SPCRD GLOBAL PUBLISHING
Sustainable Solutions
READS Review of Economics and Development Studies
Journal homepage: http://reads.spcrd.org ISSN (Print): 2519-9692 ISSN (Online): 2519-9706

Consumers Purchase Intention for Energy Efficient Household Appliances in Southern Punjab, Pakistan

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ARTICLE DETAILS

History:
Accepted 25 August 2022
Available Online September 2022

Keywords:
Energy Efficient Appliances, Purchase Intention, Environmental Concern, Household

JEL Classification:
P28, P48, Q47

DOI: 10.47067/reads.v8i3.438

ABSTRACT

Consumption of electricity all over the world has been increasing since past years. However, the present investment trend is presenting marks of power supply shortage. Hereafter, several countries have incorporated energy efficiency as a limited solution to forthcoming energy problems. Actually, a lot of households are not substituting their household energy products with energy-efficient ones. Usage of energy efficient appliances in Pakistan is still at poor level. The main focus of the study is to see the consumers purchase intention for the energy efficient household appliances in southern region of Punjab. This study using a questionnaire that was administered to four hundred consumers in three district of south Punjab, Pakistan. Partial Least Square (PLS) regression is used. The findings shows that more favorable attitudes, social influence and perceived behavioral control towards energy efficient household appliances significantly impact on purchase intention of the consumers. This study also proved that environmental concern and moderation is also positive impact on household decision to purchase efficient home energy appliances. Creating awareness through advertisement about energy star labelling will beneficial for consumers.

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1. Introduction

Electricity is commonly and mainly vital form of energy. It is worth noting here that the demand for electricity all over the world has been increased over the past few decades with the rapid increase in population growth. The role of energy is very important in development of a country. A study of Tan, Ooi and Goh (2017) showed that consumer intention to buy energy-efficient home appliances is influenced by positive attitude and PBC in Malaysia. Household behavior is diverging about consumption of energy and it sets up through economic decision making (Zhou & Yang, 2016). Moreover environmental issues such as change in climate, population increased and specially in genetically engineering are mostly discussed in every international conferences. All the environmental problems is due to energy if energy usage reduced then environment can save. More purchases of green and recyclable products enhance consumers product efficiency. With the usage of more efficient

products, users saved electricity and environment save due to less use of fossil fuels (Mills & Schleich, 2013). For this context, usage of efficient energy appliances play a significant role to reduce energy demand in household sector.

Recent decade, most of the writer mainly focus on the energy behavior of the household in residential area. Most of the field study done in home energy to check the behavior of the households towards energy efficiency (Abrahamse et al., 2007). Mostly thermal plant is used to generate energy and that cause to environmental problems like air pollution. So the consumption of electricity can be reduced through smart technologies installed in home and it led to the development of the society. With the Increase of the household family size may increase home appliances and this cause to raise his electric bills.

Energy is a very important part in nation building as a result it's a backbone in a socio economic development of a country. Nobel laureate Theller (2017) described that how individual decision will manipulate with limited rationality, his social preference and lack of self-control. In this context, this study is very interesting to examine the consumer intention to buy energy proficient home appliances.

Most of the researchers focus on encouraging the energy-saving behavior. With the uses of energy efficient appliances, the energy can be saved and these findings are also very useful in policy making for conserving the environment in Germany (Mills & Schleich, 2012). The major share of household energy consumption based on energy appliances, the most of the greenhouse gas emission comes from electric products like air conditioners, refrigerator, and TVs at the household level in China (Xu, 2010). Energy consumption may contribute to serious problems of the environment in Canada due to weather changes and exploitation of natural resources in the production of power generation (Ngo, West & Calkins, 2009).

Electrical appliances that perform household tasks are known to them household appliances. The features of home appliances are that they do not carry fast, costly and technologically moving ahead of time. Affordable television, expensive AC, washing machines, fridge and ovens can be considered as one of the largest household appliances that develop experience in fast-growing consumer goods because they are such for consumer durable goods purchased at high frequency. So, consumers cannot buy home appliances again in small cases (Wilson, 2016).

Consumer performance is analyzed with the use planned behavior theory, its best explaining the behavioral intention of the consumers (Ajzen, 1991). This theory based on social pressure self-motivation and attitude. Nowadays Pakistan is facing power shortage in the industrial sector, agriculture and household sector and this lead to decrease the economic productivity (Choudhary, Khan, & Abbas, 2008). Economic survey sheds the light that there is urgent need to create awareness in general public about the use of energy efficient and environmentally friendly techniques. Qureshi *et al.* (2016) highlighted that use of LED lights has not only conserved electricity but are also environment-friendly. A rapid increase in energy demand of household sector in Pakistan increases the electricity bills only because of usage of inefficient electric appliances. Most commonly used energy appliances are a refrigerator, iron, washing machine, tube lights, water heater, air conditioner and water pump. They all require more amount of electricity. Energy saving appliances are now a common desire of every consumer because energy prices are increasing rapidly. With the uses of energy-efficient appliances, every household can save money and conserve the environment. Energy efficient appliances like LED, CFL lights are economical and eco-friendly.

