we hope to improve TPB's predictive ability. The following research framework and hypotheses have been created based on the discussion above.

Figure 1.

The Conceptual Framework



Attitude and Purchase Intention

Individual's positive and negative disposition toward an object, another person, or a circumstance is referred to as their attitude. Thus, attitude is the result of mental processes and personal experiences (Ajzen, 1991). This viewpoint was backed by Newhouse (1990), who characterised it as an assessment of emotions, both good and bad, in a person and in specific situations. When it comes to how household consumers utilise energy products, attitude is the propensity of consumers to conserve energy, which is impacted by energy-saving actions (Wang et al., 2014; Hameed et al., 2021c; Alzubaidi et al., 2021). Previous studies in the field of environmental marketing indicated that environmental concerns were major and crucial antecedents of behaviour to conserve energy (Akehurst et al., 2012). Positive correlation exists between attitude and intention to purchase energy-saving products, according to numerous research (Tan et al., 2017; Wang & Lu, 2016; Hossain et al., 2022). On the basis of the aforementioned rationale, it can be hypothesised that consumers' favourable attitudes about energy-efficient household equipment will result in their intention to make a purchase:

H₁: *Attitude has a positive impact on the consumers' intention to purchase energy-efficient household appliances.*

Subjective Norm and Purchase Intention

A consumer's perception of societal pressure that prompts them to act in a particular way is referred to as a "subjective norm" (Ajzen, 1991). According to recent research, an individual's subjective norm is a key predictor of their desire to purchase (Lee and Chow, 2020; Akar, 2019; McIntyre et al., 2019; Liu et al., 2020; Bhutto et al., 2020). According to the TPB, a person's decision to embrace sustainable products should take into account the subjective norm (McBride et al., 2020; Liobikiene et al., 2016). As members of social groups, consumers learn about things from others and share knowledge about them, as well as examine others' opinions on how acceptable products are (Zhao et al., 2019). The use of green products is encouraged by subjective norm, which is also seen as a means of elevating one's status and encouraging customers to act in favour of the environment (Hameed et al., 2021b). The most significant predictor of consumer behavior, according to Ha and Janda's (2012) study on consumers intention to buy energy efficient appliances was found to be subjective norm. In support of this, Wang et al (2014)'s research revealed that customers intentions to purchase energy-saving goods are significantly influenced by subjective norms. According to prior research (Lopes et al., 2019; Fatoki, 2020), industrial workers' energy-saving behaviour and acceptance of green power are significantly influenced by subjective norm (Kowalska-Pyzalska, 2018; Hameed et al., 2021c; Pop et al., 2022). Evidence from past studies has shown that subjective norm has an impact on people's willingness to purchase energy-efficient appliances. As a result, the following can be assumed:

H₂: Subjective norms positively influence the consumers' intentions to purchase energy efficient home appliances.

Perceived Behavioral Control and Purchase Intention

The extent to which a person has the opportunity and capacity to carry out an action is measured by their perceived behaviour control (PBC) (Klößner et al., 2013; Obaidallah et al., 2019). Beliefs that one's behaviour is made possible by both external and internal variables have a profound impact on PBC (Tan et al., 2017; Waris & Hameed, 2020a; Waris & Hameed, 2020b). PBC is a word used to describe people who are willing to invest in energy efficient household appliances, even if they are a little more expensive, and who have the expertise and money to do it. PBC independently forecasts consumers' intentions to buy green goods (Obaidallah et al., 2019; Hameed et al., 2021b). Therefore, despite positive attitudes and acceptable subjective norms, limited perceived behavioural control results in low intentions to behave (Al-Swidi et al., 2012). According to earlier research, understanding of the relevant problems and products is necessary to improve perceived behaviour (Hossain et al., 2022). If people continue to lack knowledge, information, trust, understanding of labels, and performance of their purchasing intentions, it is unlikely that they will continue to purchase organic food (Zhao et al., 2019). PBC was a key contributing factor to the behavioural intention of organic items (Nekmahmud & Fekete-Farkas, 2020), green hotels, and green products (Nekmahmud, 2020), according to earlier studies. Similar to this, other academics confirmed that PBC strongly influences the purchase of household goods that are energy-efficient (Wang et al., 2019). As a result, we suggest the following:

H₃: Perceived behavioral control positively impact the consumers' purchase intention to purchase energy efficient household appliances.

Perceived Behavioral Control and Purchase Behavior

When it comes to environmental marketing, it has been proven that perceived behavioral control is a strong predictor of environmentally conscious behavior (Chen et al., 2015). Behavioral intention can be predicted by one's belief in one's own ability to change one's own actions. For example, perceived behavioral control is associated with plans to use green hotels (Lee et al., 2020), recycle (Taylor & Todd, 1995a), eat organic (Tarkiainen & Sundqvist, 2005), and conserve (Tan et al., 2017). Joshi and Rehman (2019) discovered that behavioral control beliefs influence people's motivations to utilize energy-efficient gadgets and appliances. Therefore, the hypothesis is assumed to be as follows:

H₄: Perceived behavioral control has a positive impact on consumers' purchase of energy-efficient household appliances.

