WHAT DRIVES ENERGY-EFFICIENT HOME APPLIANCES PURCHASING? EVIDENCE FROM PAKISTAN

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ABSTRACT

The principal determination of this study is to explore the human motivation towards energy-efficient home appliances purchasing. However, the research has been done in Karachi city whereas “310” respondents had taken part in data collection with the help of purposive sampling. Although, data have been analyzed in the Smart PLS while SEM was adopted to achieve the desired results. Also, the obtained results have shown that the data is quite reliable and authentic. Moreover, all the relationships of variables have been established significant except one moderating relationship of the product price has not been found substantial. Furthermore, some noteworthy limitations have also been faced like the study was only conducted in one city because of the limited time frame. Besides this, small sample size was used for data collection. For further study different cities must be focused on so that diverse results can be obtained. Adopt a large size of sample for better data accuracy. Last, the present study has introduced a unique conceptual model for innovative concepts and ideas.

Keywords: Subjective norm, perceived behavioral control, behavioral intention, product price concern, actual purchase, bill control

INTRODUCTION

In the last few years, the consumption of energy has drastically been increased all over the world. Besides this, unseen risks are also generating due to the consecutive use of energy (International Energy Agency, 2017). The study of Tan, Ooi, and Goh (2017) has endorsed that the constant utilization of energy may be harmful to the atmosphere and may cause a serious threat to human lives. Less consumption of energy can reduce hidden risks and may develop a healthy environment (Hameed & Khan, 2020). Similarly in Pakistan, the usage of energy particularly in homes is around 85% and the rest is used on a commercial basis (Ali et al. 2019a; Ali, et al. 2019b). Large household appliances like (refrigerator, air conditioner, washing machine, microwave, and iron) consume a big portion of energy resulting in a high electricity bill which increases the cost and depression (Parikh & Parikh, 2016; Hameed & Khan, 2020). Due to this, large household appliances should be less energy consumed and also save energy to avoid dangerous hidden threats (Hua & Wang, 2019). The most suitable example is given by Del et al. (2016) people use luminous bulbs in their homes of 60 watts which means per hour energy is used of sixty watts similarly 11 watts bulb can save 49 watts energy in one hour. That is human psychic everyone wants ease in every situation whether it is financial or non-financial (Swalehe, Chombo, & Marungsri, 2018). The economic growth of a country can be enhanced when people live with full autonomy and zero percent depression so this reason makesa prosperous and peaceful country (Wang, 2016).

Studies pointed out that people must understand the vital demands and needs of every person in terms of fundamental necessities like water-saving, electricity-saving, or gas-saving because in the least developed countries there is a scarce of these essential resources (Yuksel et al., 2018; Khan & Hameed, 2019a; Hameed et al., 2021). It is cleared from the past studies that energy-saving is very much important these days for the betterment of a country as well as for the people's lives.The majority of work to determine people’s intention towards purchasing has been done on the most popular theory of human psychology “the theory of planned behavior”, though a similar theory particularly has also been applied to know purchasing intention of electronic appliances (Ali et al., 2019a; Ali et al.,

2019b). According to the world ranking in terms of population, Pakistan is the 6th largest populated country (Worldometer, 2018). As it has also been seen in other populous countries that many uncontrollable problems are also generated due to the increasing ratio of the population such as economic growth decreases, unable to provide fundamental resources, gradually country's infrastructure weakens, poverty, and many others. These are the main highlighted issues that Pakistan has also been facing for many years. The less supply of energy is a highly recognized problem, therefore, to control this issue people must change their way of thinking towards home appliance purchasing (Valasai et al., 2017).

