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An Empirical Study of Customers Eagerness to Buy Energy Efficient Products in Delhi/NCR

Ankur Lohiya, Dr. Vivek Aggarwal, Dr. Rashi Srivastav, Shakshi Tyagi, S.k verma

[1] Research Scholar, Galgotias University, Greater Noida
Ankurlohiya97@gmail.com
[2] Associate Professor, Galgotias University, Greater Noida
Vivek.aggarwal@galgotiasuniveristy.edu.in
[3] Assistant Professor, Greater Noida Institute of Technology, Greater Noida
Rashi1994srivastav@gmail.com
[4] Research scholar, Noida international university
Shakshityagi000@gmail.com
[5] Dean,Noida international university
dir.sbm@niu.edu.in

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Abstract

This study explores the factors influencing **customer eagerness to purchase energy-efficient appliances,** a key component in the transition toward sustainable consumption. As environmental concerns grow and energy costs rise, consumers are becoming increasingly interested in appliances that reduce energy usage and lower long-term costs. The research highlights the roles of **perceived behavioural control, price sensitivity**, and **environmental knowledge** in shaping purchasing decisions by using SEM analysis. While consumers are drawn to the environmental and economic benefits of energy-efficient products, high upfront costs and limited awareness of long-term savings pose significant barriers. The findings suggests that environmental knowledge, perceived behavioural control, price sensitivity can enhance customer willingness by providing information on energy savings, offering financial incentives, and making energy-efficient appliances more affordable. This shift is critical for driving sustainable market growth and promoting eco-friendly behaviours in households and industries.

INTRODUCTION

In recent years, the market for energy-efficient tools and products has grown exponentially, reflecting a global shift toward sustainability and responsible consumption. With climate change at the forefront of public consciousness and environmental regulations becoming more stringent, consumers are increasingly eager to adopt energy-efficient solutions. This trend is driven by a combination of factors, including rising energy costs, heightened awareness of environmental impacts, and the availability of advanced technology that makes energy efficiency more accessible and affordable.

CUSTOMERS' EAGERNESS TO BUY ENERGY-EFFICIENT TOOLS

The growing demand for energy-efficient tools is a clear reflection of the increasing global focus on sustainability and eco-conscious living. Customers today are more eager than ever to reserve in products that not only help them save on energy costs but also contribute to a greener future. This enthusiasm is driven by several key factors, including rising energy prices, heightened environmental awareness, advancements in technology, and supportive government policies.

- Rising Energy Costs

One of the primary reasons customers are keen to buy energy-efficient tools is the desire to reduce energy costs. An energy costs rises continuously; customers are seeking energy-efficient tools provide a practical solution. For

both individuals and businesses, adopting energy-efficient products—such as power tools, appliances, and machinery—helps significantly cut down on energy consumption, leading to long-term cost savings. This is especially appealing in industries where energy consumption is a major operational expense, such as manufacturing and construction.

- Environmental Awareness

The growing understanding of climate change, environmental degradation, and the need for sustainable practices has fueled a shift toward more responsible consumption. Energy-efficient tools align with consumers' values by reducing carbon footprints and conserving resources. As more people seek to minimize their environmental impact, they are naturally gravitating toward products that use less energy and promote sustainability.

- Advancements in Technology

Technological innovation is another key factor contributing to customers' eagerness for energy-efficient tools. Over the past decade, significant advancements have been made in making these tools more powerful, reliable, and affordable. For instance, improvements in battery technology have made cordless power tools more efficient, with longer battery life and reduced charging times. Smart home devices, such as thermostats and lighting systems, allow consumers to optimize energy usage with greater control and convenience. These innovations make energy-efficient tools more attractive and easier to integrate into daily life, further increasing their appeal.

- Government Incentives and Regulations

Many governments around the world are encouraging the adoption of energy-efficient products through incentives such as tax credits, rebates, and grants. These initiatives are designed to promote energy conservation and reduce greenhouse gas emissions. In addition, regulations are pushing for higher energy efficiency standards across various industries, driving the demand for products that meet these criteria. As a result, customers are increasingly choosing energy-efficient tools to take advantage of financial incentives and stay compliant with evolving regulations.