Home-based applications are comparatively costly and contain planning, information of appliances and estimation before purchase. Since 1980, energy demand has increased almost six times in Pakistan and is likely to be re-joined by 2016. With a very high dependence on hydrocarbons as a major source of energy, the situation is not permanent. Contrary to this, demand for energy is actually expected in developed economies, such as the OECD. Although in 2005 they were less than 2030, despite their expectations of an increase of 50% in their economies. Due to significant progress in energy efficiency in these countries, Pakistan will get benefit to adopt their models. Existing energy infrastructure is also desperately needed to improve: transmission and distribution are disabled, large water reservoir lost working capacity, and generating current price strategy, many options that provide costly energy imbalance in the mix of arbitration (Govt of Pakistan, 2017).

Last decades, global power consumption is increasing rapidly. However, the current investment trend indicates power failure, many nations have agreed to use energy proficiency equally limited resolution to the upcoming energy issues. In fact, various people does not exchange their home energy home appliances with efficient products. Household incentives to accept energy-saving appliances can be doubled. Firstly, it is assumed that the households that maximize their utilization are meant to minimize the cost of services such as food cooling or laundry drying. Therefore, in addition to initial purchase costs, it is expected that the energy efficiency and related energy costs of the appliances over time are relevant criteria for choosing a technology along with other features such as size, design, accountability or other operating expenses. Secondly, as the purchase of energy-saving applications leads to less resource use and lower emissions of local and global pollutants, environmental degradation is diminishing. Therefore, from an economic point of view, adopting an energy efficiency device also creates a public good in terms of a cleaner environment (Leeuw, Pierre & Ajzen, 2015).

The problem of a shortfall in electricity is uses of electric appliances which cause a gap between supply and demand of electricity. People facing load shedding that timing of load shedding in summer seasons is high due to increase in household demand of energy (Govt of Pakistan, 2017). This survey also highlighted that there is four percent increase in consumption of electricity in households sector from June 2016 to June 2017 while industrial sector consumption of energy is decreased by one percent. The demand of electricity for households increases the total demand. Now the problem is that how people can use energy efficiently because every consumer wants to save money. If electricity bills are increasing every month than it's very difficult to manage his income to meet his expenditure. Also, load shedding is a big problem of Pakistan and it is increasing hourly.

There is no research about using energy efficient products in the selected district of south area of Punjab. In this context, this study can be a unique contribution which will conduct in three district of southern Punjab (Multan, Khanewal and Vehari) to see the buying intention of energy-efficient home appliances and also sees the consumers' behavior about environment conserving. Second including the environmental variable in the research is also a new contribution in Theory of planned behavior. Last is Last is including moderation term in the model also raises the importance of this study. To fill the gap by using TPB with two environmental variable and moderation term can increase the importance of energy efficient appliances.

The objectives of the study are:

- To analyze the consumer behavior about the purchase intention of energy-efficient household appliances.
- To check the moderating role of environmental knowledge in a relationship with perceived behavioral control and purchase intention of energy-efficient household appliances**.**

2. Hypothesis Development

Theory of planned behavior is developed by Icek Ajzen in 1985, it is one of the best theory that explained the human behavior about the way of they behaving. This theory is explained by its three main variables and that's are Perceived Behavioral Control, Attitude and Subjective Norm. Many past studies applied theory of planned behavior to see the purchasers purchase intention about electricity saving behavior (Wang, Zhang, Yin & Zhang, 2011); energy saving behavior (Wang, Zhang & Li, 2014); energy efficient products (Wang, Wang & Guo, 2017) and pro environmental behavior studied by (Chan et al., 2014).

2.1 Attitude

Attitude is mentally state; it may be positive or negative according to the situations. Attitude is a mental state of activeness seeking and it's organized by individual experience (Ivancevich, Konopaske & Matteson, 2010). It's also influence by object, others person responses and relevant situation. If there is one positive attitude is performed towards action, there is possibility that task is performed by the consumer. As three independent determinants of consumers purchase intention in the theory attitude is satisfactory or unfavorable assessment towards a positive behavior (Ajzen, 1991).

Wang et al. (2011) define attitude is the degree of consumers consciousness to execute an energy saving behavior. It's also include that information of energy saving types and its past experience also helpful to do positive behavior.

For reviewing above literature about the attitude it can be said that purchase intention of energy efficient appliances is influence by positive attitude and research hypotheses is

H1: "Attitude has positive impact on the purchase intention of energy-efficient appliances"

2.2 Subjective Norm

The second element of the theory of planed behavior is Subjective Norm. Subjective norm is the thinking of other people about you that how you will perform a certain behavior. Ajzen (1991) defined that subjective norms is the perceived social pressure to perform the behavior. In simple words, its individual observation or belief near what key others trust to do a task or perform behavior. It also defines as a viewpoint of the nearest people who are very close to me that can influence his decision making for example his family members, colleagues, friends and relatives. Earlier studies propose that subjective norm was positively affect the consumers behavioral intention about using energy efficient household appliances (Han & Kim, 2010).