Nevertheless, very limited research work is completed on the consumption of energy-efficient home appliances in other countries but gradually the policy and strategy makers are keeping an eye on and have started to give awareness regarding the benefits of the exploitation of energy-efficient home appliances, their use will certainly help to save more energy and will also assist in enhancing GDP of a country (International Energy Agency, 2017). According to the State bank of Pakistan (2018), proper management and efficient utilization of energy are the elementary requirements to solve this delinquent, and it can only be done when people start to buy energy-efficient household appliances to save energy and control electricity bills.Thus, the present study has focused on these above-highlighted issues and also linked them with the theory of planned behavior (TPB) towards energy-efficient home appliances purchasing.

Literature Review

Theory of Planned Behavior (TPB)

The initial theory was introduced by the name of TRA (theory of reasoned action) and after that planned behavior theory (TPB) was presented to explain human's psychological behavior this theory is based on human's psychological behavior (Ajzen, 1991). The important factors which are involved to better explain human behavior are attitude, subjective norm, perceived behavioral control, and behavioral intention all these aspects help to develop a positive behavior of a person (Ajzen & Fishbein, 1972). In the past, several studies have used planned behavior

theory in a different context, some used as to understand human behavior only, whereas others applied it to describe an individual's purchasing intention behavior (Liu, 2008). The theory of planned behavior is deliberated as the best theory to define human psychology in depth. Therefore, the current study has also preferred to explain well an individual's purchasing behavior towards energy-efficient household appliances

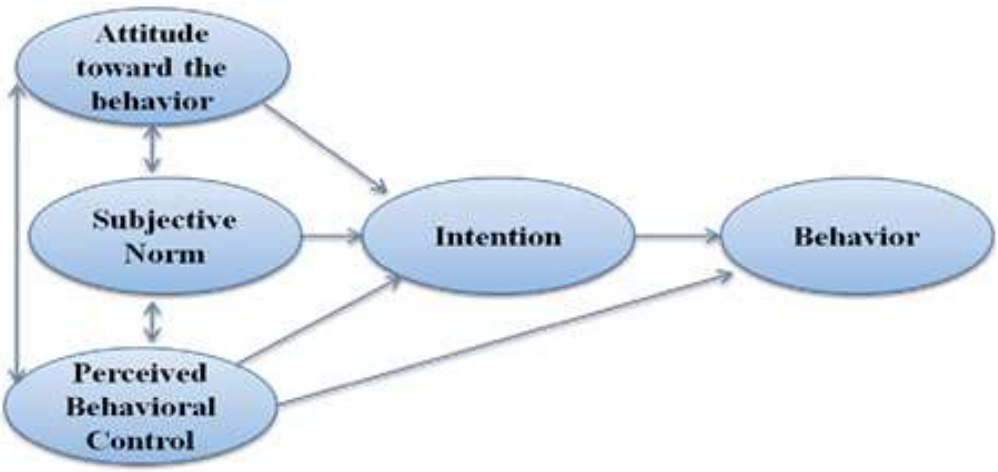

Figure1: The Planned Behavior Theory (TPB) (Ajzen, 1991)

Attitude (AT)

Attitude is a decisive factor that inclines to do an action (Allport, 1935). There are two kinds of attitudes which are positive and negative, both exist in human psychology (Ajzen, 1991). Eagly and Chaiken (1993) debated that if an attitude has two different forms, consequently the ultimate result will depend accordingly. The mixed feelings of both negative and positive are known as attitude (Newhouse, 1991). Attitude is considered as an essential factor to achieve the desired result if a person shows an affirmative attitude towards something then gets the decided outcome. Similarly, a favorable attitude towards purchasing leads to a successful result (Irland, 1993; Khan & Hameed, 2019b). In the same way, people's buying behavior for large things is very conditional, they want a complete package e.g. quality, price, long-lasting, best service provider, etc. Correspondingly in the context of purchasing energy-efficient home appliances, people show both positive and negative attitudes in the light of mentioned factors (Tan et al., 2017).

H1: There is a positive effect of attitude on purchasing of energy-efficient home appliances.