- Practical Benefits for Consumers

Beyond cost savings and environmental concerns, energy-efficient tools offer several practical benefits that make them attractive to consumers. Many energy-efficient products are designed with longevity in mind, meaning they often have longer lifespans than traditional tools, resulting in fewer replacements and repairs. Additionally, these tools tend to operate more quietly, run cooler, and provide better performance, contributing to a more pleasant user experience. Consumers also appreciate the ease of use and enhanced control that often come with energy-efficient technologies, such as programmable thermostats or automated systems that can be controlled via smartphones.

OBJECTIVES OF THE RESEARCH STUDY

RO1: To determine the effect of Environmental knowledge on Customer attitude towards energy efficient appliances.

RO2: To determine the effect of Perceived Behavioral Control on Customer attitude towards energy efficient appliances.

RO3: To determine the effect of Customer attitude towards energy efficient appliance on Willingness to Pay.

RO4: To analyze the effect of Customer attitude towards energy efficient appliance associated with Price Sensitivity.

RO5: To examine the relationship between price sensitivity and willingness to pay.

HYPOTHESIS OF THE RESEARCH STUDY

H1- Environmental Knowledge significantly affects Customer attitude towards energy efficient appliance.

H2- Perceived Behavioral Control significantly affects Customer attitude towards energy efficient appliance.

H3- There is a significant relationship between customer attitude towards energy efficient appliances on willingness to pay.

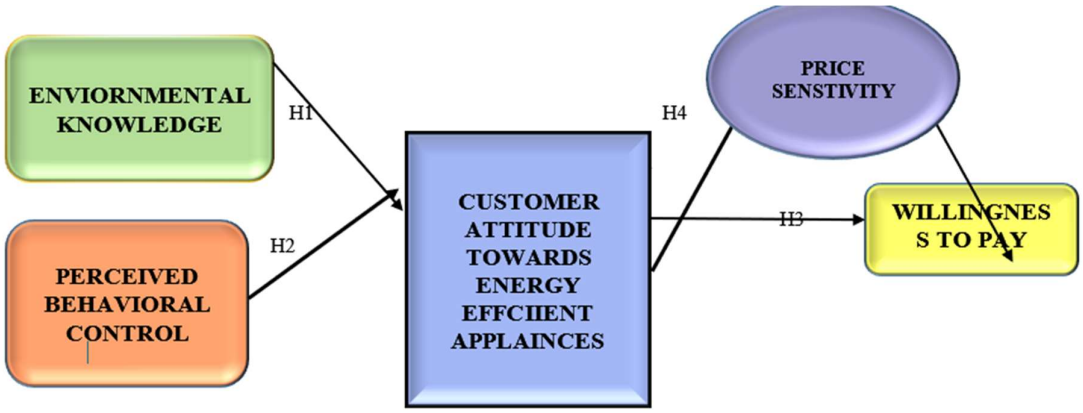
H4- Customer attitude towards energy efficient appliance is Significantly associated with Price Sensitivity.

H5- Price Sensitivity is Significantly associated with Willingness to Pay.

CONCEPTUAL FRAMEWORK

A Conceptual framework is a visual representation that helps to illustrate the expected relationship between cause

and effect.



EFA: EXPLORATRY FACTOR ANALYSIS

It is a statistical method used to uncover the underlying structure of a relatively large set of variables. EFA is a technique within factor analysis whose overarching goal is to identify the underlying relationships between measured variables. "As a prerequisite, the KMO and Bartlett's test of sphericity was run to check data suitability for EFA. The outcomes of the study illustrates that the Kaiser-Meyer-Olkin (KMO) value is in the acceptable range of 0.5 and 1.0 (Heir et al. 2009; faiser 1984) which supports the application of the principal component analysis for data reduction. Also, a statistically significant value of Bartlett's test of sphericity (p< 3 Good;.95 great ; >.090 traditional 0.992 CFI Great >.95 great ; >.090 traditional 0.995 NFI Great >.95 great ; >.090 traditional 0.984 AGFI Key Terms: EK-Environmental Knowledge; CA- Customer Attitude; WTP- Willingness to purchase; PBC- Perceived Behavioral Control, PS-Price Sensitivity Great >.95 great ; >.090 traditional 0.978 RMSEA Great.