Purchase Intention and Purchase Behavior

According to Ajzen (1991), a person's purpose reveals their entire motivation for and dedication to a specific behaviour. The TPB asserts that behaviour is directly caused by intention (Ajzen, 1991). Previous research, mostly in the field of environmental advocacy, such as (Hasan et al., 2019; Alzubaidi et al., 2021; Hossain et al., 2022), looked at the connection between intention

and behaviour. The theory behind the intention-behavior link assumes that If consumers have positive intentions to purchase an energy-efficient product, they are more likely to do so if they mentally prepare for it. This logic applies to consumer purchasing intents of energy-efficient appliances. Accordingly, the TPB suggests that the higher the participation in purchasing behaviour should be, the stronger the inclinations to acquire energy-efficient equipment (Hossain et al., 2022). Most often, a product's intention to be energy-efficient mirrors user inclinations in terms of direction and intensity. So, we suggest the following link between intention and behaviour:

H₅: *Consumers' intention to buy has a positive impact on their decision to buy energy efficient home appliances.*

Environmental Concern and Purchase Intention

Environmental concern (EC) refers to a consumer's awareness of ecological problems, which include climate change, water pollution, air pollution, and the depletion of natural resources. Ecologically conscious customers are more inclined to purchase environmentally friendly goods (Chen & Lee, 2015; Wang et al., 2017b). The TPB's attitude component, which manifests as environmental concern, can lessen the unfavourable effects of pro-environmental acts (Urban & Ščasný, 2012). Prior studies on green marketing looked at whether environmental awareness and behavioural intentions were significantly correlated (Nekmahmud, 2020). O'Cass and Lim (2002) used the TPB to link consumer environmental consciousness among Chinese and Americans, and discovered a strong association between environmental consciousness and intent to make green purchases (Chen et al., 2014). According to other studies (Chen & Tung, 2014; Tan et al., 2017; Hartmann & Siegrist, 2017; Isock et al., 2018), EC has an impact on consumers' intentions to purchase energy-efficient products. The most often employed variable in environmental behavioural research has been shown to be EC. It should therefore be taken into account when dealing with pro-environmental investigations (Han et al., 2010; Tan et al., 2017). We think about the following assertion:

H₆: *Environmental concern positively influence the consumer intention to purchase energy efficient household equipment.*

Environmental Concern and Purchase Behavior

Wei et al. (2017) defined pro environmental consumer behavior as ensuring the planet's safety through sustainability. After identifying customer decision-making elements, environment friendly product manufacturers can build products. Consumers' emotional attachment to environmental safety could lead to fewer harmful products. Human actions have exhausted numerous natural resources, causing concerns with fisheries, deforestation, soil erosion, and biodiversity, according to Hossain et al. (2022). Song, Zhao and Zhang (2019) said consumers who value environmental sustainability will support environmentally friendly efforts and reject environmental degraders. Companies' green promotion techniques include eco-friendly packaging, environmental advertising, and environmental claims. Xie, Bagozzi and Grnhaug (2015) suggested that environmentally concerned consumers are more hesitant. Do Paço and Reis (2012) hypothesised that consumers' environmental concern increased their purchase intent. Pro-environmental beliefs affect pro environmental customer behaviour, according to Polonsky (2011). Health promotion and environmental concern support environmental friendly product purchase behaviour (Joshi & Rahman, 2019):

H₇: *Environmental concern positively influence the consumer purchase of energy efficient household appliances.*

Environmental Concern and Perceived Consumer Effectiveness

According to research by Song et al. (2019) on green consumption, manufacturers are including environmental considerations in product design to assure sustainability. Wei et al. (2017) contend the significance of environmental concern in business and marketing literature. Numerous researchers have backed the claim on the importance of the environmental issue in a person's life. They contend that consumers frequently base their decisions about the products they choose on environmental ideals (Kilbourne and Beckmann, 1998; Waris & Hameed, 2020a). According to Polonsky (2011), consumer decision-making is heavily influenced by environmental considerations, and how much influence depends on how each customer evaluates the products and services and how much of an impact they have on the environment. For instance, car owners differ from consumers who are environmentally sensitive and have major concerns about the impact of auto emissions on the environment (Kahn, 2007; Liu et al., 2020). The aforementioned talks highlight the importance of environmental considerations in customers' choices to buy sustainable goods. We can

therefore draw the conclusion that customers' concern for the environment will affect their choice to use energy efficient household appliances. Therefore, we assumed that:

H₈: *Environmental concern positively influence the perceived consumer effectiveness.*

