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Antecedents of Consumer's Purchase Intention Towards Energy-Efficient Home Appliances: An Agenda of Energy Efficiency in the Post COVID-19 Era

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This study focuses on the energy efficiency in the past COVID-19 era and targeted the young population of Pakistan who are facing the critical situation of COVID-19 era and much aware that this situation will badly affect the energy situation when COVID-19 will end and they also aware that energy efficient appliances will be the most valuable products after the COVID-19 era. Data was collected from five major cities of Pakistan and analyzed by applying structure equation modelling through smart-PLS 3.3. Results show that knowledge of eco-labels has significant impact on perceived functional values, green trust and purchase intention of energy efficient home appliances. Results further indicate that consumers social responsibility has significant impact on personal norms and purchase intention of energy efficient home appliances. Moreover, functional value and green trust mediates the relationship of knowledge of eco-labels and purchase intention of energy efficient home appliances. Furthermore, attitude towards energy efficient appliances mediates the relationship between consumers social responsibility and purchase intention but surprisingly no mediating affect of attitude between consumer social responsibility and purchase intention of energy efficient home appliances. This study presents an antecedent model for predicting energy-efficient home appliances based on consumer awareness. This study will help companies for technology innovation and improvements in the efficiency of household appliances are among the key functional values that companies should emphasize, in order to attract consumers to value the surprising energy-saving effects of appliances.

Keywords: eco-labels, consumer social responsibility, functional value, green trust, energy efficiency, purchase intention

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INTRODUCTION

Household electrical appliances have sparked a massive increase in energy consumption, resulting in increased levels of pollution. A non-energy-efficient appliance can also waste electricity, which is counterproductive to reducing emissions and saving energy. A move toward energy-efficient appliances could help alleviate the current situation, where severe ecological and environmental problems exist (Tan et al., 2017; Ahmad et al., 2021a).

Since the mid-1980s, ecological behavior has shifted dramatically toward a higher standard of living for people. In addition to contributing to an excellent quality of life, a good environment also boosts economic growth (Joshi et al., 2019; Ahmad et al., 2022). People are developing and evolving, and as a result there is a growing need for better services like computers, mobile phones, the internet, televisions, and fast trains (Elavarasan et al., 2021a). Ecological development and reduction of greenhouse gas emissions can be boosted by utilizing resources efficiently (Wang et al., 2019). Eco-efficiency is the process of using resources efficiently to achieve these goals. From 2011 to 2030, energy consumption is expected to increase by 36% (Nguyen et al., 2017). Approximately 80% of greenhouse gas emissions are attributed to fossil fuels (Guomin Li et al., 2019). Middle-income economies consume the most fossil fuels due to their reliance on energy for economic development. By 2050, energy efficiency is expected to reduce greenhouse gas emissions by 50%, according to the American Council for Energy-Efficient Economy (ACEEE). Reduced greenhouse gas emissions and increased economic growth are linked to middle-income countries' energy efficiency (Wang J et al., 2017).

The energy sector has experienced tremendous growth all over the world. Developed countries such as Switzerland, United Kingdom, Australia, and the US have given much attention to consumer energy consumption (Sreen et al., 2018; Elavarasan et al., 2021b). The use of energy in households is expected to rise by 30% in developing nations by 2040, but little is known about this area. According to Ali et al. (2021), 89% of Asians have access to electricity since 2000, which is 75% of the world's population. According to population statistics, Pakistan is the fifth largest nation in the world. It has the highest population growth rate (2.0%). Pakistan consumes 85% of its energy domestically. Increasing usage of home appliances by the middle class will further increase the consumption of domestic energy (Bhutto et al., 2021; Elavarasan et al., 2022a).

The marketing of energy-efficient appliances has led to increasing familiarity among Pakistani consumers. Pakistan's appliance market has not gained a lot of market share from energy-efficiency appliances (Ali et al., 2021). In light of current sales figures, it is apparent that energy-efficient appliances are sometimes several times as expensive as common appliances. The poor price/performance ratio discourages many consumers from buying it, which lowers their enthusiasm (Hua & Wang, 2019; Gul et al., 2021a). The savings on electricity bills are not considered sufficient for many consumers to justify the higher price of these new and advanced energy-efficient appliances (Jamil et al., 2021a). Moreover, energy-efficient appliances are made from better materials, have better internal components, and have better external hardware than typical appliances, but consumers are not aware of these advantages. Energy-efficient appliances therefore don't attract new customers (Abu-Elsamen et al., 2019; Elavarasan et al., 2022b).