KMO and Bartlett's Test		
Cronbach 's Alpha		0.897
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.913
Bartlett's Test of Sphericity	**Approx. Chi-Square**	13560.114
	df	702
	Sig.	0.000

CONSTRUCT LOADINGS

	Customer Attitude Towards Energy Efficient Appliances	**Willingness To Purchase Energy Efficient Appliances**	**Environmental knowledge of Customer**	**Perceived Behavioral Control**	**Price Sensitivity**
CA1	0.806				
CA2	0.843				
CA3	0.842				

WP1		0.716			
WP2		0.871			
WP3		0.875			
EK1			0.880		
EK2			0.875		
EK3			0.801		
PBC1				0.869	
PBC2				0.901	
PBC3				0.854	
PS1					0.846
PS2					0.923
PS3					0.871

CONFIRMATORY FACTOR ANALYSIS

It is a theory driven confirmatory statistical technique (Schreiber, Stage and King, 2006). It used to verify the factor structure of a set of observed variables and test the hypotheses to test the relationship between observed variables and their underlying latent constructs (Suhr, 2006). Theoretical knowledge or empirical research or both are applied together to postulate prior relationship patterns in a research model and then tests the hypotheses statistically. The independent variables are unobserved constructs, also known as factors, dimensions or latent variables. The measurement model of the study depends upon the conceptual framework as shown in the figure above. From the conceptual framework it is clear that environmental knowledge, customer attitude, perceived behavioural control and willingness to pay are independent variables.

MODEL FIT STATISTICS FOR MEASUREMENT MODEL

Fit statistic	Acceptable limits	Obtained	Remark
CMIN/df	< 3 Good;<5 acceptable	2.106	Acceptable
GFI	>.95 great ; >.090 traditional	0.992	Great
CFI	>.95 great ; >.090 traditional	0.995	Great
NFI	>.95 great ; >.090 traditional	0.984	Great
AGFI	>.95 great ; >.090 traditional	0.978	Great
RMSEA	<.05 Good; .05-.10 moderate	0.024	Good

From the above table, it can be noticed that obtained values of different indices for overall model fit of measurement model are satisfactory. Various parameters like Chi-square, GFI, CFI, NFI, AGFI and RMSEA were used for fit indices. According to the results of goodness of fit confirms that the changed estimations seems satisfactory fit with the information, which shows no advance adjustment are needed within the model. Hence, the uni-dimensionality of the model is confirmed (Hair et al., 2013). To estimate the degree of effectiveness with which manifest variables represent the latent constructs and how all constructs relate with each other, a measurement model for different parameters used in the study has been conceptualized and tested for its fit.