Perceived Consumer Effectiveness and Purchase Intention

PCE is "a domain-specific notion that an individual's efforts may make a difference". It's also a personal belief that "examines the impact a one consumer can have on the environment" (Zhou et al., 2013). The consumers must be convinced that their actions affect the environment and environmental issues to change their behaviour. PCE can predict individuals' intentions to adopt environmental behaviors Consumers who believe their environmentally conscious actions can benefit the environment are more likely to participate in PEBs (Kang et al., 2013). Hence, we hypothesized that:

H₉: *The perceived consumer effectiveness have a positive influence on the purchase intention of energy efficient home appliances.*

Perceived Consumer Effectiveness and Purchase Behavior

Studies have demonstrated that consumers who believe their actions enhance society are more cooperative and care less about their own interests, which is how customer influence on environmental issues is measured using perceived consumer effectiveness (Albayrak et al., 2013). Roberts (1996) asserts that in order to modify consumer behaviour, people need to believe that their actions will result in positive changes like less ecological damage or greater social equality. High perceived consumer effectiveness has been linked to higher levels of green consumerism, according to previous studies (Wang et al., 2017a; Joshi & Rahman, 2019). According to Wesley et al. (2012), high perceived consumer effectiveness led to attitudes and behaviours that are socially conscious. Therefore, we suggest:

H₁₀: *Perceived consumer effectiveness positively impact the purchase of energy efficient home appliances.*

The Moderating Role of Herd Mentality

Conformity, compliance, and obedience are the three categories into which social influence is divided by psychologists. Conformity is defined as people making changes to or maintaining their behaviour to conform to the group's standards (Liu et al., 2020). Conformity is characterised from a consumer and marketing standpoint as consumers changing their own product reviews, purchasing intents, or other behaviours in response to those of other consumers (Rahman et al., 2019; Song et al., 2019). Consumers frequently consult other people's reviews and identified buying facts, among other things, in order to influence consumers' perceptions of the goods and cause them to appear to make better decisions. This is because the environment in which the consumer is positioned during the process of purchasing energy-efficient equipment is unpredictable, the information they may obtain is limited and asymmetric, and they may only obtain information from certain sources. Ultimately, choices on whether to buy, trust, and other things will be made, leading to the illogical herd effect (Song et al., 2019; Obaidallah et al., 2019; Zhao et al., 2019).

Members of a group believe and/or act in particular ways thanks to an intentional alignment. When individuals are anxious, such as during the COVID-19 situation, the herd mentality manifests in several ways. To conform to the consensus, compliance, and obedience expectations of the group, people will either alter or maintain their behaviour (Rahman et al., 2019; Bhutto et al., 2020). Consumers who follow the crowd mimic the opinions and intentions of other shoppers. Wealthy individuals favour energy-saving machinery and appliances, and people tend to trust, purchase, and act in other irrational ways (Joshi & Rahman, 2019; Song et al., 2019). Considering the aforementioned reasoning, we hypothesise the following:

H_{11a}: *Herd mentality positively moderates the relationship among environmental concern and consumer purchase behavior.*

H_{11b}: *Herd mentality positively moderates the relationship among perceived consumer effectiveness and consumers's purchase intention.*

H_{11c}: *Herd mentality positively moderates the relationship among perceived consumer effectiveness and consumers' purchase behavior.*

Research Methodology

Data and Sample

The disparity between rural and urban Pakistanis has wide-ranging repercussions. Not only does human development vary, but so does electrical usage. Urban households spend 68.4% of their income on fuel and lighting, but only 38.6% on electricity (Rafique et al., 2018). Urban and rural Pakistani households own a wide range of appliances (Ali et al., 2021). Residents of Karachi City, Sindh Province, Pakistan, were the target audience for the questionnaires. More than two-thirds of the population in Pakistan is under the age of 34, according to the Pakistan Bureau of Statistics (2017). Individual household consumers aged 18 and over who dwell in Karachi, Pakistan's largest urban city, constitute the study's unit of analysis. Due to their knowledge of energy-efficient appliances and their impact on the environment, data from respondents over the age of 18 was obtained. Even if huge metropolitan responses are better for projecting population reactions, smaller geographic areas provide superior data (Ritter et al., 2015). Karachi, Pakistan's most populous metropolis, reflects the collective belief of the country's customers due to its ethnic and cultural variety. In terms of population density, Karachi is one of the largest cities in the world and hence has a high level of household consumption, thus questionnaires were sent to Karachi residents. The sample size was calculated through Hair et al. (2012) suggested criteria. They proposed a ratio of five to ten responses per item. The initiative used non-probability purposive sampling to collect data. When gathering a complete sampling frame is challenging, the procedure is judged appropriate. It's a non-random sampling technique that doesn't rely on hidden ideas or a set number of informants.

