

A STUDY OF MARKET DYNAMICS AND ENERGY SUSTAINABILITY EFFORTS ANALYSIS FOR ELECTRICAL HOME APPLIANCES

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Keywords- Market dynamics, energy efficient electrical home appliances, socioeconomic factors, sustainability factors, marketing mix, purchase decision.

Abstract: Three major changes are being seen to be taking place in the electrical home appliances market, as can be witnessed in the present day all across the world. The first is the rise in domestic energy use, the second is technological advancements in electrical home appliances, the third is initiatives for enhancement in energy sustainability. The key element in this situation is electrical home appliances.

When the electrical home appliances market is considered, it was fascinating to observe how the market dynamics for electrical home appliances, sustainability initiatives, and marketing mix influenced consumers' decisions to buy energy-efficient electrical home appliances. It was also vital to determine whether socioeconomic factors like income and education have an association with the choice to buy electrical home appliances. Hence it has been determined through data analysis that each of these elements affects the decision to buy home appliances. Thus, the study has helped to provide a framework of the factors influencing buying decision for energy efficient electrical home appliances. Outcome of this study is helpful for deriving marketing mix strategies and market segmentation strategies for electrical home appliances.

Introduction

A wide range of electrical home appliances are available in the home appliances market, including washing machines, refrigerators, televisions, air conditioners, water heaters, fans, and lights. Customers use these products to help them with their regular tasks. Both in terms of physical space and the number of family members, households are getting smaller. An increasing number of working class population, more buying power, steady economic growth, new product development, increased electrification, and technological developments, contribute to a rise in the usage of electrical home appliances.

In 2022, the market for household appliances is generating US\$ 0.59 trillion in revenue. The market is forecast to grow by 5.77% yearly (CAGR 2022-2027). In 2021, global retail sales were 448 billion. Hence on a global scale, the demand for home appliances has grown significantly.

In order to ensure that energy-efficient electrical household appliances are available to all segments and lead to their significant increase, marketers play a crucial role. To find solutions to increased energy efficiency and consequently electric energy sustainability, it becomes crucial to evaluate socioeconomic factors, market dynamics and marketing mix considerations. The impact of socio-

economic and demographic factors including age, income, education, occupation, gender, marital status on the purchase of energy-efficient electrical home appliances is an interesting area of research. When dealing with a unique product like energy-efficient electrical home appliances, determining the dimensions and features of a product's quality assessment is essential. Compared to most other products, it is thought to have a wider diversity of brands, prices, and market dynamics pressures. It's interesting to observe how customers receive energy-efficient electrical home appliance despite their numerous benefits. Delivering value to the consumer in the form of electrical home appliances that are energy-efficient and helping to ensure the long-term sustainability of electrical energy are essential in this context. In order to build a connection between consumer perception, buying decision, and product characteristics, it is vital to understand consumer buying preferences. For the formulation of marketing strategies for energy-efficient appliances and related marketing campaigns, this will be essential.

Literature review

International Energy Agency (IEA 2021). Despite decreases in 2019 and 2020, the Coal 2021 study from the International Energy Agency projects a 9% growth to an all-time high of 10,350 terawatt-hours in 2021. The improvement is fuelled by the swift economic rebound this year. The demand for low-carbon power has increased as a result.

The need for coal might reach new heights as early as 2022, depending on the weather and economic growth. Its two-year duration emphasises the necessity of swift policy response. The primary source of carbon emissions worldwide is coal. High coal power output is an issue if net zero emissions is to be attained this year.

D. Arun Prakash Amrita et al (2021). The intents of young consumers to buy energy-efficient appliances is worth looking into. Despite the high cost of the appliances, young consumers who have previously bought energy-efficient appliances will keep doing so. Appliances that save energy are more likely to be bought by young consumers. They're conscious of environmental concerns. Marketers and decision-makers should thus stress environmental issues while promoting electrical home appliances that use less energy.

Vedran Lesica et al (2018). Consumer views of energy usage and savings should be taken into account by policymakers and marketers. This promotes in the creation of practical energy-saving techniques. It will be easier to create effective use and energy efficiency measures if consumers' misunderstandings about energy consumption and savings are known.

The measurement of energy usage will be improved through the use of smart technologies and related services.

Dalila Antunes et al (2012). It is claimed that the majority of household tasks need energy. This is a concern for both the world's resources and the nations who greatly need them. They can produce what they need or import it from other nations to suit their needs. Utilizing energy-efficient appliances determines energy efficiency. Consumption over a specific point could lead to greater energy costs and increased energy use. From a psychological perspective, this relates to

two different types of behaviours. Conscious single-choice behaviour is the first type behaviour, while habitual behaviour is the second type. Research have demonstrated that it is possible to create the knowledge and resources needed to increase energy efficiency. When a consumer interacts with a dealership, this is possible. This influences a specific decision-making behaviour, the buying of energy-efficient appliances.

Marie Cervellon et al (2011). Marketers communicate the features of their products to potential customers through a variety of communication methods. Direct marketing, internet media, and conventional media may all be used for this. When a buyer makes a purchase, he is unable to understand the meaning of all words and labels that are intended to define and indicate the guarantee of the appliances. This shows that more work is needed to communicate the qualities of the suitable appliances. Customers therefore rely on prior knowledge of the appearance and feel, opinions from a variety of sources, recommendations from family and friends, and the main advantages promoted by marketers. Therefore, customers eventually take into account both their need and their willingness to pay for the appliance.