Subjective norm is related to the mathematics as saw compression from the others regarding which action should performed according to the expectation. Because SN either inspire or prevent that how an individual act (Klockner, 2013). Household energy saving behavior is largely affected by the Norms. However, while purchasing energy appliances our decision is also influence by friends' decision, family members and our knowledge about those products. Subjective norm is positively and significant impact on intention of the consumers. People who had strong public or social relation is positive attitude about his decision and intention. So, research second hypothesis is

H2: "Subjective norm has significant impact on purchase intention of energy-efficient appliances when environment concern is high"

2.3 Perceived Behavioral Control

This is consumers relieve or complexity to achieve a particular behavior. For consumption purpose whether a consumer can simply consume product or he faces difficulty while using that product. Perceived behavioral control is individual internal factors that influence his decision. As the

person have more control on his behavior by using energy saving appliances, he definitely purchases more things in future (Alam *et al*., 2014). In the recent studies, Theory of planned behavior is widely used especially in behavioral economics and green behavior while purchasing. PBC is confirmed and significant impact on purchase intention (Chan et al., 2014).

A recent study in Malaysia found that PBC has positive effect on small family members by using renewable energy appliances intention (Alam et al., 2014). Many studies also focus on incentives that is provided by the government on energy appliances is more favorable for consumers. Wang *et al*. (2017) concluded that purchase intention is significantly affect by the perceived behavioral control. So that study third hypothesis is

H3: "Perceived behavioral control has positive impact on purchase intention of energy-efficient appliances"

2.4 Environmental Knowledge (EK)

People mostly ignore the environment while making purchase of energy appliances. People who have more knowledge or well aware of ecological issues have positive attitude. Environmental knowledge is defined that it's a person knowledge about his nearest environment or regarding issues and how much he know about the problem of the environment (Kaiser *et al*., 1999). In simple word, people knowledge, awareness, problems and solution about the environment is called the environment knowledge.

EK is generally affected by pro-environmentally attitude and behavior. Those who had lack of Ecological-knowledge are not used environmentally friendly products. While purchasing green products, a study in Swiss found that young consumer's intention is more engage with positive environment attitude (Kanchanapibul *et al*., 2014). There is positive relationship between energy knowledge and energy saving behavior (Wang *et al*., 2011). For reviewing some literature, we expect that there is significant relationship between environmental knowledge and intention. So the fourth hypothesis is:

H4: "Environmental knowledge has significant impact on purchase intention of energy-efficient appliances"

2.5 Environmental Concern (EC)

Environment concern is the motivation in the consumers while buying products. While people have more knowledge about the environment issues, have more concern to save the environment. People who have more concern about the environment are more involve in pro-environmental attitude. Environment concern is most popular variable is used in today studies while measuring environment behavior (Albayrak *et al*., 2013). Its self-responsibility of the respondents to the energy saving behavior while measuring environmental concern (wang *et al*., 2014). EC can lessen the take-bake effect that are related to the pro environment behavior (Urban & Scasny, 2012).

For that reason many scholars found that there is significant relationship between behavioral intention and environmental concern (Albayrak *et al*., 2013; Chan *et al*., 2014). Usually I suppose that purchase intention of energy efficient household appliances is positively related with environmental concern. Thus, study fifth hypothesis is:

H5: "Environmental concern has significant impact on purchase intention of energy efficient appliances"

2.6 Moderate Effect

Moderator is a variable that effect the path of the variable or strength between the dependent variable and the predictor variables. The last hypothesis that I developed to see the moderate role of environmental knowledge and perceived behavioral control on purchase energy efficient appliances. The study sixth hypothesis is:

H6: "Environmental knowledge and perceived behavioral control has significant moderate the intention to purchase energy-efficient appliances"

2.7 Proposed Model

Mainly theory of planned model is adopted that given by Ajzen in 1991. My model is derived from that model and it defined the relationship between the dependent and independent variables.

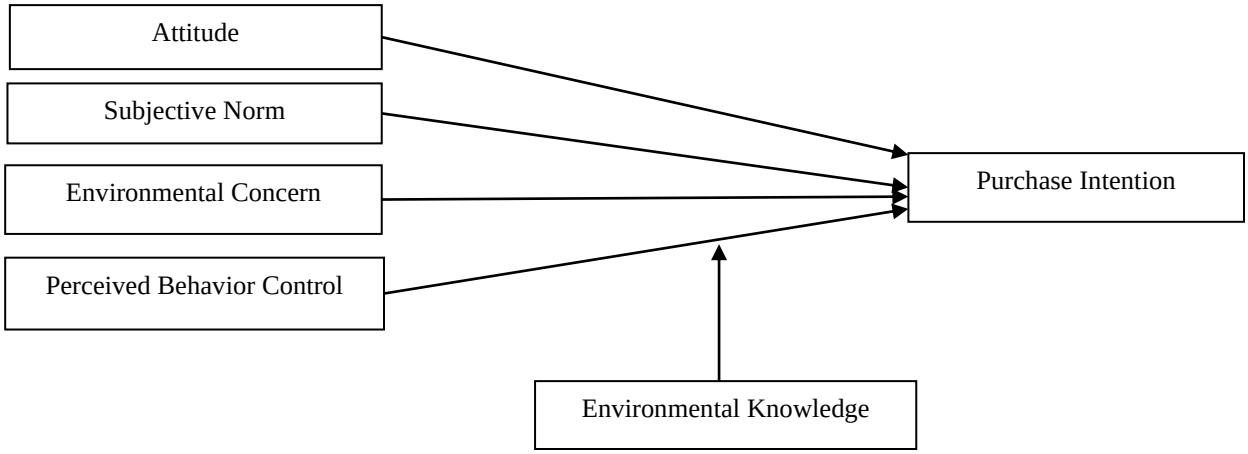

Figure 1. Theoretical Model for analyzing consumers buying intention for energy efficient household appliances.