Field survey and online survey were the two methods used to conduct the inquiry. By using random sampling, a field study was carried out in the three districts of Karachi close to universities, sizable retail malls, and corporate offices. Respondents were made aware of the research setting so that the validity of the data must be ensured. In total, 400 questionnaires were distributed; after removing partial responses, 249 questionnaires were found to be valid. The Google Form, one of the most expert online survey platforms, was also used to perform the online survey. Residents of Karachi who were relevant family members, friends, university students, and neighborhood residents were issued questionnaires by local researchers from Karachi. From the Internet, 140 valid surveys in all were gathered. As a result, we ultimately collected 389 valid questionnaires.

389 total valid replies were collected from the study's participants. When it came to demographics, the majority of respondents (n = 235) were men. The bulk of respondents (n = 225) fell between the age range of 21 to 30 years. The majority of respondents (n = 217) had an undergraduate degree when it came to academic background. The majority of respondents (n=225) fell between the age range of 21 to 30 years. The majority of respondents (n=213) fall into the PKR 100,000 and above family income category in terms of monthly family income. The remaining respondents are almost evenly split into three income categories: 67 belong to the group with incomes between PKR 80,001 and 100,000, 46 to the group with incomes between PKR 60,001 and 80,000, and 35 to the group with incomes over PKR 100,000. (PKR: 40,001 to 60,000).

Table 1.

Demographic information of the respondents

Demographic Information		Frequency	Percentage (%)
Gender	Male	235	60.4 %
	Female	154	39.6%
Total		389	100%
Age	Less than 21	144	37.0
	21 to 30	225	57.8
	31 to 40	17	4.4
	41 to 50	3	0.8
	Above 50	NIL	NIL
Total		389	100 %
Education	Matriculation/O level	2	0.5
	Intermediate/A level	72	18.5
	Undergraduate	217	55.8
	Graduate	95	24.4
	Doctorate	3	.8
Total		389	100.0

Occupation	Employee	102	26.2
	Own Business	24	6.2
	Student	263	67.6
Total		389	100.0
Family Income	Under 20,000 Rs./ month	18	4.6
	20,001 to 40,000 Rs./ month	10	2.6
	40,001 to 60,000 Rs./ month	35	9.0
	60,001 to 80,000 Rs./ month	46	11.8
	80,001 to 100,000 Rs./ month	67	17.2
	Above 100,000 Rs./ month	213	54.8
Total		389	100.0

Measurement Scales

The eight factors in this study are: attitude, subjective norms, personal norm, perceived behavioural control, purchase intention, purchase behavior, environmental concern, perceived consumer effectiveness, and herd mentality. The theoretical model's measurement items for each variable were developed, as described in the following section. The questionnaires contain two sections. At first, the demographic data about the population and then the questions concerning the variables being investigated. On a 5-point Likert scale, where 5 is strongly agree and 1 is strongly disagree, all of the study's items were evaluated.

This study combines the local air pollution and haze issue in Karachi with the features of purchase patterns of energy-efficient home equipment, to make a thorough comparison and frequent adjustments, relying mostly on the questionnaires of international researchers for the scale design. The scales of subjective norms, attitudes and intention were adopted from the study of Hua and Wang (2019). The sample item to measure subjective norms is "Most people that I know very well would think I should purchase energy-efficient appliances". Whereas the sample item to measure attitude is "Purchasing energy-efficient appliances to control haze pollution is beneficial". The sample item for the behavioral intention scale is "I am willing to purchase energy-efficient appliances". Four questions were used to measure perceived behavioral control as used in the study conducted by Han et al. (2010), the sample item is "For me, it's easy to buy energy-efficient appliances". A past study by Ding et al. (2017) served as the foundation for assessing purchasing behavior among consumers in this study. Three items were used to assess behavior and the sample item is "The lamps I bought under haze pollution are mostly energy-efficient lamps". A scale created by Kilbourne and Pickett (2008) was used to gauge environmental concern. This research included six items from the environmental concern scale. The sample item includes "I am very concerned about the environment". The items of the PCE were measured using the Kim and Choi (2005) scale. PCE scale includes three items and the sample item is "Everyone can positively affect society by purchasing energy-efficient appliances". Song et al. (2019) study has been referred to for assessing herd mentality among consumers. HM scale includes three items. The sample item includes "I am very concerned about the sales evaluation and sales volume of the energy-efficient appliances".

Methods used for Analysis

We measured the key constructs of the proposed model using PLS-SEM (partial least square-SEM) as opposed to covariance-based SEM (CB-SEM) approaches for data analysis. PLS-SEM might assess more complex models, irregular data, structural indicators, and aid in the development of theories (Ebrahimi et al., 2022). We employed the statistical software SmartPLS 4, which is well-known in the disciplines of marketing and management (Cheah et al., 2019). A bootstrapping of 5000 sub-samples was used to evaluate the analytic assumptions using the no sign changes option, bias-corrected and accelerated (BCa) bootstrap confidence interval, and one-tailed testing at a 95% confidential level.