Rannjeet Nair (2021). To promote energy efficiency, proper pricing that is acceptable to consumers is essential. Any energy efficiency programme should start by adjusting energy costs in order to convey the right signals to consumers and provide them incentives to adopt new technologies or buy energy-efficient appliances. By increasing energy prices for domestic consumers who use more energy, there should be an increased cost of energy at higher consumption levels in an effort to promote reduced energy usage.

Boris Juric(2014). Influencing consumer behaviour and increasing awareness of social responsibility in terms of environmental conservation and preservation, as well as electrical energy consumption, is crucial.

The most important set of factors inducing respondents to buy energy-efficient household appliances, with an average score of 4, is the ongoing price increases for energy and other sources. 58.46 percent of respondents would buy an energy-efficient home appliance despite the high price, while 16.92 percent are inspired to buy energy-efficient home appliances by a reduced price. The second criterion, which has an average score of 4.00, is the reduction in property taxes brought on by the adoption of energy saving measures. A product's energy efficiency label helps potential customers to make better informed decisions.

Sarita C et al (2018). Home appliances that save up to 50% more energy than their most energy-efficient versions now on the market might do so in approximately a year thanks to a government initiative offering incentives to manufacturers. A campaign to promote appliances that are 30–50% more efficient than those with a five-star rating is about to be introduced by the Bureau of Energy Efficiency (BEE), a power ministry department.

Adarsh Raj (2017). Manufacturers would gain a lot from the programmes that are beneficial to their business, such the Smart City Project. Families will be able to purchase advanced kitchen appliances if there are more dual and multiple-income households. The availability of inexpensive kitchen appliances from new players is another aspect influencing demand. Up to 2022, this will continue to expand rapidly.

Raaijet et al. (2001). Marketing communication has to be reinforced, according to a research titled "New advances in marketing communications and customer behaviour." This enhances consumer perceptions of product value and boost brand loyalty. As a consequence, by sending a targeted and focused marketing message, marketers try to influence consumer behaviour. This ensures future purchase loyalty and develops a brand's or appliance's unique value.

Christopher Koroneos (2007). Energy profiles of some Balkan countries, differ significantly. Because of variations in their economic structures, this is the case. Electric energy sustainability can be achieved through increased efficiencies. This will avoid the constraints of energy reliance, insecurity, inequality, bill costs, and environmental and health damage.

Statement of the research problem

Knowing the market and taking required steps in all important marketing aspects would have been made possible with the help of current market dynamics, but this information is not available for the current period. Understanding the current appliance marketing environment can thus aid in developing efficient marketing strategies. Finding out if socio-economic factors such as income and education levels influence consumers' purchase decision to buy energy-efficient electrical home appliances would be really useful.

Objectives

- 1.To study market dynamics, marketing mix and sustainability factors in relation to purchase decision for energy efficient electrical home appliances.
- 2.To comprehend imperative socioeconomic factors associated with energy efficient electrical home appliances purchase.

Research Methodology

Respondent profile

Table I

Respondent Profile			
Age	Percent	Education	Percent
20 to 30	45.6	Upto HSC	1.8
31 to 40	33.9	Graduate	41.4
41 to 50	12.5	Post Graduate	53.6
51 to 60	8.1	Professional	3.1
Total	100.0	Total	100.0
Gender	Percent	Profession	Percent
Male	65.4	Student	8.9
Female	34.6	Salaried	58.1
Total	100.0	Business	31.3
		Home maker	1.8
Income per annum	Percent	Total	100.0
1-5	45.1	Marital status	Percent
5.01-10	28.4	Married	70.1
10.01-15	16.1	Single	29.9
15.01-20	9.4	Total	100.0
Above 20	1.0		
Total	100.0		
Zone	Percent		
Central	23.4		
North	19.5		
South	16.9		
West	19.8		
East	20.3		
Total	100.0		

Table I Indicates respondent profile and composition.

Sampling universe is considered to be 3,124,458; population of the city according to Pune (India) census. Sample size is determined using DeMorgan table of 384 respondents.

Stratified random sampling is used and responses are taken from 5 city zones; east, west, south, north and central. The reason of choosing the stratified random sampling being obtaining more relevant sample, to avoid biasness, to remove variation and overlap of the stratum and balance demographic and socio-economic structure of the population.

Principle component – Rotated component matrix with 9 iterations is carried out to choose suitable factors for the variables market dynamics, sustainability factors and marketing mix.

Reliability of the instrument

Table II

Case Processing Summary			
		N	%
Cases	Valid	384	100.0
	Excluded ^a	0	0.0
	Total	384	100.0

a. Listwise deletion based on all variables in the procedure.

Table III

Reliability Statistics	
Cronbach's Alpha	N of Items
0.837	5

As seen in the Table III, the Cronbach's Alfa value of 0.837 indicates the instrument's reliability. Validity of the instrument is determined as, correlation between the variables under the consideration is confirmed to be significant at 0.01 and 0.05 (2-tailed test).