The study explores how consumers are likely to purchase energy-efficient products in the context of an analytical framework. A model is developed that accounts for important factors influencing consumers' decisions. Akroush et al. (2019) asserted that positive attitudes are indicators of intentions. The importance of product labels was emphasized by Jhanji (2021). They also said that developing a favorable attitude to the product involves information on the labeling. Eco-labels promote the trustworthiness of green products and do so by reducing information asymmetry. To make environmentally friendly products acceptable, it is imperative to understand how eco-labels work (Gul et al., 2021b). Consumers who are environmentally conscious care for the environment and want to help improve the quality of the environment. Consumers' perception of social responsibility, norms perceived, and trust perceived are key factors that affect their ecological behavior (Liu et al., 2020; Fang et al., 2022). In the context of environmentally friendly products, perceived green trust in the manufacturer is another potential predictor. Perceived green trust can increase product acceptance among consumers (Hao et al., 2021; Iqbal et al., 2021). Moreover, the perception of functional values of products is an essential factor when it comes to purchasing home appliances. Home appliances that are energy-efficient are extensively discussed in literature as a way to reduce energy consumption (Jamil et al., 2022). It seems, however, that very little research has been conducted regarding consumers' knowledge of eco-labels and the benefits of energy-efficient products. Following COVID-19, the study's findings will be valuable to policymakers and strategists seeking to increase adoption of energy-efficient home appliances.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Knowledge of Eco-Labels, Functional Value, Green Trust and Purchase Intention

In the green product market, eco-labels are important marketing tools to reduce information asymmetry. With the promotion of green products, eco-labeling is becoming more prevalent at both business and communication levels (Ahmad B, et al., 2021; Apipuchayakul & Vassanadumrongdee, 2020). Consumers' perception and evaluation of eco-labels are particularly related to their knowledge of eco-labels (Naseem et al., 2020). When consumers evaluate eco-labels in a holistic way, this reduces information asymmetry about green products, which leads to more informed decisions. Al-Gasawneh & Al-Adamat (2020) concluded on consumer preferences for certified wood showed that knowledge about eco-labels plays a big role in consumer preferences. The study of Issock et al. (2018) showed how the consumers' ecological behavior is shaped by their knowledge and trust of eco-labels. The importance of eco-labels has been

emphasized by Yue et al. (2021), who suggest that learning about eco-labels will lead people to buy greener products. Consumers are more likely to believe eco-labels are credible and this helps them make better decisions when purchasing products. As Lopes & Veiga (2019) examined the factors affecting organic food, brands and reputations, labels, and the certification bodies' reputations were deemed integral to establishing the consumers' trust. Researchers have brought forth the importance of eco-label knowledge in establishing a trust for eco-label products (Irfan et al., 2021a). The arguments above suggest that product values and green trust will be affected by eco-label knowledge. Hence, we proposed following hypotheses:

H1: Consumer's perceived knowledge of eco-labels has significant impact on purchase intention of energy efficient appliances.

H2: Consumer's perceived knowledge of eco-labels has significant impact on perceived functional value of energy efficient appliances.

H3: Consumer's perceived knowledge of eco-labels has significant impact on perceived green trust.

H4: Perceived functional value has significant impact on purchase intention of energy efficient home appliances.

H5: Perceived green trust has significant impact on purchase intention of energy efficient home appliances.

Consumer's Social Responsibility, Personal Norms, Attitude and Purchase Intention

Social responsibility is the most influential factor to the consumption of energy efficient appliances among ethical consumers (Irfan, Elavarasan, et al., 2021b; Jabeen et al., 2019; Song et al., 2019). Generally, consumer social responsibility relates to the willingness of consumers to acknowledge the interests of others, perform their duties as they are expected to, and honor their promises. According to Liao et al. (2020), consumer social responsibility refers to making conscious and deliberate decisions about certain products based on personal moral beliefs. Zhang et al. (2020) discussed that individual belief that it is their responsibility to support energy efficient appliances was conceptualized as the concept of responsibility (Razzaq et al., 2020; Irfan et al., 2021c). As a matter of fact, personal norms define a person's standards of behavior and ethical beliefs, as well as his or her beliefs about what is right or wrong toward certain objects. Responsibility is the driving force behind moral obligation (Joshi et al., 2019; Ahmad et al., 2020a; Islam et al., 2022). Norms and values affect how people feel responsible for exhibiting prosocial behaviors. Individuals' attributions of responsibility for their behavior can affect their norms regarding behavior, according to studies (Khan et al., 2021; Nuvvula et al., 2022). An individual's personal norms become more firmly established if he or she is responsible for a certain behavior. In the same manner, individuals who feel responsible for supporting energy efficient products purchase these products with higher personal standards (Ali et al., 2019).

The attitude of an individual is defined as a preference towards certain objects, ideas, or behaviors. Researchers have hypothesized that attitude is the judgement and evaluation of a particular object based on its abstract associations, and a psychological tendency that has its expression in the degree of favor or disfavor one accords to it (Aguiar-Quintana et al., 2021; Naseem et al., 2021; Razzaq et al., 2021). An individual's likelihood of purchasing a particular product is defined as his or her purchasing intention. A person's purchasing intention can be used to measure their likelihood to purchase a certain product. If a consumer has a positive attitude towards a product, the greater the likelihood that he/she will purchase the product (Ahmad, et al., 2021b; Chavez et al., 2020; Razzaq et al., 2020). An individual's attitude toward a certain product is measured by their positive or negative evaluations thereof (Jamil et al., 2021b; Tanveer et al., 2021). An attitude is defined as a set of beliefs, feelings, and thoughts towards a product, which leads to a specific action to be taken. The attitudes of consumers toward buying energy-efficient products significantly changed their intentions to buy such products (Nguyen et al., 2018). Hence, we proposed following hypotheses:

H6: Consumer's perceived social responsibility has significant impact on purchase intention of energy efficient home appliances.