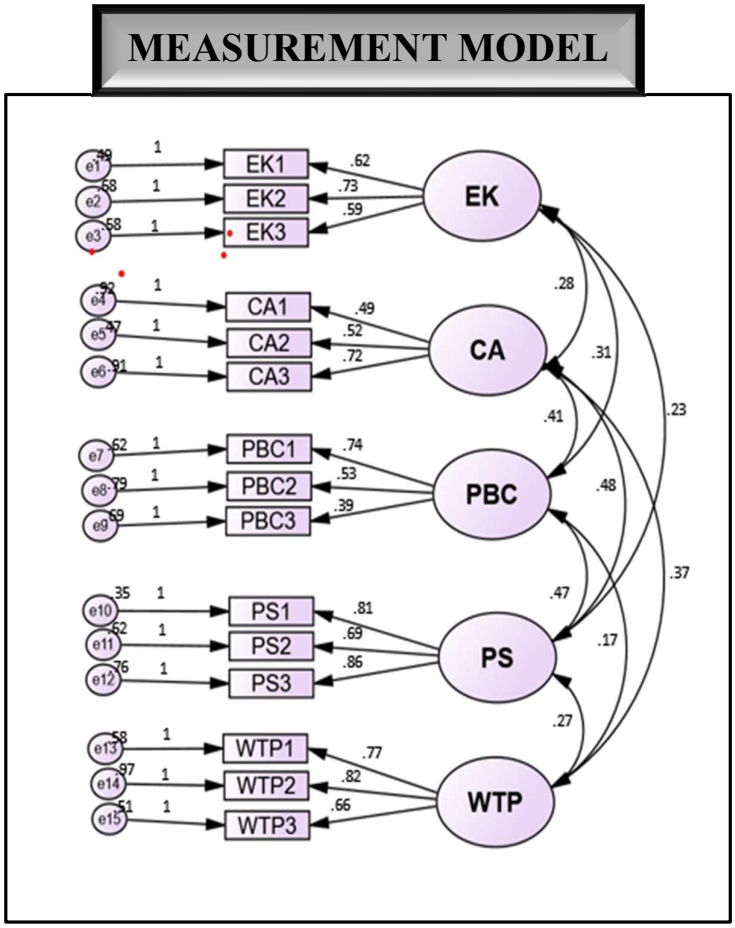


TABLE: CONSTRUCT VALIDITY & RELIABLITY

	Cronbach Alpha	CR	AVE	MSV
EK	0.892	.751	.527	.156
CA	0.912	.950	.831	.125
PS	0.879	.886	.673	.146
WTP	0.895	.741	.548	.134
PBC	0.896	.755	.524	.134

Thus, the validity and reliability of the measurement model were established. After accessing the validity and reliability, structural model and hypothesis testing were accessed.

STRUCTURE EQUATION MODELLING

To measure the fit of the structural model, the set of indices used earlier for model fitness in CFA was

also used for SEM. Table shows acceptable limits as well as obtained values for the structural model. Result of the analysis are shown in table, the fit index values and the corresponding cut-off values indicate the evidence of a good model fit. Structural Equation Structural Equation Modeling (SEM) is a powerful statistical technique used for testing and estimating complex relationships between variables. It combines multiple regression analysis, factor analysis, and path analysis into one comprehensive framework, allowing researchers to model both observed (measured) and unobserved (latent) variables, as well as their interrelationships. SEM is particularly useful in social sciences, psychology, marketing, and other fields where theoretical constructs are of interest but difficult to measure directly. SEM determines whether any relationship exists between the variables and along with CFA,it enables to accept or reject a hypothesis framed in accordance with the proposed research model (Sharif, 2013).

MODEL FIT STATISTICS FOR STRUCTURAL MODEL

Fit statistic	Acceptable limits	Obtained	Remark
CMIN/df	< 3 Good;<5 acceptable	2.106	Acceptable
GFI	>.95 great; >.090 traditional	0.992	Great
CFI	>.95 great; >.090 traditional	0.995	Great
NFI	>.95 great; >.090 traditional	0.984	Great
AGFI	>.95 great; >.090 traditional	0.978	Great
RMSEA	<.05 Good; .05-.10 moderate	0.024	Good

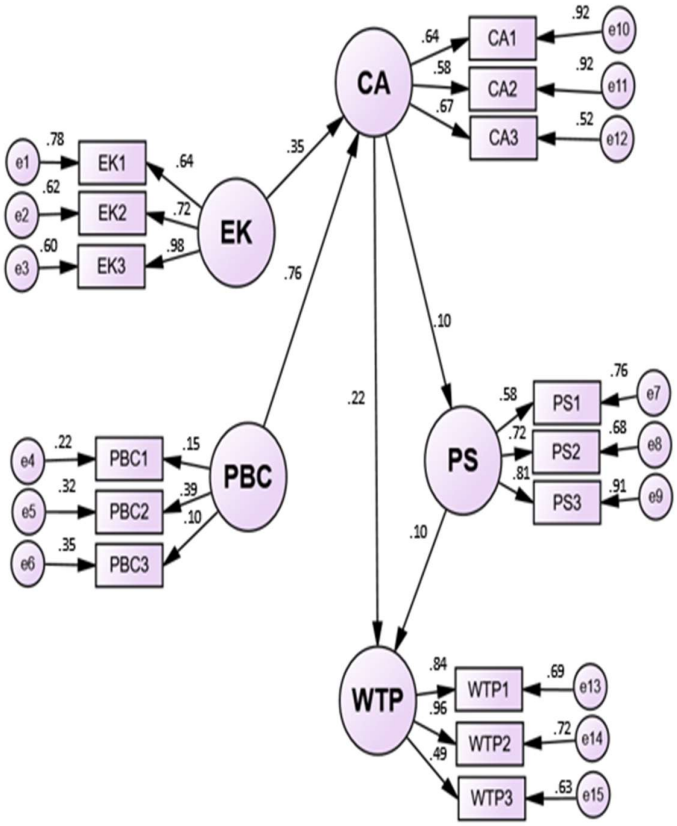
Table: Path Coefficients and Hypothesis Testing Results