Normality of the instrument is confirmed as skewness and kurtosis values are found to be within -1 to +1 and -3 to +3 respectively.

Ordinal regression and chi-square test are to check the model fit.

Percentages for various variables are calculated by finding out percentage of the responses; 'Agree' and 'Strongly agree' out of all 5 type of responses; Strongly agree, Agree, can't say, disagree and strongly disagree.

A Study of energy efficient electrical home appliances market scenario and steps to achieve energy efficiency through identifying marketing scenario is considered.

Data analysis

Figure I

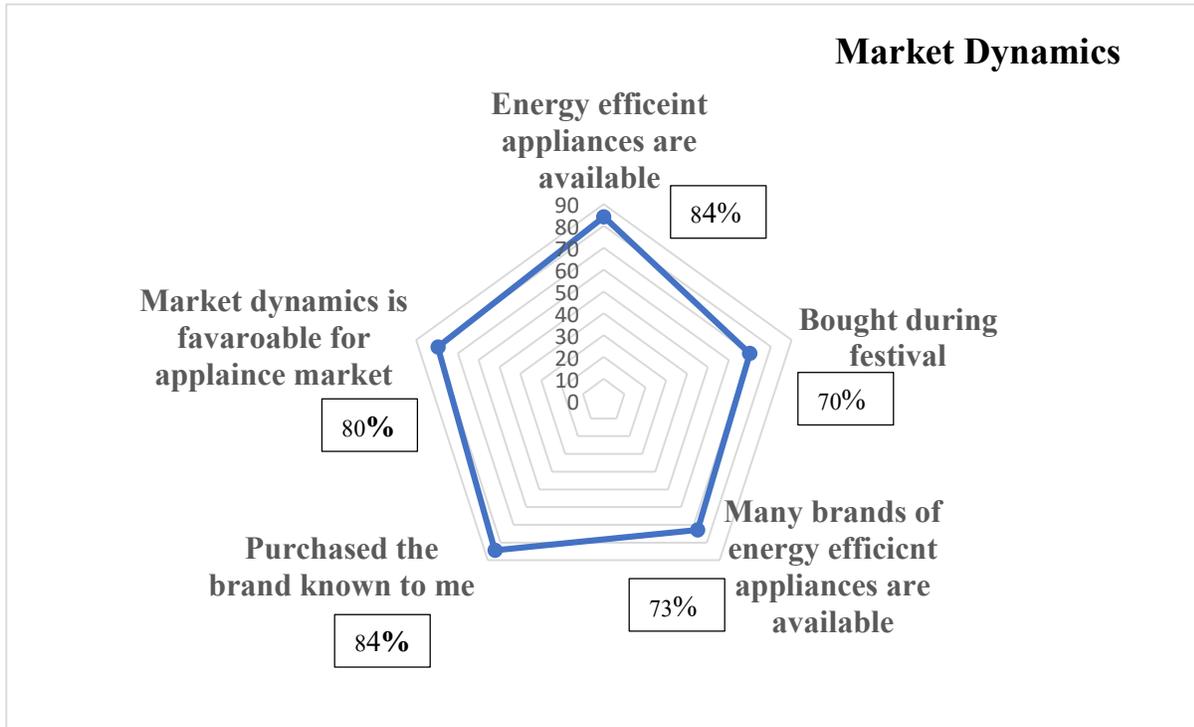


Figure I: Comparatively lesser number of energy efficient appliances brands are available in the market.

Figure II

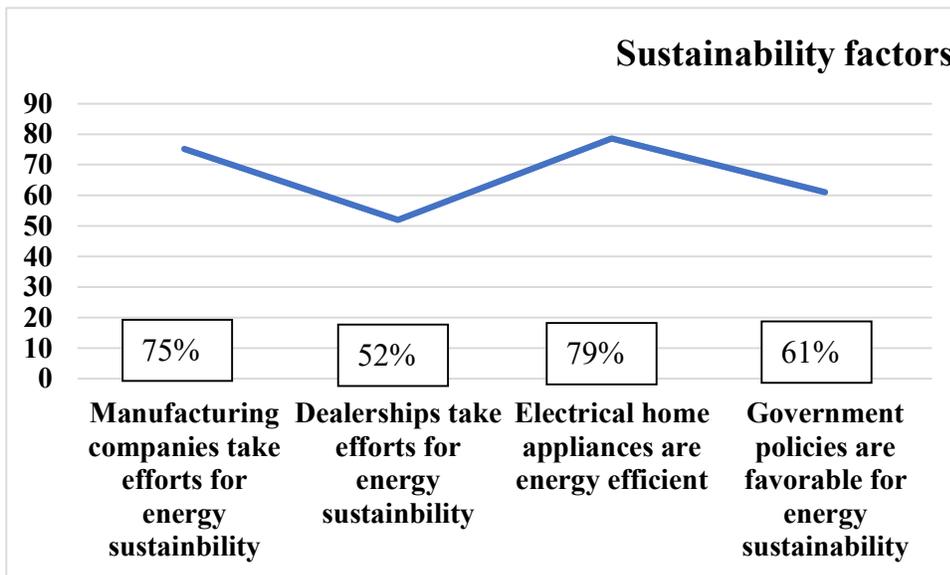


Figure II: Less visibility of the initiatives taken by the Government and dealerships for energy sustainability.