H7: Consumer's perceived social responsibility has significant impact on perceived personal norms towards energy efficient home appliances.

H8: Consumer's perceived social responsibility has significant impact on consumer's perceived attitude towards buying energy efficient home appliances.

H9: Perceived personal norms towards energy efficient appliances has significant impact on purchase intention of energy efficient home appliances.

H10: Perceived attitude towards energy efficient appliances has significant impact on purchase intention of energy efficient home appliances.

Mediating Role of Perceived Functional Value

Consumers need to keep an eye on the functions of eco-friendly products when purchasing them (Abu-Elsamen et al., 2019; Irfan et al., 2020; Wu et al., 2021). Functional values are based on the quality, durability, and cost of the product. It is clear from the preference of environmentally friendly consumers for products such as aerosols, natural ingredients in cosmetics, organic vegetables, and biodegradable products that fair prices play a significant role in their decisions (Gahlot Sarkar et al., 2019; Sarfraz et al., 2021; Xiang et al., 2022). Consumers' decisions on energy-efficient refrigerators are largely influenced by their price and durability. The functional value of products is strongly associated with purchase intentions and product usage, suggests research. Buying energy-efficient appliances requires a focus on functional values (Akroush et al., 2019; Ahmad et al., 2020b). Hence, we proposed following hypothesis:

H11: Perceived functional value mediates the relationship of perceived knowledge of eco-labels and purchase intention of energy efficient home appliances.

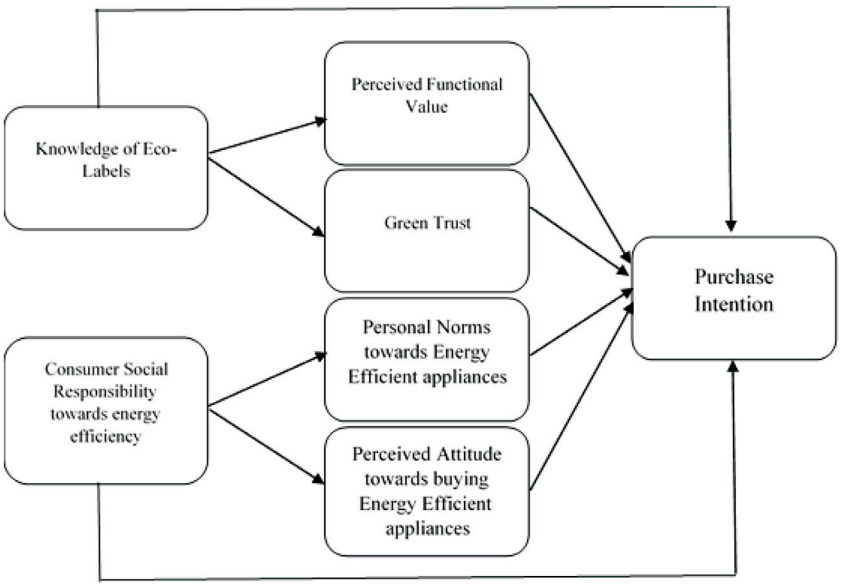

FIGURE 1 | Conceptual framework.

Mediating Role of Green Trust

Consumer behavior is fundamentally influenced by trust. The idea is that one party expects another to perform the task. Several studies have found that trust predicts purchase intentions of consumers, including Chen et al. (2015). Guangxia Li G et al. (2021) argues that green trust is one of the critical factors affecting consumers' purchasing behavior in the context of environmental marketing. Green trust of customers is posited to improve green product purchase intentions by (Khetarpal & Singh, 2020; Yang et al., 2021). It has been observed that consumers' pro-environmental behavior is positively affected by trust in eco-labels (Li N et al., 2021; Mohsin et al., 2021). Despite this, many studies have revealed that consumers' trust is sometimes unrelated to their purchase intentions. A study by Helleno et al. (2017) found that Brazilians' trust in organic foods did not influence their purchasing decisions. Several studies have relied on trust in the decision to buy an environmentally friendly product, but the results have been inconsistent. Green trust can, therefore, influence consumers' intentions to purchase energy-efficient appliances (Awan et al., 2021a; Sreen et al., 2021). Hence, we proposed following hypothesis:

H12: Perceived green trust mediates the relationship of perceived knowledge of eco-labels and purchase intention of energy efficient home appliances.

Mediating Role of Personal Norms

Personal norms are the standards of expectation faced by each individual towards a given object and are based on a set of values that are internalized and applied accordingly (Nguyen et al., 2021). Several researchers have proposed that an individual's beliefs about a behavior shape the way in which he or she responds to that behavior. In other words, attitude toward a particular behavior stems from an individual's assessment of the behavior's value (Awan FH. et al., 2021; Siyal et al., 2021). Individuals may be triggered to adopt personal norms by feeling that they must take action in order to protect themselves from negative outcomes (Jamil et al., 2021c). When people have favorable personal norms, i.e., they believe a specific behavior results in a positive outcome, they adopt a positive attitude toward it (Nguyen et al., 2019). Hence, we proposed following hypothesis:

H13: Consumer's Perceived personal norms mediate the relationship of consumer's perceived social responsibility and purchase intention of energy efficient home appliances.