Subjective Norm (SN)

The subjective norm is a kind of external pressure that influences a person's final decision exerts by the people in the surrounding, ultimately it affects an individual's behavior (Ajzen, 1991). The subjective norm influences every state of a decision such as commencing a new job or business, purchasing intention, traveling, or emotional relationship, the third person's advice always impacts other people's thinking (Akar, 2019). In the past literature, it is reflected a vital factor of human psychology, as it changes a person's decision quickly in many ways like the intention of buying may vary either the planned conclusion would take place or not (Lee & Chow, 2020). Thus, the present work has taken the subjective norm as an influential factor to know its effects on a person's thinking towards energy-efficient home appliances purchasing.

H2: There is a significant influence of subjective norm on purchasing of energy-efficient home appliances.

Perceived Behavioral Control (PBC)

The accomplishment of the desired goal with full potential and commitment without taking any external or internal pressure (Ajzen, 1991). This factor has been vastly discussed in the previous readings in the context of purchasing intention (Klöckner, 2015; Klöckner, 2013). The activity of buying is usually considered the hardest exercise for a person's decision. Although it is the toughest element of human behavior because it leads to the final goal of what a person has already been planned (Jager, 2000). On the contrary, it is quite challenging to stick to the decision of purchasing large home appliances (Tan et al., 2017).

H3: There is a momentous impact of perceived behavioral control on the purchasing of energy-efficient home appliances.

The mediating role of Behavioral Intention (BI)

The imperative element is to develop human behavior (Ajzen, 1991). Two main components have been identified by the previous studies which are strong commitment and pure enthusiasm (Rödiger, Plaßmann, & Hamm, 2016). The study of Oliver (2014) said that a strong inclination of willingness towards buying and develop repurchase intention of a specific product or to complete a particular job. Montano and Kasprzyk (2015) endorsed the previous argument when positive and negative attitudes are combined then the behavioral intention is formed along with competent skills and abilities. Another study has highlighted that it is not sufficient to have particular skills and abilities to create behavioral intention, necessary to have exact intentions that help to develop the behavior of a human (Zhou et al., 2013).

H4: There is a noteworthy role of behavioral intention among attitude, subjective norm, perceived behavioral control, and purchasing of energy-efficient home appliances.

The moderating role of Product Price Concern

Many past studies have explained that the price of a product very much influences the intended behavior of an individual not only the person's buying intention even it completely changes the person's decision to buy or not to buy(Testa, Cosic, & Iraldo, 2016). Whereas in the massive previous literature has been shown the unacceptable view regarding the price towards purchasing intention, prior authors explored that the quality of a product impacts the final decision of a person it deviates the buying intention hastily rather than price(Völckner & Hofmann, 2007; Brucks, Zeithaml, & Naylor, 2000; de Langhe, van Osselaer, Puntoni, & McGill, 2014). Jung, Cho, and Lee (2014) refused the past author's arguments and claimed that an individual's decision is only affected by the price of a product, higher price weakens the relationship between buyer and seller.

H5: There is a negative moderating effect of product price concern on behavioralintention and purchasing of energy-efficient home appliances.

The moderating role of Bill Control

The deficiency of energy and power is always being the major problem in Pakistan. Although it is predicted that in the next few years the shortage and small amount of producing megawatts would become a severe issue because the energy is being used on a residential and commercial basis too (Kessides, 2013). The high consumption of energy is used for large household appliances therefore high electricity bills come at the house door which generates different other problems in people's lives. Nowadays it is very difficult to manage income and energy-saving for a peaceful life (Seligman, et al., 2018). The utilization of energy-efficient home appliances can save energy and reduce electricity bills especially beneficial for low-income earners (Seligman et al., 2018).

H6: There is a positive moderating effect of bill control on behavioral intention and purchasing of energy-efficient home appliances.