Figure III

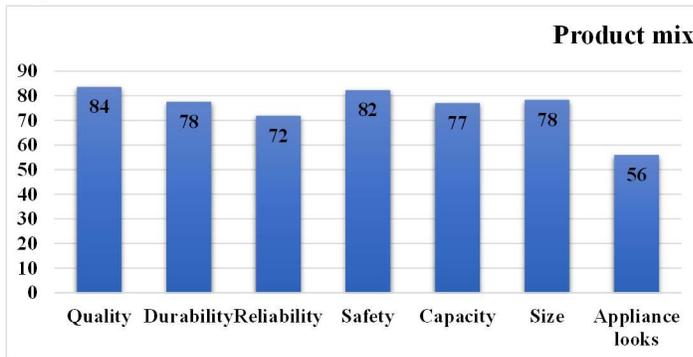


Figure III: Quality, durability, reliability, safety, capacity and size are given more importance while buying home appliance.

Figure IV

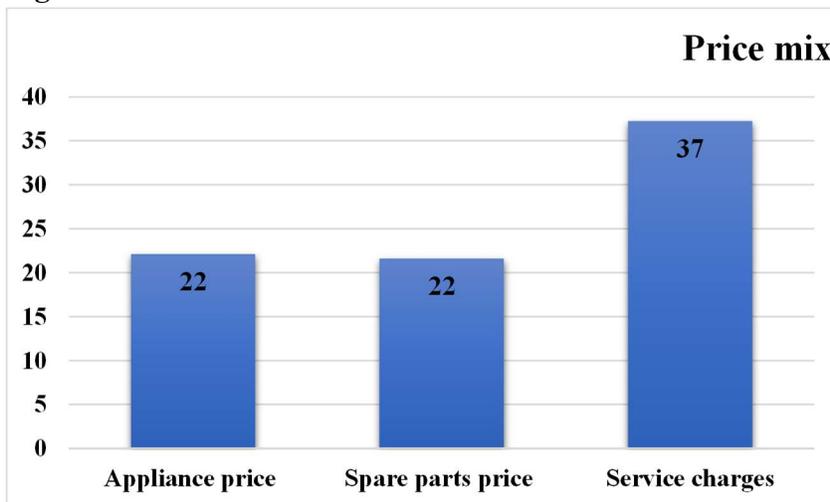


Figure IV: Price, spare parts of energy efficient electrical home appliances are high as only 22% of the respondents have responses 'Agree' and 'Strongly agree' for the assertion , 'price is reasonable.'

Figure V

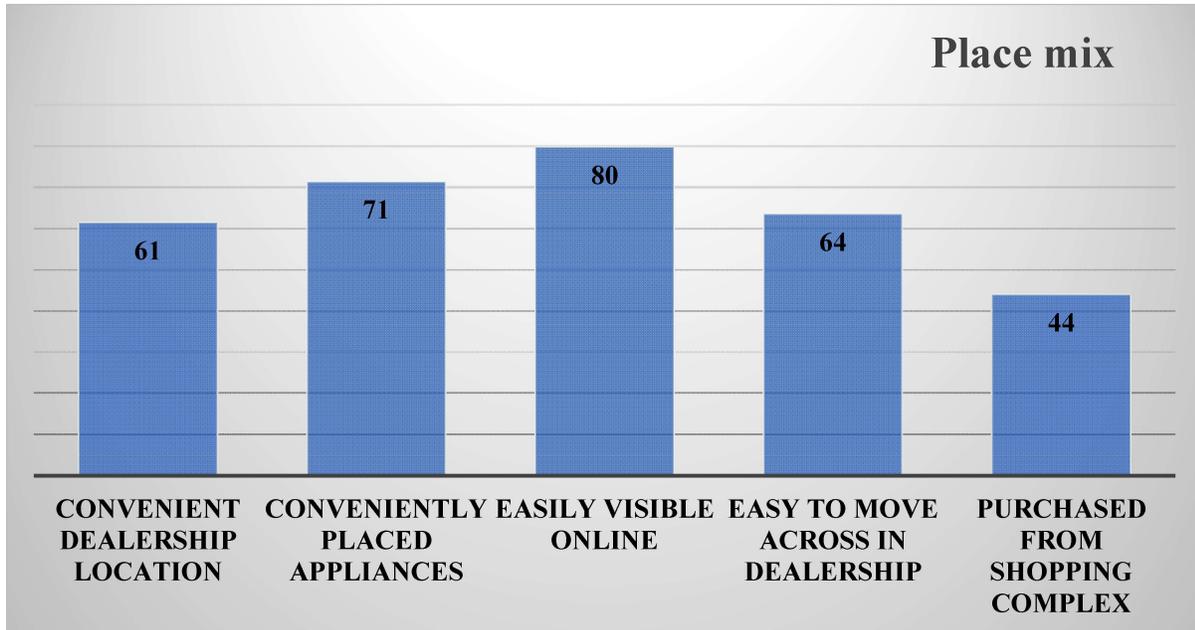


Figure V : a. Convenient dealership location and easy to move across in dealership are issues in place mix. b. A trend of buying from shopping complex has emerged.