Mediating Role of Perceived Attitude

A person's attitude is a "state of mental readiness acquired by experience" affecting responses towards people, objects, and situations. Several studies indicate that consumers' positive attitude plays a significant role in determining their environmental behavior (Zhang & Tao, 2020; Shimul et al., 2021). Various researchers have concluded that attitude is a significant determinant of energy-efficient appliance purchases. Purchasing intentions among consumers are influenced by their attitudes towards energy-efficient home appliances (Awan et al., 2021c; Joshi et al., 2022). Hence, we proposed following hypothesis:

H14: Consumer's perceived attitude mediate the relationship of consumer's perceived social responsibility and purchase intention of energy efficient home appliances (see **Figure 1**for all relationships).

METHODOLOGY

A well-structured questionnaire has been distributed to the consumers who are coming to home appliances sections in

TABLE 1 | Reliability and validity analysis.

Constructs	*Items*	*Loadings*	*Cα*	*CR*	*AVE*
Perceived Attitude	PA1	0.815	0.785	0.874	0.699
	PA2	0.842			
	PA3	0.850			
Consumer Social Responsibility	PCSR1	0.852	0.778	0.871	0.692
	PCSR2	0.855			
	PCSR3	0.788			
Perceived Functional Values	PFV1	0.901	0.709	0.872	0.774
	PFV2	0.858			
Green Trust	PGT1	0.792	0.859	0.904	0.703
	PGT2	0.842			
	PGT3	0.851			
	PGT4	0.867			
Purchase Intention	PI1	0.881	0.841	0.904	0.758
	PI2	0.853			
	PI3	0.877			
Perceived Knowledge of Eco-Labels	PK1	0.836	0.835	0.901	0.753
	PK2	0.898			
	PK3	0.867			
Personal Norms	PPN1	0.911	0.841	0.903	0.757
	PPN2	0.848			
	PPN3	0.850			

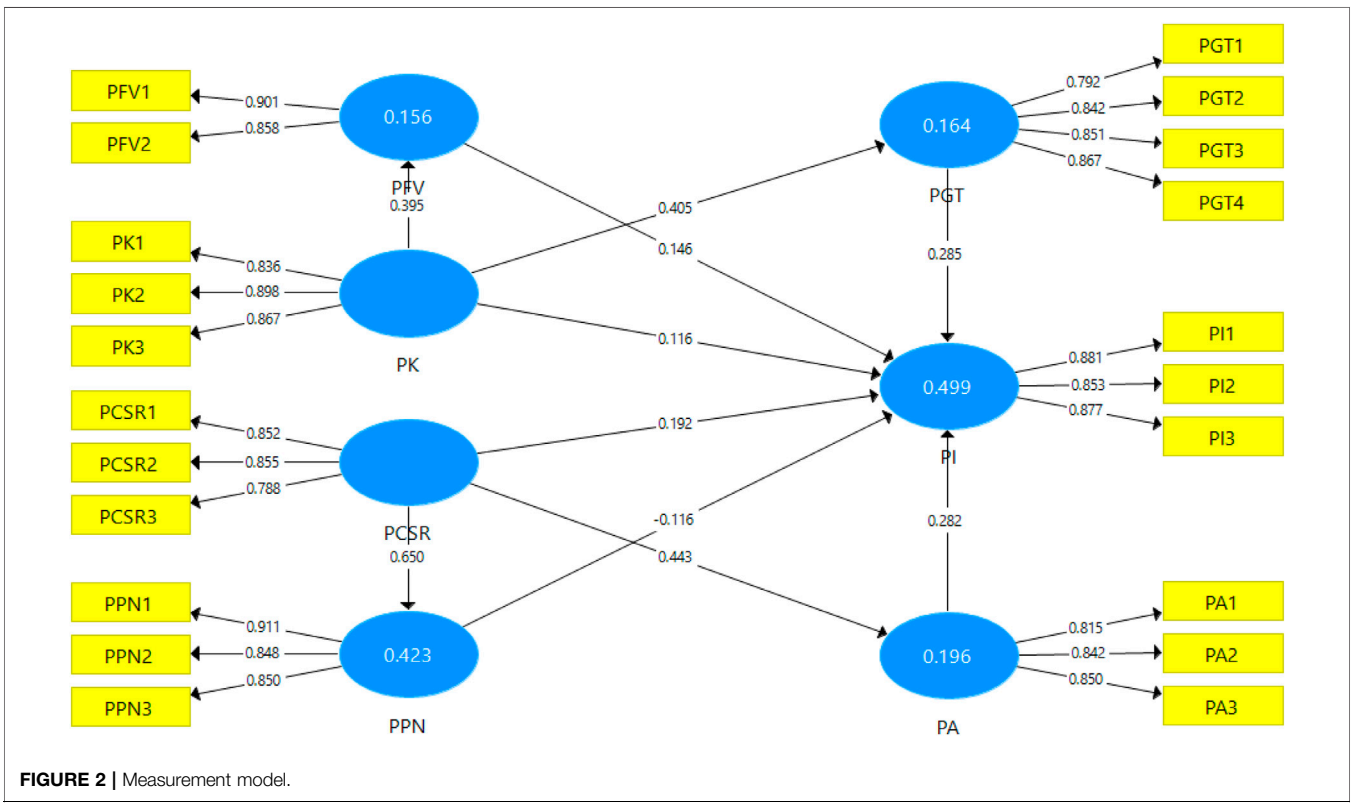

FIGURE 2 | Measurement model.