This research model has three variables that are adopted from the Ajzen theory of planned behavior that is Attitude, subjective norm and perceived behavioral control. But added two more variable that is environmental concern and environmental knowledge to see the effect of these variables on purchase intention. Figure 1 shows that all variables are directly influence the dependent variable that is purchase intention but environmental knowledge and PBC has moderate effect on purchase intention.

3. Methodology

The chapter of research methodology is very important in the research process. It is the organized way of doing research in a systematic way. This chapter includes research design, approaches, sampling, data collection techniques, questionnaire design and analytical technique.

3.1 Research Design

For this research data is collected from the household's age above 20 who are teaching in the government colleges in three districts of south Punjab, Pakistan. Present study mainly focuses on the Government College faculty as respondents are taken from three district of south Punjab, Pakistan (Multan, Khanewal and Vehari). Simple random sampling technique is used because it is easy to collect the data from the faculty. A pre-tested questionnaire is used for this study. Questionnaire were filled form the lecturer, assistant professors and associate professors for different subjects. The main concern was to see the well-educated household behavior about the purchasing the household energy appliances. Partial least square regression is used for this research. Adopted questionnaire is taken for

this research mostly question is taken from the literature (Tan *et al*., 2017; Paul *et al*., 2016). Twenty-nine questions are used for this research and 400 questionnaire is filled from the faculty of government colleges in 4 months. All questions are measured on five-point likert scale. This included (1 strongly disagree to 5 strongly agree). The questionnaire in this research consists of seven sections.

A) Section one is related to the demographic variable (e.g., Age, gender, profession, education, discipline, income).
B) Section two is related to the consumer's attitude about purchasing energy efficient household appliances. This section contains five questions to measure this variable.
C) Third section include four items of subjective norm.
D) Fourth section include five items of perceived behavioral control.
E) Fifth part of the questionnaire contains of environmental related variables that is environmental concern
F) Sixth section have environmental knowledge relevant questions.
G) The last section is dependent variable that is purchase intention included four questions.

Table 1 recorded the household demographic details which included age, education, marital status, residence and income level. Most of the respondents aged lying between 41 and 50 years and this is half of the total sample data. While 87.5 percent married respondents also have good experience to purchase energy efficient products. Mostly respondents have master degree and their monthly income is between 50000 to 70000. Lastly, many households belong to the rural area and they himself purchase the products for their home.

All the detail of the respondents is given in the table 1.

Table 1. Respondent's profile

Variable	Frequency	Percentage
Age (years)		
20-30	20	5
31-40	120	30
41-50	200	50
51-60	60	15
Marital status		
Single	50	12.5
Married	350	87.5
Education		
Masters	280	70.0
MS(MPhil)	70	17.5
PHD	50	12.5
Income Level (Rs)		
50000-70000	295	73.75
71000-90000	70	17.54
91000-110000	15	3.75
111000-130000	10	2.5
131000-150000	10	2.5
Residence		
Rural	242	60.5
Urban	158	39.5

3.2 Reliability

Reliability shows the accuracy of the data. The first step in the research is to check whether the data is reliable or not. If the results of the scale reliability meet the accuracy point then it further proceed otherwise not. Table 2 showed that the value of cronbach's alpha is greater than 0.7 or closes to the recommended value of the cronbach's alpha (Hair et al., 2014).

Table 2. Reliability Analysis

Variables	Cronbach's Alpha	Number of Items
Attitude	0.698	5
Subjective Norm	0.710	4
Perceived Behavioral Control	0.871	5
Environmental concern	0.860	6
Environmental knowledge	0.795	5
Purchase Intention	0.749	4

Table 2 showed all the variables reliability that are measure through cronbach's alpha values. The reliability of environmental concern and PBC are quite high as compared to the other variables. While attitude reliability values are close to the 0.7.

4. Results

4.1 Normality of Data

To check that collected data is normally distributed, Jarque–Bera (JB) test of normality is used and verified through skewness and kurtosis, the range of Skewness and kurtosis between -2 and 2 (Gravetter & Wallnau, 2014) for normal data. All values are placing well within range.

Table 3. Normality of Data

Statistics							
		ATT	SN	PBC	EC	EK	PI
N	Valid	400	400	400	400	400	400
Skewness		.030	-.092	-.440	.186	-.134	-.450
Std. Error of Skewness		.122	.122	.122	.122	.122	.122
Kurtosis		-.717	-.105	.801	-.551	-.583	.393
Std. Error of Kurtosis		.243	.243	.243	.243	.243	.243
Jarque-Bera		8.767	0.794	22.864	7.515	7.008	15.742
Probability		0.012	0.672	0.000	0.023	0.030	0.000

Results present in Table 3 showed that normality of data values that are measured through skewness and kurtosis. All the given values are rages between -2 and +2. It means that the data is normally distributed.

4.2 Validation of Data

There are some new constructs are used to test the data validation and they are Construct Validity (CV), Convergent Validity (CV) and Discriminate Validity (DV).