Figure VI

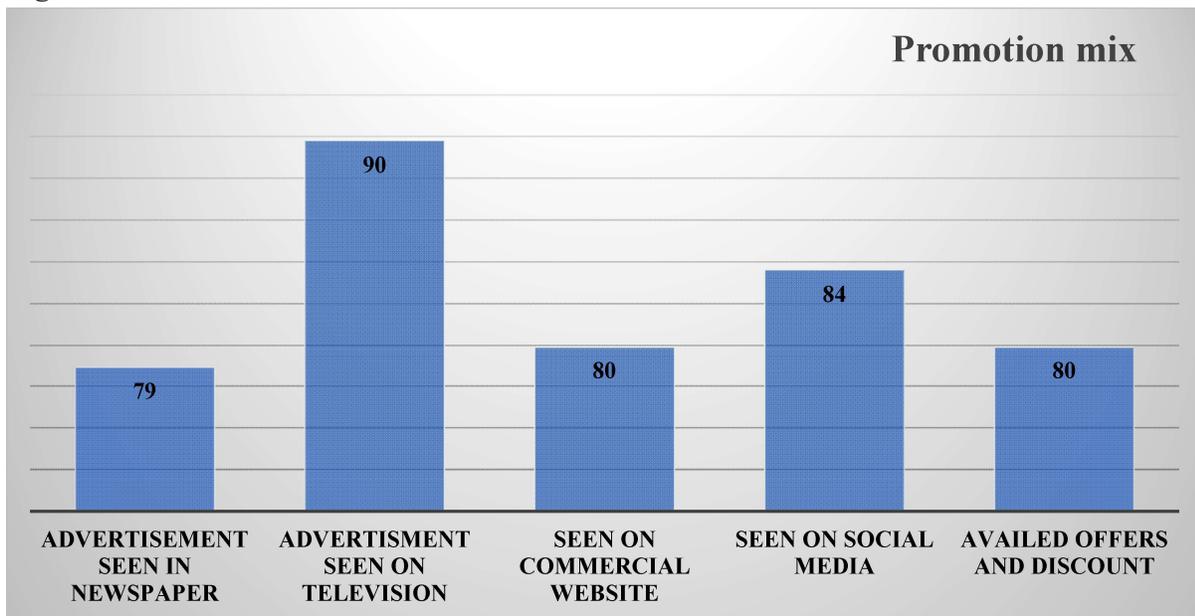


Figure VI: Apart from traditional promotional channels Social media and Commercial website have also gained importance.

Figure VII

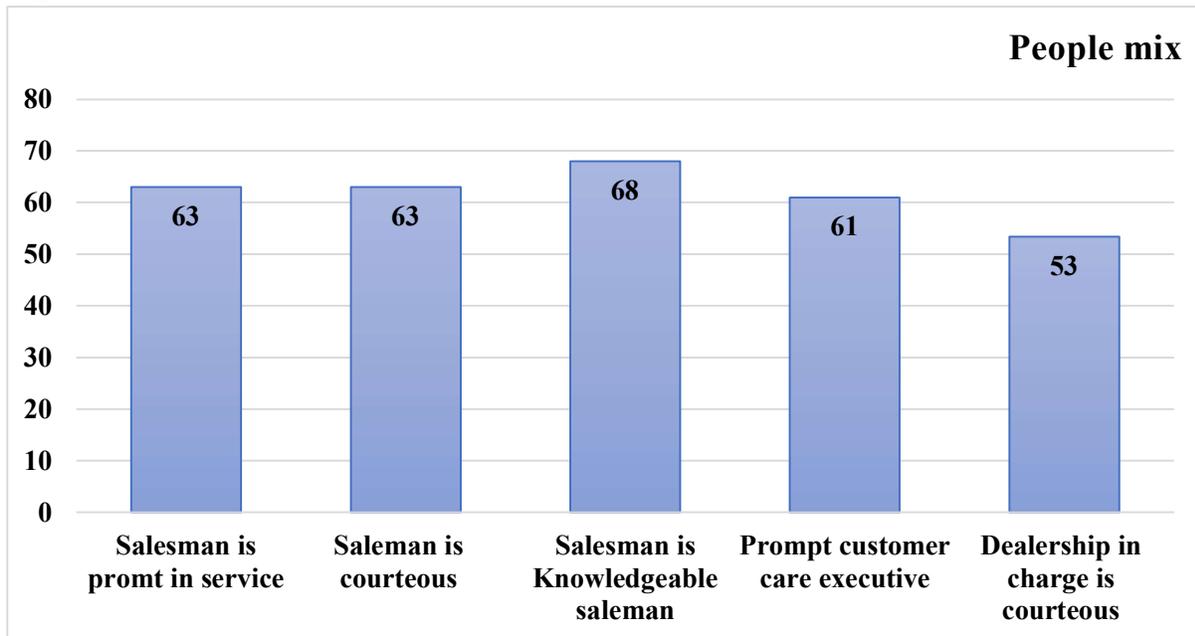


Figure VII: All people mix elements have comparatively less percentages, that are less than 70% for the options, 'Strongly agree' and 'Agree'.