HYPOTHESIS	PROPOSED PATH			Estimate	S.E.	C.R.	P
H1	Environmental knowledge	---▶	Customer attitude	0.149	0.023	9.001	0.000
H2	Perceived behavioural control	---▶	Customer attitude	0.228	0.013	5.992	0.000
H3	Customer attitude	---▶	Willingness to pay	0.050	0.030	7.065	0.000
H4	Customer attitude	---▶	Price Sensitivity	0.183	0.015	11.207	0.000
H5	Price Sensitivity	---▶	Willingness to pay	0.254	0.017	6.342	0.000

***p < 0.05; **p < 0.01; ***p < 0.001; S.E = Standard error; C.R = Critical ratio**

Table: STANDARDIZED REGRESSION WEIGHT			
			Estimate
Environmental knowledge	------→	Customer attitude	0.253
Perceived behavioural control	------→	Customer attitude	0.256
Customer attitude	------→	Willingness to pay	0.105
Customer attitude	------→	Price Sensitivity	0.201
Price Sensitivity	------→	Willingness to pay	0.189

Fig: STRUCTURAL MODEL



DISCUSSIONS OF (SEM) STRUCTURAL EQUATION MODELLING

For the present study structural equation modelling fitted the best among other models because all variables significantly and positively influenced other variables. The structural relation between environmental knowledge and customer attitude turns out to be positive and significant.

More specifically, within the energy efficient appliances the environmental knowledge of customer witnessed positive and significant relation with the context of energy efficient products. So, we can say that, the environmental knowledge and the customer attitude level are positively associated with public service sector.

The structural relation between customer attitude and willingness to purchase turns out to be positive and significant. Customer attitude and willingness to pay are positively associated with energy efficient appliances.

There is a structural relation between customer attitude and price sensitivity. The environmental knowledge has a positive impact on the perceived behavioural control in context to energy efficient appliances.

The structural equation model proved that there is positive influence between price sensitivity and willingness to pay.

The satisfaction level of perceived behavioural control showed structural relation with customer attitude towards energy efficient appliances. The level of perceived behavioural control showed positive association with customer attitude.

CONCLUSION

In conclusion, the **willingness of customers to purchase energy-efficient appliances** continues to grow as consumers become increasingly aware of the environmental and economic benefits these products offer. Factors such as **rising energy costs, environmental consciousness**, and **advancements in energy-efficient technology** are driving the shift toward more sustainable household and industrial choices. Moreover, **government incentives** and strict regulations further encourage customers to prioritize energy efficiency when making purchasing decisions. Businesses that respond to this demand by offering reliable, high-performing, and cost-effective **energy-efficient appliances** stand to gain a competitive edge in this evolving market. As customer enthusiasm for energy-efficient solutions increases, the market for such products will continue to expand, helping to foster a more sustainable and energy-conscious future. The decision to purchase energy-efficient appliances is significantly influenced by **perceived behavioral control, price sensitivity,** and **environmental knowledge**. Consumers who feel empowered through greater access to information, financial resources, and clear guidance tend to have higher perceived behavioral control, making them more likely to buy energy-efficient products. However, **price sensitivity** remains a barrier for many, especially given the higher upfront costs associated with these appliances, despite their long-term savings potential. Lastly, **environmental knowledge** plays a crucial role in shaping consumer attitudes, as those who are more informed about the environmental and economic benefits of energy efficiency are more willing to make sustainable choices. To boost adoption of energy-efficient appliances, businesses and policymakers must address these factors by educating consumers, offering financial incentives, and improving affordability, ultimately encouraging a shift toward more sustainable purchasing behaviors.

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