4.2.1 Construct Validity

Construct validity (CV) is used to test how well the required items measurement represent the whole population from the selected sample (Hair et al., 2014). For this research cross loading and outer loading is tested for construct validity. Haier et al., (2014) argue that the value of outer loading greater than 0.50 is significant considered and below than 0.50 is insignificant. Using principal component analysis in SPSS the results of CV are here. Bold values are greater than 0.50, so its significant.

Table 4. Construct validity

	ATT	SN	PBC	EC	EK	PI
ATT1AT	**0.754**	0.417	0.332	0.369	0.090	0.369
T2ATT3	**0.890**	0.233	0.423	0.417	0.070	0.320
ATT4AT	**0.865**	0.455	0.157	0.406	0.159	0.393
T5SN1	**0.870**	0.362	0.289	0.312	0.293	0.355
SN2	**0.730**	0.222	0.132	0.323	0.453	0.255
SN3	0.223	**0.692**	0.470	0.227	0.359	0.162
SN4	0.452	**0.856**	0.399	0.269	0.140	0.244
PBC1PB	0.231	**0.725**	0.256	0.245	0.099	0.388
C2PBC3	0.416	**0.903**	0.388	0.369	0.355	0.088
PBC4PB	0.321	0.472	**0.760**	0.190	0.263	0.109
C5	0.453	0.460	**0.809**	0.361	0.400	0.147
EC1	0.459	0.235	**0.793**	0.447	0.292	0.053
EC2	0.150	0.454	**0.777**	0.360	0.329	0.144
EC3	0.170	0.453	**0.860**	0.250	0.277	0.292
EC4	0.235	0.253	0.223	**0.889**	0.107	0.488
EC5	0.400	0.125	0.410	**0.910**	0.327	0.440
EC6	0.400	0.400	0.315	**0.852**	0.293	0.355
EK1	0.320	0.332	0.193	**0.900**	0.423	0.399
EK2	0.135	0.468	0.330	**0.844**	0.422	0.406
EK3	0.193	0.336	0.109	**0.815**	0.177	0.366
EK4	0.268	0.452	0.299	0.341	**0.700**	0.199
EK5	0.300	0.423	0.345	0.432	**0.820**	0.280
PI1	0.129	0.327	0.458	0.449	**0.512**	0.420
PI2	0.142	0.226	0.466	0.192	**0.789**	0.060
PI3	0.333	0.347	0.777	0.126	**0.757**	0.357
PI4	0.325	0.313	0.579	0.240	0.093	**0.880**
	0.473	0.176	0.530	0.413	0.480	**0.918**
	0.453	0.266	0.499	0.173	0.176	**0.733**
	0.323	0.400	0.497	0.176	0.269	**0.911**

Note: above 0.50 value loading are significant and bold. ATT (Attitude), SN (Subjective Norm), PBC (Perceived Behavioral Control), EC (Environmental concern), EK (Environmental Knowledge), PI (Purchase Intention).

Results in Table 4 describes the questionnaire construct that truly define the variable. If the value of the outer loading is greater than 0.5 than its truly describe the population mean (Hair et al., 2014). So, in this table all the bold values are greater than 0.5 which indicate that outer loading is truly represent the construct.

4.2.2 Convergent Validity (CV)

Convergent validity (CV) is used when many items are measured on same construct. There are two test is used for CV measurement, one is composite reliability. (CR) and second is Average Variance. Extracted (AVE) (Hair et al., 2014). The value of CR and AVE is greater than 0.50 is acceptable (Hair et al., 2014). CR measure internal reliability of the latent construct while AVE describe the indicators variance for the justification of construct.

Table 5. Convergent validity measures

Items	**Loading**	**CR**	**AVE**	**α**
ATT1	0.754	0.877	0.849	0.698
ATT2	0.890			
ATT3	0.865			
ATT4	0.870			
ATT5	0.730			
SN1	0.692	0.874	0.632	0.710
SN2	0.856			
SN3	0.725			
SN4	0.903			
PBC1	0.760	0.899	0.801	0.871
PBC2	0.809			
PBC3	0.793			
PBC4	0.777			
PBC5	0.860			
EC1	0.889			
EC2	0.910	0.948	0.755	0.860
EC3	0.852			
EC4	0.900			
EC5	0.844			
EC6	0.815			
EK1	0.700			
EK2	0.820	0.843	0.524	0.795
EK3	0.512			
EK4	0.789			
EK5	0.757			
PI1	0.880			
PI2	0.918	0.921	0.746	0.749
PI3	0.733			
PI4	0.911			

Note: CR = (square. of the summation of the factor loading)/ (square of the summation. of the factor loading) + (square of. the summation of the error variances), AVE = summation of square of the factor loading/ (summation of square of the. factor loading) + (∑E.V).

In this analysis, where purchase intention (PI) is dependent variable and independent variables are subjective norms, perceived behavioral control, environmental concern and environmental knowledge respectively. Results are present in Table 5 shows the results of CR, AVE and Cronbach's alpha which indicate that all the results are significance according to the literature. All the values are greater than 0.5, which means that construct that are design for research is good to measure the variable reliability.

4.2.3 Discriminate Validity (DV)

DV is used to differentiate the construct from the other construct (Haier et al., 2014). It is also used to measure the correlation between possibly overlapping construct. According to the Fornell.-Larcker criterion, loading of items should be greater from their own construct in model. The value of AVE square root should be greater than other construct (Fornell & Larcker, 1981; Hair et al., 2014; Tan et al., 2017).