Figure VIII

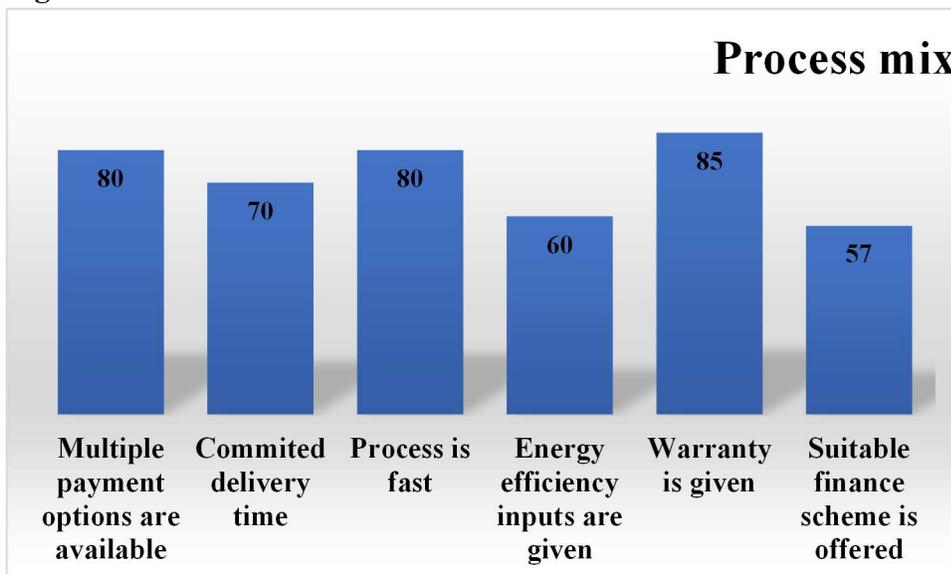


Figure VIII: Variables; energy efficiency inputs are given (60%) and suitable finance scheme is offered (57%) have low percentages for the options, 'Strongly agree' and 'Agree'.

Figure IX

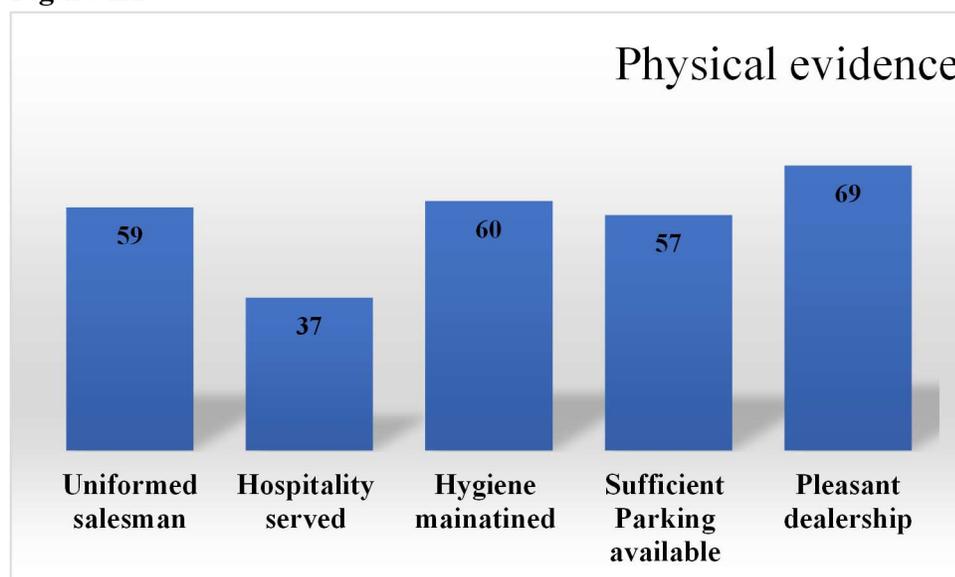


Figure IX: Hospitality is found out to be the weakest element followed by the next weak element as sufficient parking area.

Table IV

	Case Processing Summary				Total N	Percent
	Valid N			Cases		
Purchased EEA * Income	384	100.0%	0	0.0%	384	100.0%
Purchased EEA * Education	384	100.0%	0	0.0%	384	100.0%

Table V

Purchased EEA * Income Crosstabulation

			Income					Total
			1-5	5.01-10	10.01-15	15.01-20	Above 20	
Purchased EEA	No	Count	21	10	15	11	3	60
		% within Purchased EEA	35.0%	16.7%	25.0%	18.3%	5.0%	100.0%
		% within Income	12.1%	9.2%	24.2%	30.6%	75.0%	15.6%
	Yes	Count	152	99	47	25	1	324
		% within Purchased EEA	46.9%	30.6%	14.5%	7.7%	0.3%	100.0%
		% within Income	87.9%	90.8%	75.8%	69.4%	25.0%	84.4%

Total	Count	173	109	62	36	4	384
	% within Purchased EEA	45.1%	28.4%	16.1%	9.4%	1.0%	100.0%
	% within Income	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table V: The income group 5.01-10 lakhs per annum (90.8 %) is the largest, followed by the income group 1-5 lakhs per annum (87.9 %), amongst all in buying energy efficient electrical home appliances. Other consumers having income groups 10.01-15, 15.01-20 and above 20 have comparatively lower percentage of buying energy efficient electrical home appliances, that is (75.8%), (69.4%) and (25%) respectively.