Data Analysis and Results

The Measurement Model

In order to assess the validity and reliability of the constructs, we used Cronbach's Alpha, Composite Reliability, and Average Variance Extracted. Cronbach's alpha has a threshold need of larger than 0.7, while The threshold requirement for Composite Reliability (CR) is 0.7. Since every value satisfies the criteria, it may be inferred that the study's data is accurate and suitable for use. Researchers recommended that the data robustness have a minimum CR value of 0.70. (Nunnally & Bernstein, 1994; Waris & Hameed, 2020). The ranges of 0.786 to 0.884 encompass all of the CR

values (Table 2). As a result, we came to the conclusion that all of the indicators are fairly dependable and showed the data's robustness.

The average variance extracted (AVE) is a validity indicator that measures the amount of variance that a concept captures in comparison to the variance that results from measurement error. The minimum needed value of AVE should be 0.5, which demonstrates that the study's chosen constructs are more likely to be the cause of variance than a model error would be. Table 2 shows that the study's chosen constructs match the AVE threshold criterion, demonstrating that the data is reliable for testing the model (Soorani & Ahmadvand, 2019). Measurement of the distinctiveness and uniqueness of each variable in the model is carried out via discriminant validity (Hair et al., 2010). The HTMT method and the Fornell-Larcker method are the two approaches used to express it. According to the Fornell-Larcker approach, all diagonal values are discovered to be higher than both the values to their left and the values directly beneath them. It is demonstrated that there is no problem with discriminant validity present in the data, as indicated in Table 3, because HTMT results that are presented in Table 4, are likewise seem to be valid.

Common Method Bias

The use of questionnaires for data collecting and analysis is regarded as a standard method in social science research. In this context, a method for assessing variance and measurement error was put forth by Podsakoff et al. in 2003. Data inflation is a concern when the relationship between the constructs is evaluated using self-reported data (Conway and Lance, 2010). All of the measurements were adapted from different sources to lessen the potential of common method bias. Additionally, the Harman single factor test has been used to evaluate common method variance, and the variance value is 24.87%. It can be stated that the measurement of the research indicators has passed the common method bias if the percentage variance is less than 50%.

Path Analysis

Variance inflation factors (VIFs) are useful tools for locating problems with multicollinearity (Ting et al., 2019). In this study, a lack of multicollinearity in the data was confirmed by VIF values, which fall between the ranges of 1.311 to 2.051, below the advised threshold of 3.300. The findings of this study's hypothesis test, which was based on the path coefficient and t-statistics, are shown in Table 6. The path coefficient's values fall between -1 and +1. Between two constructs, an estimated path coefficient closer to +1 implies a strong, positive association, whereas -1 suggests a negative relationship (Hair et al., 2016). To empirically assess consumers' purchasing intent and behaviour for energy-efficient household appliances, eight hypotheses were evaluated. The significance and path coefficient values indicate whether or not the underlying theoretical relationships are accepted.

Table 2.

The Measurement Model

Constructs	Items	Factor Loadings	Cronbach's alpha	Composite reliability (CR)	Average variance extracted (AVE)
Attitude	ATT1	0.867	0.825	0.884	0.655
	ATT2	0.816			
	ATT3	0.777			
	ATT4	0.775			
Subjective Norms	SN1	0.801	0.700	0.786	0.488
	SN2	0.772			
	SN3	0.461			
	SN4	0.708			
Perceived Behavioral Control	PBC1	0.833	0.758	0.845	0.583
	PBC2	0.833			
	PBC3	0.542			
	PBC4	0.806			
Purchase Intention	INT1	0.796	0.782	0.873	0.697
	INT2	0.854			
	INT3	0.853			
Environmental Concern	EC1	0.695	0.827	0.874	0.536
	EC2	0.722			
	EC3	0.73			
	EC4	0.769			

	EC5	0.716			
	EC6	0.758			
Perceived Consumer Effectiveness	PCE1	0.803			
	PCE2	0.818	0.729	0.846	0.647
	PCE3	0.791			
Herd Mentality	HM1	0.82			
	HM2	0.781	0.717	0.839	0.635
	HM3	0.789			
Purchase Behavior	PB1	0.758			
	PB2	0.758	0.700	0.830	0.620
	PB3	0.843			

Notes: ATT=Attitude, SN=Subjective Norms, PBC=Perceived Behavioral Control, INT=Purchase Intention, EC=Environmental Concern, PCE=Perceived Consumer Effectiveness, HM=Herd Mentality, PB=Purchase Behavior

Table 3.