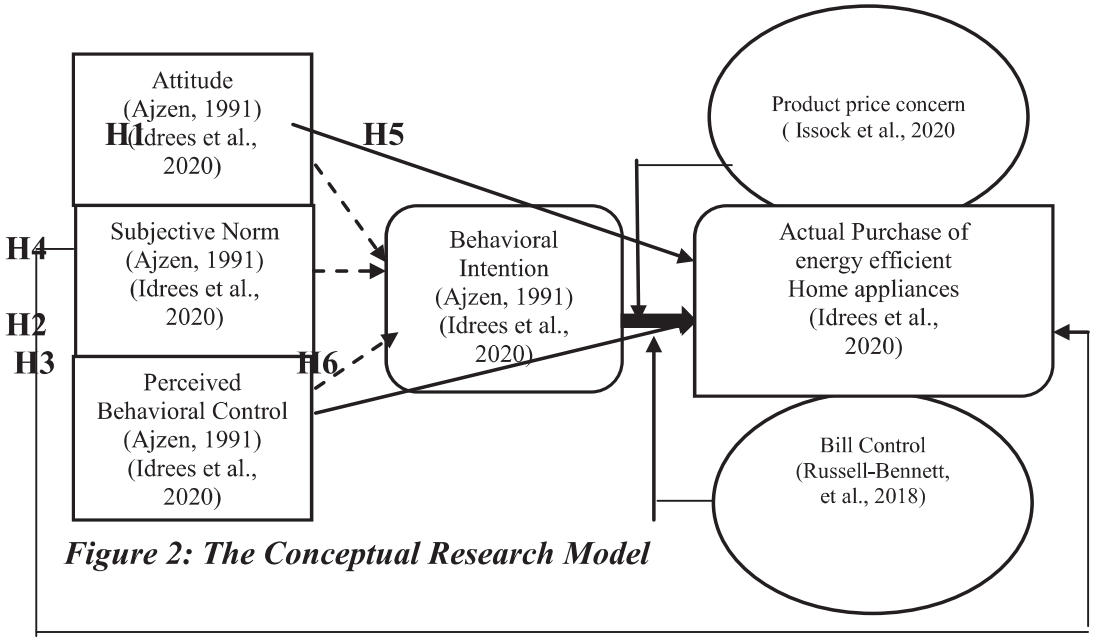

Figure 2: The Conceptual Research Model

Research Methodology

The methodology plays the role of a backbone in the study. Though it enlightens the correct path from the beginning to the final destination. However, the right way always leads to the right conclusion (Saunders et al., 2009). The concept of research onion is introduced by Saunders that provides the accurate steps and helps to develop the exact methodology (Saunders et al., 2009). The positivism philosophy is commonly used in studies (Johnson & Clark, 2006). Thus the positivism philosophy was selected in the current study to test the developed hypothe-

ses. Next, there are two types of approaches named inductive and deductive (Neuman, 2006). As the study has been conducted on the quantitative pattern, therefore the deductive approach was used. According to the research onion, several strategies have been defined, while the survey strategy was applied for data collection. Moreover, "310" as the sample size and purposive sampling were selected for the collection of desired data. The primary data was collected through a close-ended questionnaire and it was also categorized into online and physical methods, whereas the secondary data was gathered from different methods such as research articles, online research databases, and related reports. Due to the limited time frame, the study was picked a cross-sectional time horizon for the interaction with respondents. The results were analyzed in the Smart PLS version 3.2.6 with the help of structural equation modeling (SEM) (Ringle et al.,2015). The SEM is categorized into two stages, the assessment of the measurement model and the assessment of the structural model (Khan, et al., 2021). The measurement model was used to investigate the reliability, validity, and VIF values of data. Besides this, the structural model was applied to inspect the relationships of variables or the testing of developed hypotheses.