different shopping malls, students in different public sector universities and family parks in five major cities of Pakistan. Non-probability convenience sampling technique was used to collect data from respondents. Initially a pilot study has been carried out 50 participants. After the pilot study it was found that there is some ambiguity in the statements of questionnaire items and respondents cannot understand properly what actually we want to ask from them. To resolve this issue, we take from two academic experts of consumer behavior studies, they critically study our questionnaire and recommended some changes in the statements of questionnaire items and recommended that number of items should remain. After the revisions

TABLE 2 | Fornell-larcker criterion.

Constructs	*PA*	*CSR*	*PFV*	*PGT*	*PI*	*PK*	*PPN*
PA	0.836	0.832	0.880	0.838	0.871	0.867	0.870
CSR	0.443						
PFV	0.399	0.408					
PGT	0.522	0.577	0.493				
PI	0.561	0.521	0.476	0.593			
PK	0.300	0.480	0.395	0.405	0.418		
PPN	0.409	0.650	0.406	0.589	0.398	0.410	

Note(s): PK, perceived knowledge; CSR, consumer social responsibility; PFV, perceived functional value; GT, green trust; PN, personal norms; PA, perceived attitude; PI, purchase intention.

TABLE 3 | Heterotrait-monotrait ratio.

Constructs	*PA*	*CSR*	*PFV*	*PGT*	*PI*	*PK*	*PN*
PA	0.568	0.549	0.629	0.694	0.496	0.475	
CSR							
PFV	0.530						
PGT	0.634	0.703					
PI	0.688	0.642	0.603				
PK	0.367	0.595	0.513	0.477			
PN	0.495	0.787	0.523	0.685	0.461		

Note(s): PK, perceived knowledge; CSR, consumer social responsibility; PFV, perceived functional value; GT, green trust; PN, personal norms; PA, perceived attitude; PI, purchase intention.

recommended by academic experts, we were able to draft final form of questionnaire and started to collect data. The sample size was determined by using proposed criterion of Kline (2015). He suggested at least ten responses per item. We have 23 items in our questionnaire and we need minimum 230 sample size. To increase reliability and validity, 350 questionnaires were distributed to research participants and received back after the given time to fill the questionnaire. Four Ph.D. scholars were selected as volunteers to collect data in multiple locations including shopping malls, supermarkets and universities in five metropolitan cities of Pakistan. After the screening of questionnaires, we found some mistakes and incomplete responses and we excluded 24 incomplete questionnaires from final sample and now the final sample size is 326.

Questionnaire and Measurement

Before drawing the questionnaire items, we studied and undertook a detailed literature review related to all study variables. A total of 23 items were adapted to create the final questionnaire, and these items were divided into seven sections. First, perceived knowledge of eco-labels was measured with three items adapted from Taufique et al. (2017). Consumer social responsibility was measured with three items adapted from Lee (2009). Perceived functional value was measured with three items adapted from the prior study of Sweeney & Soutar, (2001). Green trust was measured with five items and these items were adapted from the past study of Chen & Chang, (2012). Personal norms were measured with three items adapted from the study of Khare (2015). Attitude towards energy efficient appliances was measured with three items and these items were adapted from the study of Taylor & Todd, (1995). Purchase Intention of energy efficient appliances was measured three items developed by Wang Z et al. (2017). All items were measured on a five-point Likert scale.

Common Method Variance

In a survey sample, common method bias is a significant problem. Harman's single-factor test was applied to analyze the common method bias in this research (Podsakoff et al., 2003). As stated by Harman (1976), a single-factor test was established to determine the existence of CMV among constructs. The data revealed that all sample items were classified into 23 distinct factors, with the first component accounting for 39.273 percent of the total variance, less than the proposed criterion of 50 percent. (**Appendix Table A1**). Furthermore, we applied Smart PLS to conduct a thorough collinearity evaluation test. According to Kock (2015) and many other social science academics, this is a relatively efficient and accurate technique (Zafar et al., 2021). All VIF values are well below the recommended threshold of 5, showing that typical process bias is not a problem in our model (Kock, 2015).