Discriminant Validity (intercorrelations) of Constructs Fornell and Larker's Criteria

Latent Variables	1	2	3	4	5	6	7	8
Attitude	0.81							
Subjective Norms	0.288	0.699						
Perceived Behavioral Control	0.383	0.415	0.764					
Purchase Intention	0.528	0.316	0.295	0.835				
Environmental Concern	0.578	0.225	0.317	0.58	0.732			
Perceived Consumer Effectiveness	0.514	0.412	0.32	0.502	0.62	0.804		
Herd Mentality	0.304	0.328	0.297	0.321	0.258	0.352	0.797	
Purchase Behavior	0.264	0.414	0.49	0.306	0.222	0.289	0.383	0.787

Notes: Off-diagonal numbers represent the correlations between each construct and other constructs, while diagonals (in italics) represent the square root of AVE.

Table 4.

HTMT Ratio

Latent Variables	1	2	3	4	5	6	7	8
Attitude								
Subjective Norms	0.314							
Perceived Behavioral Control	0.484	0.523						
Purchase Intention	0.651	0.377	0.371					
Environmental Concern	0.699	0.281	0.405	0.715				
Perceived Consumer Effectiveness	0.654	0.518	0.437	0.658	0.785			
Herd Mentality	0.397	0.517	0.388	0.42	0.331	0.494		
Purchase Behavior	0.347	0.62	0.654	0.415	0.289	0.412	0.532	

Table 5.

Cross Loadings

	01. ATT	02. SN	03. PBC	04. INT	05. EC	06. PCE	07. HM	08. PB
ATT1	0.867	0.274	0.352	0.494	0.509	0.463	0.286	0.244
ATT2	0.816	0.193	0.323	0.432	0.49	0.427	0.21	0.192
ATT3	0.777	0.281	0.272	0.403	0.421	0.421	0.251	0.247
ATT4	0.775	0.177	0.287	0.367	0.446	0.34	0.233	0.163
EC1	0.39	0.288	0.257	0.477	0.695	0.445	0.287	0.275
EC2	0.442	0.075	0.221	0.356	0.722	0.383	0.1	0.127
EC3	0.395	0.224	0.257	0.451	0.73	0.468	0.181	0.147
EC4	0.429	0.135	0.192	0.438	0.769	0.431	0.174	0.124
EC5	0.445	0.133	0.219	0.41	0.716	0.472	0.196	0.125
EC6	0.44	0.107	0.24	0.4	0.758	0.511	0.171	0.158
HM1	0.229	0.284	0.254	0.296	0.187	0.254	0.82	0.365
HM2	0.266	0.269	0.249	0.209	0.226	0.286	0.781	0.271
HM3	0.239	0.226	0.204	0.251	0.212	0.312	0.789	0.262
INT1	0.417	0.273	0.226	0.796	0.444	0.41	0.216	0.257
INT2	0.42	0.27	0.243	0.854	0.477	0.423	0.318	0.262
INT3	0.482	0.25	0.267	0.853	0.528	0.424	0.268	0.25
PB1	0.217	0.366	0.386	0.269	0.174	0.237	0.279	0.758
PB2	0.199	0.269	0.374	0.184	0.183	0.227	0.296	0.758
PB3	0.207	0.341	0.396	0.266	0.167	0.219	0.329	0.843

PBC1	0.264	0.364	0.833	0.227	0.191	0.215	0.239	0.445
PBC2	0.366	0.268	0.833	0.304	0.317	0.264	0.291	0.387
PBC3	0.243	0.214	0.542	0.13	0.22	0.198	0.124	0.197
PBC4	0.303	0.403	0.806	0.211	0.255	0.304	0.222	0.412
PCE1	0.429	0.282	0.2	0.464	0.563	0.803	0.281	0.208
PCE2	0.441	0.354	0.308	0.379	0.507	0.818	0.244	0.214
PCE3	0.363	0.368	0.273	0.356	0.411	0.791	0.329	0.283
SN1	0.196	0.801	0.304	0.259	0.17	0.262	0.185	0.306
SN2	0.326	0.772	0.303	0.235	0.208	0.401	0.267	0.262
SN3	-0.002	0.461	0.165	-0.003	-0.093	0.104	0.302	0.294
SN4	0.134	0.708	0.345	0.225	0.134	0.281	0.309	0.385

Regarding the suggested theoretical relationships, five of the eight hypotheses were approved. For instance, H1 proposed a positive influence of attitude on consumers' purchase intentions for energy-efficient home appliances, which was accepted ($b = 0.219$, $t = 3.298$, $p < 0.001$); H2 proposed a positive influence of subjective norms on consumers' purchase intentions, which was accepted ($b = 0.106$, $t = 2.375$, $p < 0.009$); and H3 proposed a negative influence of perceived behavioural control on purchase intentions, but this was found to be insignificant ($b = -0.007$, $t = 0.135$, $p < 0.446$). The relationship between perceived behavioural control and consumers' proenvironmental buying behaviour was among the most significant ones, according to path coefficients. H4's claim that perceived behavioural control has a positive impact on customers' pro-environmental behaviors to buy energy-efficient home appliances was confirmed ($b = 0.391$, $t = 7.154$, $p < 0.000$).