Results

Demographics

Table 1: Demographic's Information

Profile		*Frequency*	*Percentage %*
Gender	Male	195	63%
	Female	115	37%
Age Group	Below 20 years	10	3.2%
	21 to 30 years	21	6.8%
	31 to 40 years	180	58%
	41 to 50 years	80	26%
	51 and Above	19	6%
Household Income level	Below 25000	25	8%
	26,000 – 35,000	90	29%
	36,000 – 45,000	93	30%
	46,000 – 55,000	53	17%
	Above 55,000	49	16%
Qualification	Matric	0	0
	Intermediate	17	5%
	Bachelors	111	36%
	Masters	136	44%
	Diploma certificate	46	15%
Prefer Home Appliances	Air Conditioner	145	47%
	Refrigerator/Fridge-Freezer	165	53%
Prefered Brand	Haier	120	38%
	Dawlance	175	57%
	PEL	15	5%

The relevant information regarding the targeted respondent is necessary to evaluate the overall participation (Burns & Bush, 2003). According to the obtained results of demographics, the men had strongly participated in providing significantdata and their strength was around 63%, whereas 37% of women had taken part in this study. Furthermore, the largest category of respondents was fall in the age group of 31 to 40 years, and their household income level was 36,000 – 45,000. The most preferable home appliance as per the people's opinion is a refrigerator. Besides this, the majority of the respondents were well educated and had a master's degree. The results can be seen in Table 1.