Data Analysis

The Smart PLS 3.3.3 software package was employed in this study. PLS-SEM is a multiphase analysis that first evaluates the measurement model and then assesses the structural model (Ringle et al., 2020). The measurement model requirement ensures that only constructs with adequate items loading, convergent validity, composite reliability (CR), and discriminant validity will be considered significant and used in the structural model. The bootstrapping approach evaluates path coefficients and assesses their magnitude in structural model evaluation. Preacher & Hayes (2008) method was employed in terms of mediation evaluation because it is a more specific way for testing mediating effects and is more suited for use with the PLS-SEM methodology (Hayes, 2009; Hair Jr et al., 2014). For data analysis, the PLS-SEM tool has been used in most recent management research studies (Shujahat et al., 2019; Usman Shehzad et al., 2022).

Measurement Model Assessment

The measurement model was subjected to a first-phase assessment in order to establish the constructs' reliability and validity Hair et al. (2016a). During the evaluation of the measurement model, two factors were deleted due to low loadings, and the remaining ones were greater than the recommended value of 0.70. Except for PFV3 and PGT5, all questions were included in the final measurement model. The factor loadings in **Table 1** and **Figure 2** are greater than the recommended threshold of 0.70. Similarly, the AVE and CR of all constructs are equal to or greater than the recommended standards value of 0.50 and 0.70, respectively. This leads to the development of convergent validity and reliability.

TABLE 4 | Effects size, coefficient of determination, blindfolding results.

Constructs	F^2					R^2	Q^2
	PA	*PFV*	*GT*	*PI*	*PN*	*Enogenouse Constructs*	*Enogenouse Constructs*
CSR	0.244	0.185	0.197	0.035	0.732	0.196	0.135
PK				0.019			
PA				0.107			
PFV				0.029		0.156	0.118
GT				0.079		0.164	0.112
PI						0.499	0.361
PPN				0.013		0.423	0.310

Note(s): PK, perceived knowledge; CSR, consumer social responsibility; PFV, perceived functional value; GT, green trust; PN, personal norms; PA, perceived attitude; PI, purchase intention.

TABLE 5 | Hypotheses results.

	Relationships	*Path Coefficient [T-Statistics]*	*p Values*	*BCILL-BCI UL*	*Results*
H1	PK - > PI	0.116 [2.088]	0.037	[0.009, 0.225]	Supported
H2	PK - > PFV	0.395 [7.373]	0.000	[0.288, 0.501]	Supported
H3	PK - > GT	0.405 [8.966]	0.000	[0.318, 0.495]	Supported
H4	PFV - > PI	0.146 [2.719]	0.007	[0.042, 0.252]	Supported
H5	GT - > PI	0.285 [3.158]	0.002	[0.107, 0.455]	Supported
H6	CSR - > PI	0.192 [2.691]	0.007	[0.047, 0.329]	Supported
H7	CSR - > PN	0.650 [17.479]	0.000	[0.575, 0.720]	Supported
H8	CSR - > PA	0.443 [7.347]	0.000	[0.326, 0.560]	Supported
H9	PN - > PI	-0.116 [1.665]	0.096	[-0.243, 0.025]	Not Supported
H10	PA - > PI	0.282 [5.037]	0.000	[0.172, 0.396]	Supported
Indirect Effects					
H11	PK - > PFV - > PI	0.058 [2.413]	0.016	[0.015, 0.109]	Supported
H12	PK - > GT - > PI	0.115 [3.053]	0.002	[0.044, 0.190]	Supported
H13	CSR- > PN- > PI	-0.075 [1.668]	0.095	[-0.159, 0.017]	Not Supported
H14	CSR- > PA- > PI	0.125 [3.863]	0.000	[0.069, 0.197]	Supported

Note(s): PK, perceived knowledge; CSR, consumer social responsibility; PFV, perceived functional value; GT, green trust; PN, personal norms; PA, perceived attitude; PI, purchase intention.

Further, the Fornell–Larcker criteria and heterotrait–monotrait (HTMT) ratios are used to validate the discriminant validity of the current research (Hair et al., 2016a). Using the Fornell–Larcker criteria, **Table 2** shows that discriminant validity has been confirmed since the top value of variables correlations in each column is the maximum (Hair et al., 2016b). The values of HTMT ratios should be less than 0.85 according to the HTMT ratios criteria; nevertheless, ranges up to 0.90 are allowed (Hair et al., 2016a). As shown in **Table 3**, all HTMT ratios are below 0.85, indicating that discriminant validity has been verified for the current research model.

Structural Model Assessment

The findings show that the R2 and Q2 values for PA are 0.196 (Q2 = 0.135), PFV 0.156 (Q2 = 0.118), PGT 0.164 (Q2 = 0.112), PI 0.499 (Q2 = 0.361), and PPN 0.423 (Q2 = 0.310). The R2 values indicate the model's in-sample predictive potential (Sarstedt et al., 2014) since they are more than the necessary threshold of 0.10. Also, Q2 values larger than 0 suggest appropriate predictive relevance. Likewise, effect sizes (f2) are computed to determine the amount to which a predicting (exogenous) variable adds to an endogenous variable's R2 value. The results in **Table 4** demonstrate that the effect sizes of the variables in this study range from small to large, confirming the model's strength (Hair et al., 2016a).