Table 6.
Hypothesis Assessment Summary

Hypotheses	Path Coefficient (Beta)	Standard deviation (SE)	p-values	t-values	Decision
ATT -> INT	0.219	0.066	0.001	3.298	Accepted
SN -> INT	0.106	0.045	0.009	2.375	Accepted
PBC -> INT	-0.007	0.049	0.446	0.135	Rejected
PBC -> PB	0.391	0.055	0	7.154	Accepted
INT -> PB	0.136	0.061	0.013	2.231	Accepted
EC -> INT	0.341	0.068	0	5.046	Accepted
EC -> PCE	0.62	0.041	0	15.06	Accepted
EC -> PB	-0.074	0.062	0.118	1.188	Rejected
PCE -> INT	0.097	0.059	0.05	1.649	Accepted
PCE -> PB	0.072	0.062	0.125	1.152	Rejected
HM x 05. EC -> PB	0.017	0.054	0.378	0.312	Rejected
HM x 06. PCE -> INT	-0.026	0.033	0.218	0.78	Rejected
HM x 06. PCE -> PB	0.018	0.053	0.37	0.332	Rejected

Notes: Here * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; T-values for one-tailed; 2.33 ($p < 0.01^{**}$), 1.645 ($p < 0.05^{*}$). T-values for two-tailed; 2.58 ($p < 0.01^{**}$), 1.96 ($p < 0.05^{*}$)

H₅, which proposed that consumers' purchase intentions had a positive impact on their pro-environmental behaviour when they bought energy-efficient household appliances, was accepted ($b = 0.136$, $t = 2.231$, $p < 0.013$); H₆, which proposed that environmental concerns had a positive impact on purchase intentions, was also accepted ($b = 0.341$, $t = 5.046$, $p < 0.000$).

H₇, which proposed that environmental concern had a favourable and peculiar influence on PCE among all the relationships in the model, was accepted ($b = 0.62$, $t = 15.06$, $p < 0.000$); H₈, which suggested that environmental concerns have a detrimental impact on consumer behaviour, was rejected because it was insignificant ($b = -0.074$, $t = 1.18$, $p < 0.118$); H₉, which predicted that PCE will positively affect purchase intention, was similarly accepted ($b = 0.097$, $t = 1.649$, $p < 0.05$). H₁₀, which suggested that PCE had a beneficial effect on pro-environmental purchasing behaviour, was likewise disproved because it was insignificant ($b = 0.018$, $t = 1.152$, $p < 0.125$). Herd mentality's moderating effects have also been examined in this study. The results of the moderating effects were insignificant, as shown in Table 6, and there was no difference in the consumer's herd mentality and its consequences on their purchase intentions for energy-efficient home appliances and pro-environmental purchase behaviour.

Analyzing the path coefficients and R² values is a part of evaluating the structural equation model (ranges from 0 to 1 represents complete predictive accuracy). Finally, predictive validity (Q2). We utilised the bootstrapping approach with 5,000 resamples to assess path

coefficients. For the endogenous variables, such as purchase intention, perceived consumer effectiveness, and purchase behaviour, the value of R2 was calculated in order to assess the variance explained in the endogenous variables, which is regarded as the structural model's capacity for prediction. R2 explains the variance in purchase intention, perceived consumer effectiveness, and purchase behaviour, respectively, by 43%, 38.5%, and 31.9%. The Stone-Q2 Geisser's value is a crucial criterion that must be assessed when blindfolded in addition to the R2 values as a criterion for predictive accuracy. The fact that Q2 is greater than zero and has values of 0.403 for purchase intention, 0.377 for PCE, and 0.284 for purchase behaviour in this study suggests that the exogenous construct has predictive validity in this investigation (Hair et al., 2016).

Discussion

This study attempts to examine the factors that influence customers' decision to buy energy-efficient home appliances while taking haze pollution into consideration. This study focuses on consumers' propensity to buy energy-efficient home equipment, which can help to significantly lower haze pollution by reducing energy usage. This study has empirically confirmed the significance of environmental concern and perceived consumer effectiveness in the purchase of energy-efficient home appliances. The study is based on the goal to conserve the environment and reduce energy usage through the purchase of energy-efficient household appliances. This study incorporates novel constructs like EC and PCE of a group of actual and potential users of energy-efficient household products in order to present a comprehensive picture of customers' predisposition toward the purchase of energy-efficient household appliances. This article, which is based on TPB, examines the factors that affect Pakistani urban households' use of energy-efficient household appliances and the moderating effects of HM in relation to haze pollution. The key findings are listed below. The extended TPB has been effectively used to the study of energy-efficient home equipment, which can help to better understand the factors that influence consumer behaviour and offer theoretical backing for the study of household energy consumption in Pakistan. To help the model more thoroughly describe consumer purchasing behaviour for energy-efficient household appliances, the three additional variables of environmental concern, herd mentality, and perceived consumer effectiveness are included.