Table VI
Purchased EEA * Education Crosstabulation

		Education					Total
		Up to HSC	Graduate	Post Graduate	Professiona l		
Purchased EEA	No	Count	2	22	31	5	60
		% within Purchased EEA	3.3%	36.7%	51.7%	8.3%	100.0%
		% within Education	28.6%	13.8%	15.0%	41.7%	15.6%
Purchased EEA	Yes	Count	5	137	175	7	324
		% within Purchased EEA	1.5%	42.3%	54.0%	2.2%	100.0%
		% within Education	71.4%	86.2%	85.0%	58.3%	84.4%
Total		Count	7	159	206	12	384
		% within Purchased EEA	1.8%	41.4%	53.6%	3.1%	100.0%
		% within Education	100.0%	100.0%	100.0%	100.0%	100.0%

Table VI: The consumers who are graduate are the largest group (86.2%) amongst all education levels in buying energy efficient electrical home appliances followed by the post graduates (85 %). Other consumer groups; Professionals and Higher secondary school certified (HSC) group have comparatively lower percentage of buying energy efficient electrical home appliances, that is 58.3 % and 71.4% respectively.

Hypotheses Testing

Ha1: Marketing mix, market dynamics and sustainability factors influence the purchase decision of energy efficient electrical home appliances.

Table VII

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	327.305			
Final	184.915	142.391	54	0

Link function: Logit.

Table VII: The significance level is obtained to be 0. Hence the alternative hypothesis; ‘Marketing mix, Market dynamics and Sustainability factors influence the purchase decision of electrical home appliances.’ is accepted.

Predictors are considered as the elements of Marketing mix, Market dynamics and Sustainability factors and the dependent variable is considered as, ‘Purchased Energy efficient appliance.’

Table VIII

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	316.929	283	0.081
Deviance	179.369	283	1

Link function: Logit.

Table VIII: As significance level is obtained to be more than 0.05, that is 0.081, the test confirms for Goodness of fit for the model.

Table IX

Pseudo R-Square

Cox and Snell	0.31
Nagelkerke	0.534
McFadden	0.428

Link function: Logit.

Table IX: The Nagelkerke value of 0.534 suggests that independent variables have 53.4% prediction for the dependent variable, ‘purchased energy efficient electrical home appliance.’

Ha2: There is an association of income and education with the purchase of electrical home appliances.

Table X

Socio-economic and Demographic	Chi-Square Tests		
	Value	df	Asymptotic Significance (2-sided)
Age	3.988 ^a	3	0.263
Gender	.904 ^a	1	0.342
Income	25.272 ^a	4	0.000
Education	5.501 ^a	3	0.038
Profession	1.347 ^a	3	0.718
Marital status	.365 ^a	1	0.546
Zone	6.682 ^a	4	0.154

Table X: The significance levels for Income and Education are 0.00 and 0.038. Hence the alternative hypothesis; ‘There is an association of income and education with the purchase of electrical home appliances.’ is accepted.

Figure X

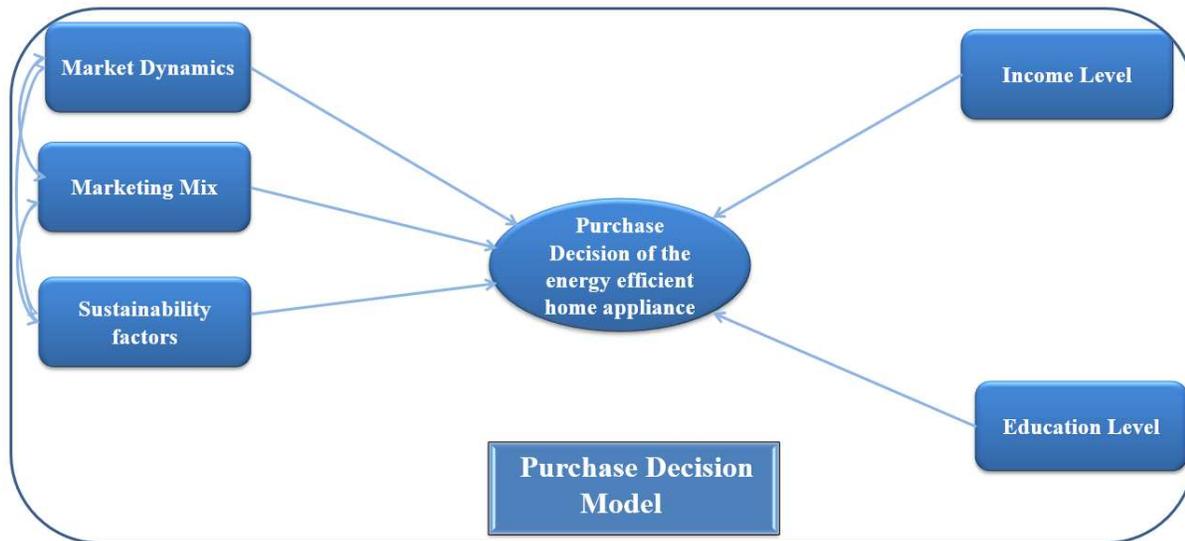


Figure X: Hence it is seen that marketing mix, market dynamics and sustainability factors influence the purchase of energy efficient home appliance and there is an association of Income and Education level with the purchase of energy efficient appliance.