Table 6. Discriminate validity

Latent variable	**ATT**	**SN**	**PBC**	**EC**	**EK**	**PI**
Attitude	**0.921**					
Subjective Norm	0.499	**0.794**				
PBC	0.356	0.438	**0.894**			
Environmental Concern	0.596	0.700	0.555	**0.868**		
Environmental knowledge	0.362	0.597	0.499	0.423	**0.723**	
Purchase Intention	0.556	0.298	0.630	0.700	0.566	**0.863**

Note: The bold values are Square root of AVE and remaining entries are Square correlation with the use of Fornell-Larcker criteria (Fornell & Larcker, 1981).

Finally, the results in Table 6 shows that square root of AVE values are greater than the square correlation of construct. It can be said that all the construct different from each other.

4.3 Regression Analysis and Moderation

To find out the relationship between dependent variable and independent variables, regression analysis is done and results are given below. In regression analysis, partial least regression is used to test the hypothesis.

4.3.1 Hypothesis Analysis

To test the hypothesis, a bootstrapping function is used. Minimum of 5000 bootstrap samples is selected and one-tailed t-test critical value (1.645) at five percent level of significance and 2.33 (one percent significant level) is applied (Hair et al., 2014; Tan et al., 2017). The results of PLS regression is here. The bootstrapping sample identify the coefficients values and t-values suggests that hypothesis are statistical significant.

Table 7. PLS regression results

Unstandardized Coefficients			Standardized Coefficients	t-value	Sig.
B		Std. Error	Beta		
(Constant)	.222	.196		1.134	.257
ATT	.157	.047	.161	3.340	.001**
SN	.099	.045	.093	2.185	.029**
PBC	.226	.047	.210	4.808	.000**
EC	.238	.051	.225	4.659	.000**
EK	.222	.047	.211	4.698	.000**

Note: **p <0.05

Results shows in table 7 that the values of the standardized coefficient is significant at five percent level. Using bootstrapping function for testing the hypothesis, nearly 5000 bootstrap sample is selected minimum. The value of attitude is 0.161 (p-value, 0.001) indicate that people attitude towards energy efficient appliances is positive and want more products that needs less energy. It means that attitude has significant impact on buying energy efficient home products. Coefficient of subjective norm is also positive and significant (0.093, p-value, 0.029). This indicate that there is positive relationship between purchase intention and the subjective norm. This indicates that social pressure on households to buy efficient electric products more because his closest friends and family members suggest to buy. Third variable is the perceived behavioral control and that is significant impact on the purchase intention of energy efficient home appliances. Coefficient values of environmental concern and perceived behavioral control are high compare with the other three variables.

4.3.2 Correlation Analysis

Correlation is used to test the relationship between the variable. For this study Pearson correlation is used. The given table described the results of the correlation.

Table 8. Correlation Analysis

Correlations						
		ATT	SN	PBC	EC	EK	PI
ATT	Pearson Correlation	1					
SN	Pearson Correlation	.484**	1				
PBC	Pearson Correlation	.437**	.405**	1			
EC	Pearson Correlation	.602**	.441**	.460**	1		
EK	Pearson Correlation	.508**	.367**	.425**	.492**	1	
PI	Pearson Correlation	.546**	.428**	.500**	.552**	.525**	1
**. Correlation is significant at the 0.01 level (2-tailed).							

The results presents in 8 table describe the Pearson correlation among all variables. The stronger the association of the two variables, the closer the Pearson correlation coefficient, r, is to either +1 or -1 depending on whether the relationship is positive or negative, respectively (Swinscow & Campbell, 1997) and (Hinkle, Wiersma, & Jurs, 2003). Correlation results with double asterisk shows highly significant relationship between two variables and values without asterisk show insignificant relationship. The analysis shows that attitude is positively associated with subjective norm and perceived behavioral. Similarly, environmental variables that are EK and EC are also significant and associated with purchase intention of energy efficient appliances.

4.3.3 Moderation Results

Moderation term is used in this model that is done in SPSS 25. PBC is taken as a moderator between EK and PI. The results of the moderation is given in table 9.

Table 9. Moderation Results

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t- value	Sig
		B	Std. Error	Beta		
1	(Constant)	1.307	.200		6.549	.000
	EK	.141	.068	.133	2.069	.039
	PBC	.307	.047	.286	6.525	.000
	Pbc*Ek[b]	.054	.011	.330	4.975	.000
Dependent Variable: PI Pbc* Ek: Interaction Term						

This moderation analysis is done in statistical software SPSS. The level of significance is five percent. All the variable is significant at five percent level of significance. The result shows in table 9 that interaction term (Pbc*Ek) is significant because p values is 0.000. It shows that 33 percent change in dependent variable is explained by the moderator. Results also indicate that households purchase intention is decisively moderated by the interaction term (perceived behavioral control and environmental knowledge). While environmental knowledge and perceived behavioral control is also significant impact on purchasing energy efficient appliances. But perceived behavioral control is more important factor while purchasing energy products instead of environmental knowledge.