Assessment of the Measurement Model Validation

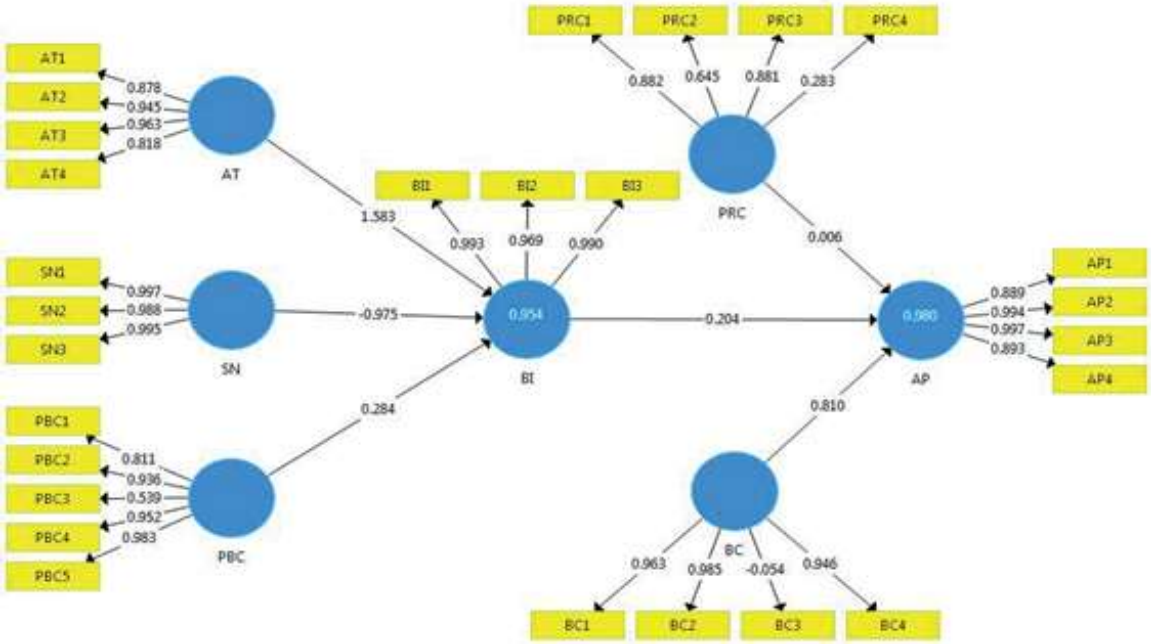

Figure 3: The Measurement Model

Table 2: The results of the Measurement Model

Constructs	Items	Outer Loadings	Cronbach's Alpha	rho_A	Composite Reliability	AVE	VIF
AP	AP1	0.889	0.959	0.964	0.971	0.893	1.5831
	AP2	0.994					1.0493
	AP3	0.997					1.3380
	AP4	0.893					1.9271
AT	AT1	0.878	0.924	0.953	0.946	0.815	1.1657
	AT2	0.945					1.4595
	AT3	0.963					1.8464
	AT4	0.818					1.5659
BC	BC1	0.963	0.741	0.965	0.870	0.699	1.4066
	BC2	0.985					1.1632
	BC3	0.054					1.1023
	BC4	0.946					1.2836
BI	BI1	0.993	0.984	0.985	0.989	0.968	1.0892
	BI2	0.969					1.1159
	BI3	0.990					1.0800
PBC	PBC1	0.811	0.903	0.960	0.932	0.739	1.1225
	PBC2	0.936					1.0383
	PBC3	0.539					1.2768

Constructs	Items	Outer Loadings	Cronbach's Alpha	rho_A	Composite Reliability	AVE	VIF
PRC	PBC4	0.952					1.2649
	PBC5	0.983					1.2120
	PRC1	0.882	0.787	0.725	0.788	0.513	1.5105
	PRC2	0.645					1.0997
SN	PRC3	0.881					1.0356
	PRC4	0.283					1.4523
	SN1	0.997	0.993	0.993	0.995	0.986	1.2064
	SN2	0.988					1.2021
	SN3	0.995					1.0042

The obtained results of the measurement model can be seen in Table 2. Thus, the internal consistency could be measured from two approaches that are Cronbach's alpha and composite reliabilities (Gefen et al., 2000). If the values of both approaches are >= 0.7 then it confirms the existence of internal consistency. The study of Meng-Hisang et al., (2014) well explained the composite reliability and considered the authentic method of finding internal consistency. Hence, the obtained results of Cronbach's alpha and composite reliabilities have effusively verified the acquired data are consistent and reliable. Similarly, the convergent validity can be established through two methods the first one is outer loadings and the other method is average variance extracted (AVE). The values of outer loadings must be >= 0.7, whereas the values of AVE should be greater than >= 0.5 to confirm the convergent validity (Hair et al., 2016). Another study has confirmed that the lower values of outer loadings affect the internal consistency (Hair et al., 2017). Thus, the attained results of both methods are well enough to confirm the convergent validity. The study of Hair et al. (2017) explored that multicollinearity issue which has commonly occurred in data and for its identification, the attained results should be <5. Hence, the achieved data are quite reliable, have no multicollinearity issues, and can be utilized for future study.

Table 3: The Fornell-Larcker Criterion Test

	AP	AT	BC	BI	PBC	PRC	SN
AP	0.945						
AT	0.834	0.903					
BC	0.983	0.850	0.836				
BI	0.881	0.912	0.830	0.984			
PBC	0.838	0.937	0.809	0.958	0.860		
PRC	0.667	0.706	0.628	0.749	0.725	0.716	
SN	0.735	0.961	0.788	0.781	0.831	0.624	0.993

Table 4: The Heterotrait-Monotrait Ratio (HTMT) Test

	AP	AT	BC	BI	PBC	PRC	SN
AP							
AT	0.5263						
BC	0.1141	0.1688					
BI	0.4371	0.3990	0.2152				
PBC	0.2347	0.4083	0.0881	0.1581			
PRC	0.4388	0.3688	0.0912	0.7120	0.2516		
SN	0.3127	1.3405	0.1095	0.4692	0.7140	0.3079	

The Fornell-Larcker Criterion and The HTMT ratio are two methods of determining the discriminant validity of the measurement model (Henseler et al., 2014). The Fornell-Larcker has been widely used in previous studies, however, the HTMT ratio test is being preferred to obtain accurate results of confirming the discriminant validity in data. In the Fornell-Larcker criterion test, the squared value of AVE must be greater which confirms the existence of discriminant validity (Fornell & Larcker , 1981). Thus, the obtained results in table 3 all the values are greater than the squared value of AVE that confirms the discriminant validity has been establishedthrough this method. While the HTMT ratio is the most appropriate technique for the verification, therefore the values must be <= 0.9. Hence, it can be seen in table 4, all the values met the standard value except 1.3405, which describes that unable to differentiate the construct by the respondent.