After compulsory evaluation of measurement model, evaluation of structural model test was done in the second phase. Bootstrap resampling technique with 5,000 resamples (Ringle et al., 2020; Gul et al., 2021c) was utilized to establish the significance of direct and indirect paths. **Table 5** lists the test outcomes of hypotheses intended for direct and indirect associations (see **Figure 3**).

First, we assessed the direct relationships before looking at the mediation effects. Results in **table 5** revealed that PK was significantly associated with PI (β = 0.116, p = 0.037), PFV (β = 0.395, $p < 0.001$), and PGT (β = 0.405, $p < 0.001$). Therefore, H1, H2 and H3 were supported. Similarly, PFV (β = 0.146, $p < 0.01$) and PGT (β = 0.285, $p < 0.01$) were also significantly associated with PI and study results supporting H4 and H5. Moreover, results revealed that PCSR was also significantly associated with PI (β = 0.192, $p < 0.01$), PPN (β = 0.650, $p < 0.001$), and PA (β = 0.443, $p < 0.001$). Therefore, findings confirm

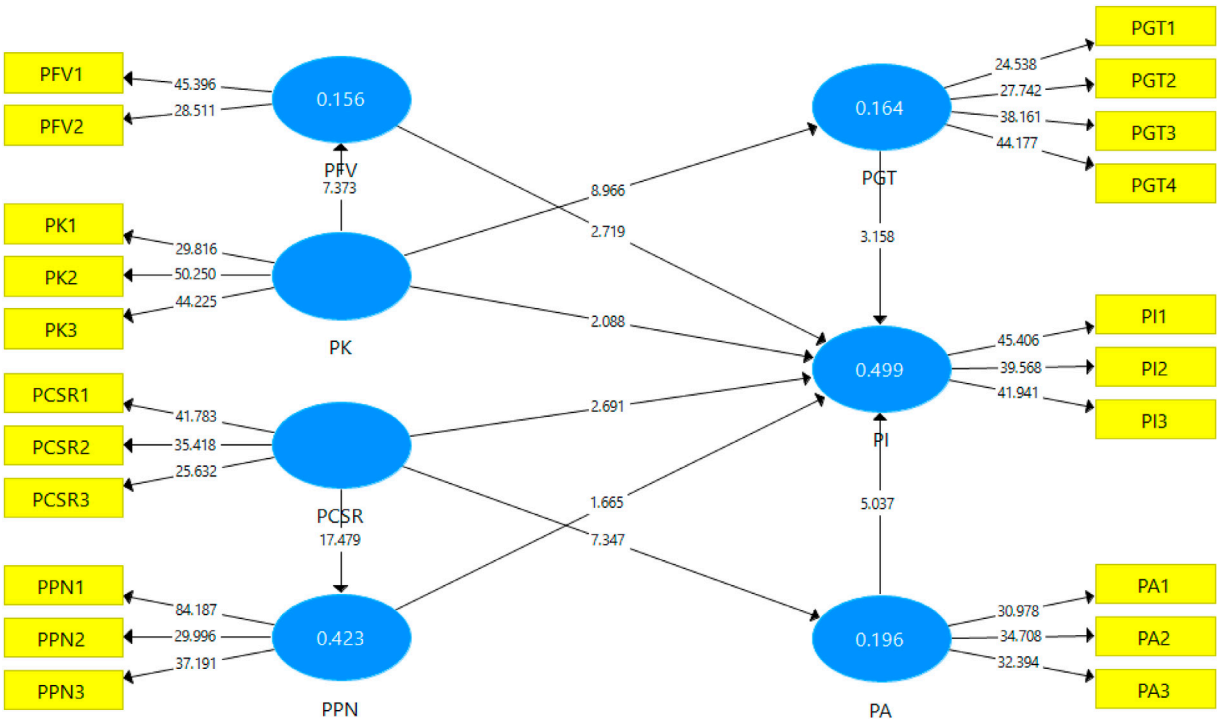

FIGURE 3 | Structural model.

that H6, H7 and H8 were supported. For H9 and H10, study found PPN (β = -0.116, p = 0.096) was insignificantly asscoiated with PI, Whereas PA (β = 0.282, p < 0.001) was significantly associated with PI. Thus, H9 was rejected and H10 was supported.

To test the mediation effect, we used the bootstrapping the indirect effect method (Preacher & Hayes, 2008) with a 5,000 resample. For H11 and H12, Results revealed that PFV (β = 0.058, p = 0.016) and PGT (β = 0.115, p < 0.01) were significantly mediated the relationship between PK and PI. Therefore, results support H11 and H12. Moreover, For H13 and H14, study found insignificant mediating effects of PPN (β = -0.075, p = 0.095) and significant effects of PA (β = 0.125, p < 0.001) in the relationship beween CSR and PI, which do not support H13, while H14 was not supported.

DISCUSSION AND CONCLUSION

In the study, despite strong theoretical grounds for the prediction in previous studies, consumers' purchase intentions for energy-efficient appliances were predicted in Pakistan. In previous studies, the authors examined consumer intentions to buy energy-efficient appliances, but failed to uncover whether consumer perceptions of their social responsibility or personal norms impacted their buying decisions. An investigation of consumer intentions to purchase energy-efficient appliances was conducted using a conceptual framework in this study.