Findings

Energy efficient home appliances brands available in the market and bought during festivals have percentage of response for ‘Strongly agree’ and ‘Agree are’ (73%) and (70%) respectively as compared to Energy efficient appliances are available in the market (84%), purchased brand known to me (84%) and market dynamics is favorable (80%).

More the sustainability efforts by manufacturing companies and marketers more is the favorable influence on the home appliances market.

Dealership take efforts for energy sustainability and Government policies are favorable for sustainability are comparatively observed to have low percentage of 52% and 61% respectively.

On the contrary Manufacturing companies take efforts for sustainability, Appliances are energy efficient have 75% and 79% respectively.

There are only 22% responses for the Price of energy efficient home appliances is satisfactory, Price of the spare parts are satisfactory; (22%) and Service charges are satisfactory ; (37 %). This percentages are comparatively quite low.

In place mix , the elements, Convenient dealership location (61%) and Convenient to move in dealership (64%) have comparatively low percentage than Appliances are easily visible online (80%) and Conveniently placed appliances (81%).

A trend of buying home appliances from shopping complex (44%) has emerged.

Television is found to be the most popular media (90 %) for receiving information about the home appliances.

In people mix elements all the elements have scores less than 70% as it is noticed to be comparatively more in other marketing mix elements. All these elements can be improved based on the priority. Salesman is prompt (63%), Salesman is courteous (63%), Salesman is knowledgeable (68%), Prompt customer care executive (61%), Dealership in-charge is courteous (53%).

In process mix elements Energy efficiency inputs are given (60%) and availability of suitable finance scheme (57 %) have low percentage as compared to other process mix elements; Multiple payment options (80%), Fast process (80 %), Committed delivery time (70%) and Warranty (85%).

All the elements of Physical evidence have low percentage; less than 60 % except Pleasant dealership (69%).These are Uniformed salesman (59%), Hospitality served (37%), Hygiene maintained(60%), Sufficient Parking available (57%).

Appliance purchase is seen prominently different in different income levels and different educational levels.

Recommendations

Marketers need to continuously monitor the developments occurring in the appliance industry.

During festive times, a well-trained sales staff should be in action.

Both offline and internet sales should be prioritized.

Appliance placement needs to be carefully thought out on a frequent basis.

The market for electrical home appliances is more influenced favorably by marketing mix techniques.

Consumers must be made aware of the fact that buying an energy efficient appliance can help them save money on energy costs and energy usage in the long term.

For dealership location, a scientific study such a site suitability analysis should be done.

A dealership warehouse must be located nearby. This makes it easier to make available various brands and appliances.

Dealership locations in retail centers and malls should be considered.

Social media and commercial websites should also be utilized to their maximum potential in addition to traditional promotional channels.

For the promotion of energy-efficient appliances, the sales team should be given rewarding incentives.

The sales process should be required to include information about energy efficiency and cost savings.

Customer referral bonuses needs to be offered.

Focusing on young consumers is beneficial.

Insufficient parking limits the scope of the possibilities for customers to visit dealerships. There can be options as stack parking, multistorey, or valet parking.

Enhancing and making a better hospitality is the need of the service protocol.

A strict policy should be applied for Uniformed salesman, and dealerships and companies should support it appropriately.

As the entity that executes the majority of the schemes for sustainability and energy efficiency, the government's efforts must be made more visible.

Government policies, such as those that encourage importers of home appliances and component parts, can offer more assistance. This will go a long way toward addressing the appliance price issue.

Soft skill training in context to customer sensitization should be used to improve people mix elements such as Prompt salesman (63%), Courteous salesman (63%), Knowledgeable salesman (68%), Prompt customer care executive (61%) and Courteous dealership head (53%). Markets should be precisely segmented based on income and education levels.

Conclusion

Promoting energy-efficient appliances is crucial and some strategies for it include using popular media and encouraging literacy about energy efficiency when interacting with customers.

Precise market segmentation based upon socio-economic factors attracts more business.

The sales process and the finance schemes should be such that , customers should enjoy it .

Sales of electrical appliances that save energy will rise, increasing the energy sustainability.

Price mix, marketing mix, place mix, and physical evidence can all be improved based on the priorities of the organization.

Initial single-choice behavior in appliance purchase is essential before rational appliance usage after purchase.

The relationship between consumers and appliance providers is being fundamentally transformed by the emergence of new and more engaged customers.

If appliance manufacturers adopted this new energy revolution with an energy efficiency plan, they would do better than those who keep things the same.

Usefulness and uniqueness of the research

A significant portrayal of contemporary market dynamics is provided by the investigation.

On the elements of the marketing mix, comprehensive and distinctive insights are revealed. To develop workable plans for sustainable electric energy, there are crucial inputs. The study lays a foundation for and adds to growing consumer awareness of energy efficiency. The efforts made by the manufacturers and dealers are seen from the perspective of the consumer.

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