Table 5: The Variance Explained

	R Square	R Square Adjusted
AP	0.3991	0.3932
BI	0.2558	0.2485

Hair et al (2017) elucidated the criteria of variance explained in terms of substantial, moderate, and weak, 0.75, 0.50, or 0.25. in table 5 the values are quite nearer to the moderate. Therefore, the results of AP & BI have been shown a moderate variance in the model.

Table 6: Model Fit Summary

	Saturated Model	Estimated Model
SRMR	0.073	0.072
d_ULS	1.735	1.732
d_G	0.952	0.963
Chi-Square	1918.7377	1920.0543
NFI	0.7493	0.7463

Assessment of the Structural Model Assessment

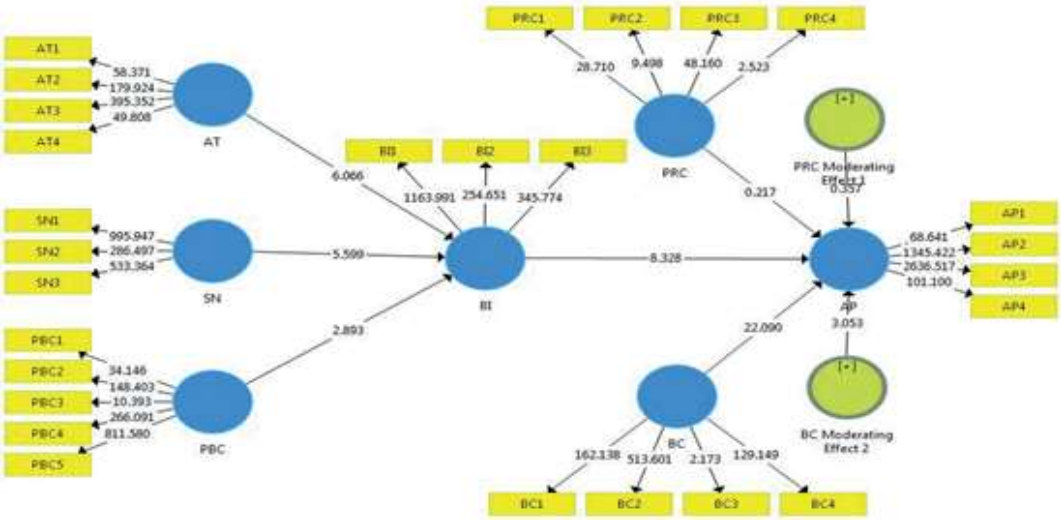

Figure 4: The Structural Model

Hu and Bentler (1999) clarified well the fitness of the model if the value of SRMR <= 0.08, then the model is considered a good fit. Hereafter, the obtained value of SRMR is less than 0.08 so that it can be concluded that the model is a normal fit.

The testing of hypotheses in the Smart PLS through the bootstrapping procedure. The relationships of variables are confirmed significant if they meet the P-value (Hair et al., 2016). In the prior studies, different levels of significance have been used according to their data such as 0.1 (10%), 0.05 (5%), or 0.01 (1%) (Hair et al., 2016)