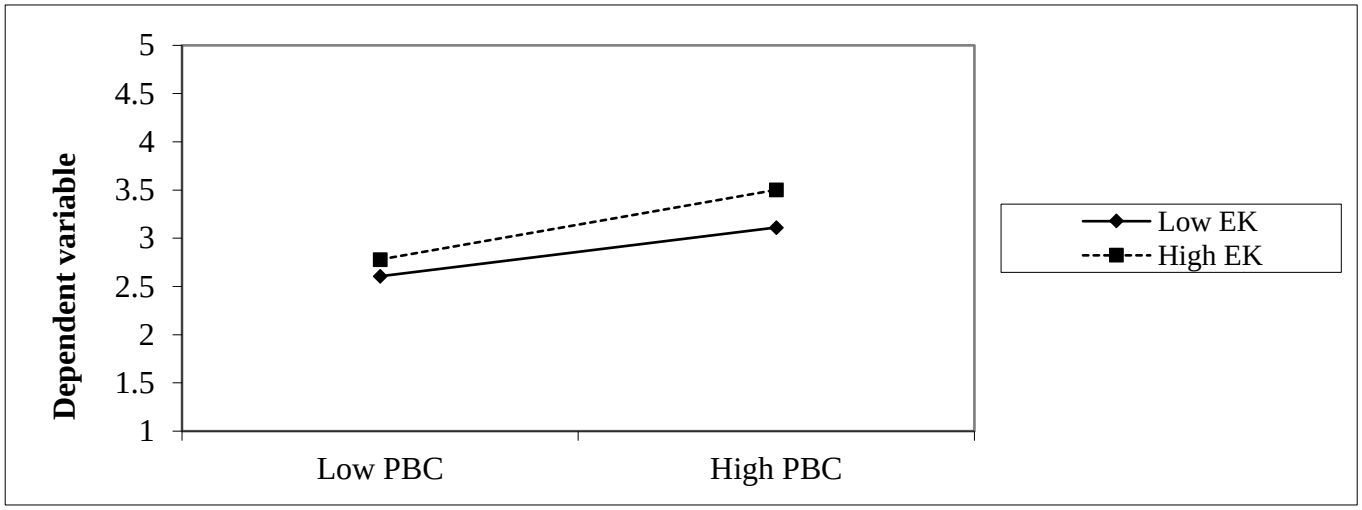

Figure 2. Moderation effect

5. Discussion and Conclusion

5.1 Discussion

Attitude of the consumers about the use of efficient energy home appliances is positive and significant to the household purchase intention. Therefore, these results purposes that positive attitude of the consumers about using efficient energy products in their homes buy more products that consume less energy. Finding of this study is also related with the former studies by (Greaves et al., 2013 and Ha & Janda,. 2012). The study of the presented of the TPB authors Fishbein and Ajzen (1975) found that positive attitude existence of purchase intention of efficient home energy appliances is admitted. Their results showed that attitude of the consumers is very high correlated with intention to buy more efficient energy home appliances and suggest that attitude is rational predictor of the household real behavior. The result also indicates that consumers that have past experience to buy efficient home appliances is positive impact on their behavior. Now this specify that the consumers of the selected three district of the southern Punjab mostly representing satisfactory attitude about efficient energy home products. This attitude still more positive if government should subsidies on the energy efficient products than people buy more efficient products (Galarraga et al., 2016).

If the products that needs more energy are going to be expensive and government impose taxes on inefficient appliances than may be people will shift towards buying more efficient appliances. Subjective norm found significant and positive related with the purchase intention and the impact of subjective norm on the dependent variable is about 0.093 which means that nine percent variance is explained by subjective norm in purchase intention. The finding of Ha & Janda (2012) is also similar with that concluded that subjective norm is positive and significant related with the consumer purchase intention of energy efficient home appliances in Korea. It can be said that both countries culture are different that's why these significant level is changes from country to country. It's the consumers' responsibility to perform a certain behavior about buying energy efficient products. A study of Lopez (2014) showed that it may be possible that subjective norms may affect indirectly to the household behavior about buying efficient appliances.

Widely used in the social research, PBC are very important factor in theory of planned behavior. Perceived behavioral control results also indicate that it is significant and positive impact on PI. A study conducted in China found that PBC and purchase intention of the energy efficient home appliances are positive and significant correlated (Wang et al., 2017).

In this study environmental concern is also significant and positive impact on intention to buy more efficient energy product. The value of the coefficient of environmental concern is 0.225, it shows that one percent increase in the environmental concern will bring twenty five percent increase in the consumers purchase intention to buy more efficient home appliances. These finding are reliable with finding of (Albaryak et al., 2013; Tan et al., 2017; Urban & Scansy, 2012). But these finding are not linked with the study about visiting green hoteling in Malaysia that environment concern is not a substantial interpreter of the purchase intention (Ramayah, 2010). But in this case, in the selected region of my study consumers are more concern to save the environment because summer season increases and temperature are too high almost fifty degree centigrade. That's why people are more and well aware about conserving environment.

Next variable is environmental knowledge that is positive impact on the purchase of energy efficient products and also significant. The value of the environmental knowledge is 0.211 that shows

that if one percent change in the EK will bring change in dependent variable about twenty one percent change. The study of Tan et al. (2017) found the insignificant impact on PI but positive results shows that people of the Malaysia are less knowledge able as compare with the Pakistani consumers. May be the reason is that data is collected from the well knowledge household's in southern region of the Punjab, Pakistan. Same results found (Chan et al., 2014).