Consumer knowledge of eco-labels impacts green trust and the functional value of products significantly and strongly, as found by previous studies. As a result, eco-label knowledge can contribute to the overall value of a product and establish trust. The finding is consistent with Khare (2015), claiming that consumer social responsibility has a positive impact on consumers' attitudes towards energy-efficient appliances. It was confirmed that consumers' social responsibility influences perceived consumer norms, which is similar to Schuitema et al. (2020). These findings reveal consumers' intention to reduce environmental issues. In addition, consumers' expectations as well as their view of energy-efficient appliances was associated with the intention to purchase them.

Consumer expectations and attitudes greatly influence consumers' choice of energy-efficient appliances, according to Trotta (2018) and Oikonomou et al. (2009). In contrast, previous studies on purchase intention examined the influence of functional attributes on purchase intentions and found the influence to be positive (Orlov & Kallbekken, 2019; Gul et al., 2021d). According to Mazhar et al. (2022), green trust did not have any significant influence on purchase intention, which was reiterated in this study. Consumption of eco-friendly products is not given much importance by consumers because they are skeptical about their functional values. Overall, the results showed that the proposed model is highly applicable to eco-friendly products purchases because its predictive capability is high.

Theoretical Implications

In contrast to previous studies, this study makes significant contributions. Initially, this study presented an antecedent

model for predicting energy-efficient home appliances based on consumer awareness of eco-labels and functional values. It differs from previous studies that have focused primarily on the general understanding of the environment and attitudes toward purchasing energy-efficient appliances (Zhao et al., 2020). The current study focuses primarily on eco-label knowledge. It is a strategic marketing tool to create a positive image about eco-friendly products and to encourage customers to buy them. Additionally, the conceptual model was tested in a developing country (Pakistan). Consumer attitudes toward social responsibility and consumer norms regarding the purchase of eco-friendly products are both important factors in determining whether they will buy eco-friendly products. When eco-label knowledge is combined with consumer perceptions of customer responsibility and consumer norms, the probability of eco-friendly behavior is improved following COVID-19.

Managerial Implications

Researchers have found that home appliances that are energy-efficient are more likely to be purchased by consumers, and their findings can provide marketing and policy makers with guidelines. Promotion and development of energy-efficient products are largely the responsibility of marketers and policy-makers. It is essential to establish a standard for eco-labeling and to strengthen its supervision in the country. Thus, consumers' trust in and decisions about buying energy-efficient appliances are largely influenced by the information on ecolabels (Gahlot Sarkar et al., 2019). It is also crucial for companies to help develop and promote energy-efficient home appliances. Technology innovation and improvements in the efficiency of household appliances are among the key functional values that companies should emphasize, in order to attract consumers to value the surprising energy-saving effects of appliances. By providing information on how to use energy-efficient appliances, eco-label designs could help households save money. In turn, it indicates that functional values are holding people back from buying energy-efficient appliances. Consumer confidence will be built through the use of environmental labeling schemes promoted by policymakers and marketers. Consumers' attitudes and perceptions of consumer's personal norms are influenced by consumers' social responsibility, which supports the significance of environmental values (Abu-Elsamen et al., 2019). Consequently, eco-labels are a good way of making sure consumers are informed about how emissions can be reduced by utilizing energy-efficient appliances. By advertising and marketing campaigns, consumers should also be encouraged to save energy by using energy-saving appliances.

Limitations and Future Research Directions

We have attempted to present a holistic model in this study. Future research should address some limitations. Results may be limited in their generalizability when self-reported data are used. It may be possible for future researchers to evaluate consumers' actual consumption of energy-efficient products by using longitudinal data or by using experimental design. In this study, constructs such as self-identity and altruism were included as potential constructs to predict purchase intention, however many other constructs could also be used. Its focus is on a single country i.e., Pakistan. To increase generalizability, future studies need to include more countries.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fenrg.2022.863127/full#supplementary-material

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APPENDIX 1 | COMMON METHOD VARIANCE.

Total variance explained

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% Of variance	Cumulative %	Total	% Of variance	Cumulative %
1	9.033	39.273	39.273	9.033	39.273	39.273
2	1.800	7.826	47.098			
3	1.588	6.905	54.003			
4	1.320	5.738	59.741			
5	1.035	4.501	64.242			
6	0.932	4.054	68.296			
7	0.812	3.533	71.829			
8	0.772	3.354	75.183			
9	0.647	2.815	77.998			
10	0.575	2.499	80.497			
11	0.545	2.371	82.868			
12	0.494	2.148	85.016			
13	0.459	1.995	87.011			
14	0.427	1.855	88.866			
15	0.404	1.757	90.624			
16	0.356	1.548	92.172			
17	0.316	1.375	93.547			
18	0.297	1.292	94.839			
19	0.280	1.219	96.058			
20	0.257	1.116	97.174			
21	0.242	1.052	98.226			
22	0.214	0.931	99.158			
23	0.194	0.842	100.000			

Extraction Method: Principal Component Analysis.