Table 7: The results of Hypotheses Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Status
AT -> AP	0.473	0.491	0.105	4.514	0.000	Significant
AT -> BI	1.583	1.601	0.267	5.930	0.000	Significant
BC -> AP	0.827	0.817	0.037	22.492	0.000	Significant
BI -> AP	0.299	0.306	0.037	8.139	0.000	Significant
PRC Moderating Effect 1 -> AP	-0.014	-0.027	0.041	0.351	0.726	*Insignificant*
BC Moderating Effect 2 -> AP	0.100	0.108	0.033	3.022	0.003	Significant
PBC -> AP	0.085	0.085	0.032	2.614	0.009	Significant
PBC -> BI	0.284	0.278	0.101	2.822	0.005	Significant
PRC -> AP	0.006	0.002	0.029	0.215	0.830	*Insignificant*
SN -> AP	-0.291	-0.303	0.068	4.268	0.000	Significant
SN -> BI	-0.975	-0.988	0.178	5.469	0.000	Significant

T-statistics > 1.96 at P- value < 0.05

The results of the hypotheses can be seen in Table 7. The relationships of all the variables have been found significant that means the null hypotheses are successfully rejected except the one hypothesis of product price concern that demonstrated an insignificant relationship or failed to reject the null hypothesis. All the obtained p-values are less than 0.05 that confirmed the adopted independent variables have sufficient effects on the dependent variable.

Discussion

According to the achieved statistical results, the men had strongly participated comparatively than women for acquiring data. Around 63% of men had filled the questionnaire whereas 37% by the women. Moreover, the data were collected from the respondents with full consent. That is the reason more accurate information had been gathered. The SEM research technique was used to measure the measurement and structural model while, the reliability was checked through different tests such as internal consistency, convergent validity, and discriminant validity as all described in the previous section. Although, the testing of hypotheses was examined by the execution of bootstrapping procedure. Likewise, the relationships of all the variables have positive effects and represent that the null hypotheses are successfully rejected, except one hypothesis of product price concern was accepted. Besides this, the model was a good fit and can be utilized for further study.

Conclusion

The core purpose of conducting this study was to determine the human behavior towards purchasing energy-efficient home appliances. In the prior literature, the theory of planned behavior (TPB) was linked with human psychology in different contexts. Whereas the planned behavior theory explains the key elements of an individual's behavior, and consists of four fundamental factors named attitude, subjective norm, perceived behavioral control, and behavioral intention and these causes derive to perform a particular task. Same as the present study has focused on the human's buying intention towards energy-efficient appliances. The purchasing behavior is deliberated as the most difficult activity for people due to the intensive internal and external factors that influence the person's decision. Thus, the core objective has fruitfully completed after getting the accurate results which cleared the behavior of a human certainly motivates by some reasons, same in the context of purchasing large home appliances an individual's psychic varies from diverse aspects, some in favor to develop that specific behavior which leads to the final decision.

Contribution to the Field

Understanding a person's behavior in the respective discipline is relatively tough because no one can recognize what they want and think about. Like in purchasing so many things come in people's mind regarding the product which they are willing to buy. The manufacturers of large home appliances have to realize the requirements of a consumer because there is no other way to sell their products. Therefore, the current study describes the hardcore demands concerning energy-efficient household appliances. It also contributes to providing appropriate statistics and advises the concerned companies on what type of home appliances should be and can relieve to a common person in terms of electricity and money-saving. It could be possible when companies start to make energy-efficient and cost-saving appliances that will reduce depression and assist to create a healthy and peaceful environment in homes.

Limitations and Recommendations

The study has underlined some primary limitations. The study was only conducted in the main city of Pakistan i.e. Karachi. The other major cities should be covered in the next study, and in this way, diverse data would be collected. The study used a relatively small sample of 310 which was considered an average, but in future studies must adopt a large sample size for better data accuracy and authenticity. Due to the shortage period, the cross-sectional pattern was followed and interacted with the respondent for one time because of unlimited resources and lack of time. Further research must take a long time and collect data from the respondents more than one time. In the last, the quantitative research method was focused, and picked purposive sampling technique for the mathematical data collection. Use the qualitative approach with other sampling techniques to achieve different results, and information, and also introduce innovative ideas.

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