Under the influence of haze pollution, attitude had a significant and direct impact on residents' intentions to buy energy-efficient household appliances. This finding supports Wang et al. (2017a) conclusion that residents are more likely to buy energy-efficient appliances if they have a positive attitude toward them. Subjective norm had a direct impact on residents' intentions to buy energy-efficient home appliances, showing that it was a significant antecedent variable of purchase intention. Therefore, when residents purchase energy-efficient equipment, their decisions will be impacted by the values and spending patterns of others. On purchasing intention, perceived behaviour control had less of an impact. However, it had a favourable, strong, and significant impact on purchase behaviour, indicating that residents will inevitably think about whether or not to buy energy-saving appliances when making their purchase. This is consistent with Tan et al. (2017) conclusion that residents will consider time, energy, and other behavioural factors. The results of this study show that PCE has a favourable and considerable impact on the decision to buy energy-efficient household appliances (Akehurst et al., 2012). This shows that customers are willing to support environmental sustainability by purchasing energy-efficient household goods.

Additionally, the creation of customers' purchase intentions for energy-efficient household appliances is significantly influenced by both EC and PCE, and EC has a beneficial impact on PCE. It is simpler to encourage residents to purchase and utilise energy-efficient home appliances, the greater their perceived environmental concern and perceived consumer effectiveness. This is consistent with earlier research's findings that environmental concerns can influence consumers' perceptions of their own effectiveness and their propensity to make purchases (Shi et al., 2017). PBC significantly influenced consumers' decisions to buy energy-saving equipment, according to a detailed review of the factors influencing these decisions. This finding fit perfectly with the current research conclusions that PBC is a substantial predictor of pro-environmental consumer behaviour, indicating that PBC was the most direct and important component. The association between environmental concern and appliance purchasing behaviour is unaffected by herd mentality which is not consistent with the results of the study by Song et al. (2019). Even though residents with lower conformity are more logical, they will not act in a pro-environmental manner when pressured by others. However, residents with higher levels of environmental concern may still be inspired to make energy-saving appliance purchases as a result of their increased awareness of the dangers of air pollution and haze. These customers place a high priority on environmental preservation and

prefer to act independently in favour of the environment rather than being influenced by others in order to reduce domestic energy use.

Practical and Managerial Implications

The paper's major result has the following policy implications. First, attitude, subjective norm, and perceived behavioural control can affect pro-environmental behaviour, according to this article. The residents' propensity to acquire energy-efficient appliances increases with their attitude, subjective norms, and perceived behavioural control. As attitude was the most relevant component of TPB in this study, immediate action should be taken to raise residents' attitudes about energy-saving appliances by the corporate sector and government. Education regarding haze pollution can be improved to promote environmental understanding of energy-efficient appliances and to emphasize citizens' obligation to use energy-efficient appliances. By comprehending the environmental impact caused by severe haze pollution, residents will be more optimistic about haze pollution reduction and more likely to buy energy-efficient products.

Government agencies can increase urban residents' buying intentions because the research findings also show how important environmental concern and perceived consumer effectiveness are to purchase intention. To help residents understand the detrimental effects of haze pollution and the critical connections between various factors, government departments and corporate sector organizations should organize and carry out a variety of publicity activities, such as airing environmentally friendly public service advertisements and documentaries, vigorously reporting the energy-saving and emission-reduction effects of energy-saving appliances, and timely disclosing haze pollution information. Such measures will stimulate their own norms, boosting the likelihood that people in haze-affected areas will purchase energy-efficient products.

Limitations and Future Recommendations

The current study has some limitations. The study was only undertaken in one large metropolis, Karachi, which is the first methodological restriction. A comprehensive picture of consumers' purchasing intentions for energy-efficient home appliances under the influence of haze pollution would be provided by data from other Pakistani metropolises. The second restriction relates to the product category, as only energy-efficient home appliances have been considered in this study. To assess customer propensity for pro-environmental behavior, future research can be conducted with a wide range of energy-efficient products, such as cars, large machinery, and industrial appliances. Thirdly, this study's application of theory was limited. Environmental models like the ecologically conscious model, the knowledge, attitude, and behavior model of pro-environmental behavior, the value-belief-norm theory, and the norm activation model might serve as the foundation for future studies. Future research may also incorporate additional psychographic elements like altruism and moral beliefs. In the current study, a survey method was employed to gather data from the houses using a quantitative research strategy. By using qualitative research methods or choosing a mixed-method approach to fully comprehend the problem, significant contributions might be made. Additionally, the cross-sectional methodology used in the current study collects data all at once. To comprehend the various aspects of the study, future researchers can choose to do longitudinal research as well.

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