Another study by Carfora et al. (2017) concluded that moderating role of environmental knowledge and PBC has a positive impact on buying efficient electric appliances. Their research results showed a significant relationship with the household knowledge about the environmental issues, behaviors towards saving energy and the use of energy related appliances.

Due to the several energy crisis in the past ten years in Pakistan, energy demand increased the use of more efficient appliances for homes. Increase in the tariff in electricity bills raises the household monthly bills. Many strikes are happen against government fail to provide the electricity. If consumers buy more efficient energy products (e.g. DC inverter AC and Refrigerator, LED lights) instead of inefficient appliances that consume more energy is helpful to reducing the monthly expenses of the households. Most important factor that influence the household purchase intention is social pressure (friends, family member) and his own ability to purchase products. Household purchase decisions is also affected by the others persons buying decision.

Using the theory of planned behavior variable in my research helpful to find out the household buying decision of energy appliances. Most of the people are buying products as their relatives and friends ask to buy. Because social pressure and products knowledge are more helpful while making purchasing. More positive attitude towards buying efficient energy appliances for home is more effect on the household decision. Struggle and mediations is helpful to increase the perceived behavioral control and make a sense of independent effectiveness to improve the attitude of the consumers like the finding of Chan et al. (2016).

Our main energy system knowledge to the consumers still not impact on the customers purchase intention to buy efficient products, if government and the policy makers spend more in the advertisement to save the electricity. According to the latest survey (Govt of Pakistan, 2017), many consumers are not buying the efficient home appliances because of the high price relative to the old appliances. If marketers and government subsidies low energy consumption products or make a choice for the consumers to change their home inefficient appliances with the new appliances then the people behavior will change automatically. More knowledge about the products also helpful to the consumers to buy efficient products. More knowledge about the environment activities like increase in co2 emission in the air, global warming, reduction in the forest and waste generation that cause to pollute the environment.

Every country have now more concern about the energy efficiency and the environment. More people are well aware about these problems of upcoming decades faced by the southern Punjab not only but also whole area of the Pakistan. Because of the summer seasons extended every year due to environment change and electricity shortfall raises as day past. For the government side such as WAPDA that provide electricity to the whole country should advertise the labeling schemes about the energy efficient products for home. Electronic media and print media helpful for the household behavior and its intention while taking decision to buy the efficient products like Malaysia and Singapore (Tan et al., 2017). Many companies in the markets provide efficient products like Sony, Samsung, Hair and Panasonic's Dc inverter AC's, Refrigerator, LED Lights and TV, Washing machines

and air-collar that takes less energy. Now-a-days government of Pakistan printed the labeling schemes on electric bills. But the problems is that most of the educated person not read the bills, they did not know that these labeling products are helpful to reduce the expenses on their monthly electric bills (Govt of Pakistan, 2017). Most of the consumers does not know about the peak and off-peak time periods in the electricity. In the peak time period charges of electricity raises if household reduce its appliances consumption in that time, it will save electricity and also cost of that uses.

Household should consume more in the off-peak hours. It is very good advantage for the residential sector in the southern Punjab, Pakistan. It is often seeming that people who have more concern in the consumption of the electricity in the peak hours, have more intention to buy efficient energy appliance for their homes. Many past studies beliefs that if the consumers have ability and enough knowledge to observe his consumption of the electricity on monthly basis, they will able to buy more efficient products by replacing their old inefficient appliances (Tan et al., 2017).

6. Conclusion

In this study, by developing a model to analyze the consumers purchase intention for efficient energy home appliances in the southern Punjab, Pakistan. This study mostly focus on the theory of behavioral economics, theory of planned behavior. Main focus of the study is to find out the household purchase intention and the moderation role of the environmental concern with the perceived behavioral control and the intention to purchase efficient products that needs less power. This is primary study and data is collected from the adopted questionnaire form the past literature. Questionnaire have twenty nine items of the five independent variable (attitude, perceived behavioral control, subjective or social norms, environmental concern and environmental knowledge) and dependent variable is purchase intention of the energy efficient products. Questionnaire is filled from the government college's faculty. Partial least square regression is used to test research six hypotheses. Also moderation regression is run to check the moderating role of environmental knowledge and perceived behavioral control in relationship with purchase intention. The results described that all the variables are significant impact on the consumption of the electric efficient home appliances. The results of the moderator variable are also significant and positive link with the dependent variable purchase intention of energy efficient products.

7. Policy Implications

Finding of this study provides policy implication for the consumers to raise the uses of energy efficient home products awareness and also support the energy efficiency in Pakistan. First of all, most of the energy is used in the household sector. Companies of energy products making should work with the government to promote the efficient products. Most of the brands like Samsung, Haier, Panasonic and Sony will work with the energy department to promote his products that needs less energy. Most of the household is educated in this study and their behavior towards energy saving is positive. Improving energy can save environment, more knowledge about environmental sciences will bring changes in the consumer's attitude about buying energy efficient products.

The current study is done in the three district of the southern Punjab, Pakistan, and it can be further extended in other region of the Pakistan to explore the household behaviors towards saving or using efficient energy home appliances. Secondly, due to time constraints, only Government College's faculty is selected as a respondents for my research, further this research can be done in others regions of Pakistan respondents like illiterate households, comparison of low and high level income households.

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