Original Article
ISSN (Online): 2582-7472

ShodhKosh: Journal of Visual and Performing Arts
July-December 2023 4(2), 1834–1850

THE FUTURE OF GREEN HOUSEHOLD APPLIANCES: CONSUMER PREFERENCES, MARKETING TOOLS AND CHALLENGES WITH SUSTAINABILITY GOALS

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DOI
10.29121/shodhkosh.v4.i2.2023.3030

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

The future of green household appliances is poised at the intersection of consumer preferences, innovative marketing strategies, and the growing urgency to meet sustainability goals. As environmental awareness rises globally, consumers are increasingly favouring energy-efficient, eco-friendly appliances. However, the shift in consumer behaviour is driven not just by ecological concerns but also by cost savings and performance efficiency, pushing manufacturers to innovate beyond traditional offerings. This paper explores behavior pattern of consumers in relation to various appliances. It aims to understand consumers' perception and reasons for purchasing Eco-friendly products. The study further delves to explore the relationship between Green Marketing Tools and Green Purchase Behavior as well as it explores the relationship between consumer's attitude towards Sustainable Development Practices. This paper seeks to provide a comprehensive overview of the future trajectory of green household appliances, highlighting the delicate balance between, marketing tools and strategies, and the challenges involved in achieving global sustainability objectives.

Keywords: Green Household Appliances, Sustainability Goals, Eco-Friendly Products and Marketing Tools

1. INTRODUCTION

The global push for sustainability and environmental consciousness has significantly impacted various industries, particularly the household appliance sector. As energy consumption continues to rise due to increasing populations and modern lifestyles, the demand for more sustainable, energy-efficient, and environmentally friendly household appliances has become a critical focus for manufacturers and consumers alike. Green household appliances, designed to reduce environmental impact by minimizing energy use, water consumption, and waste generation, are gaining popularity. This trend reflects a broader shift toward sustainability in consumer behaviour, influenced by growing awareness of climate change and the need for sustainable living. In recent years, various studies have explored the relationship between consumer preferences, marketing strategies, and the challenges faced by manufacturers in aligning with global sustainability goals. The rise of green household appliances is largely driven by changing consumer preferences. As

awareness of environmental issues such as climate change, pollution, and resource depletion grows, consumers are increasingly opting for eco-friendly products. A study by McKinsey & Company (2020) revealed that 70% of consumers consider sustainability as a key factor in their purchasing decisions, particularly when it comes to household goods. This shift has encouraged manufacturers to develop energy-efficient appliances, such as refrigerators, washing machines, and air conditioners, that reduce energy consumption and have a lower environmental impact.

However, while sustainability is a growing concern, other factors also influence consumer choices. A study by Luchs et al. (2010) suggests that consumers are primarily driven by a combination of factors, including cost savings, product performance, and environmental benefits. For example, energy-efficient appliances not only reduce electricity bills but also provide superior performance in many cases, making them attractive to consumers beyond their eco-friendly attributes. Additionally, the availability of government incentives, such as tax credits and rebates for purchasing energy-efficient appliances, further encourages consumers to make greener choices. A study by Sammer and Wüstenhagen (2006) found that eco-labels significantly influence consumer purchasing behavior, particularly when combined with marketing that highlights both environmental and financial benefits.

In addition to eco-labels, digital marketing and social media have become powerful tools for promoting green household appliances. Brands leverage platforms like Instagram, Facebook, and YouTube to showcase the environmental benefits of their products through visually appealing content and influencer partnerships. A study by Fuchs et al. (2016) found that consumers are more likely to trust and engage with brands that demonstrate genuine commitment to sustainability, making digital storytelling an essential component of modern marketing strategies. However, marketing green household appliances is not without challenges. A study by Grimmer and Woolley (2014) found that consumers often experience "green fatigue" when they perceive sustainability claims as overwhelming or inauthentic. This phenomenon underscores the importance of balancing sustainability messaging with clear, practical benefits, such as cost savings and product durability, to avoid alienating potential buyers.

2. REVIEW OF LITERATURE

A comprehensive review of existing academic research is crucial for gaining a clear perspective on the subject of green household appliances. It helps familiarize the researcher with prior work in the field, offering valuable insights into research methods and key findings. This section of the research paper aims to provide a conceptual understanding of the research problem by presenting empirical studies conducted by other scholars. The review covers factors such as demographics, knowledge, attitudes, consumer readiness, subjective social norms, moral norms, environmental self-identity, warm glow, and perceived barriers to adopting green household appliances. Given the significance of understanding consumer behaviour in this context, this review of literature offers an overview of studies related to purchasing behaviour, with a particular focus on energy-efficient household appliances. It sets the stage for understanding the dynamics that influence consumer choices in adopting green technology for household use.

Qiao, Q., and Lin, B. (2024) examined the factors that impact households' change from habitual to consumption-oriented energy-saving behaviour. It moreover examines the possibilities for green alternatives to traditional energy consumption. Empirical results show an inverted U-shaped link between household income and energy usage, which occurs when individuals are aware of energy savings. Better-income households with better Energy Saving Awareness tend to consume less energy, highlighting the possibility for green solutions.

Lianga, C., Dingb, J., and Lee, E. S. (2024) used green household appliances as an example and explored how green product features influence consumers' perceived value and buying intention. The paper investigates how consumer innovativeness and perceived value act as moderators and mediators. Green products' fundamental (functional and value-for-money) and peripheral (emotional and social) features have a favourable influence on consumer perceived value, leading to increased purchase intention. Perceived value is a positive mediator between green product features and consumer purchase intentions.

Oanh, T. T. T. (2024) the findings revealed that customers were keen to help safeguard the environment, were aware of their environmental responsibilities, and were eager to learn more in relation to sustainable products. Supporting environmental protection, the urge for responsibility for the environment, green product experience, the sustainability of companies, social attractiveness, and green brand image is all regarded as important characteristics that influence customers' decisions to buy green products. Furthermore, the study discovered that the relationship between these parameters and decisions to buy green products is intervened by green brand images.

Widodo, A., Yusiana, R., and Hidayat, A. M. (2024) evaluated the relationship among attitudes, social marketing media, green product knowledge, and green purchase intentions in the relation of bottled mineral water consumption. The findings revealed that client attitudes towards green products were positively connected with increased knowledge about green products, which led to a larger tendency to purchase green items—particularly bottled mineral water. Furthermore, the study found that social media marketing has a significant role in increasing consumer knowledge of green bottled mineral water products, which leads consumers to choose environmentally friendly options when making purchases.

R**ahman, M. H., Akter, M., Uddin, M. K., and Biswas, R. (2023)** examined the impact of responsibility and knowledge on consumer behaviour, specifically while making purchases. The study also examines how environmental concern acts as a mediator. The study found a correlation between knowledge and ecological responsibilities, as well as the intention to make environmentally friendly purchases. Research indicates that understanding the environment increases people's concern for it. Knowledge can influence consumers' environmental consciousness and lead to green purchasing behaviours.

Lin and Dong (2023) used the theories of planned behaviour, perceived value, and environmental awareness by building a comprehensive model. According to the findings, consumers' intentions to purchase energy-efficient household appliances were positively influenced by their attitude towards purchasing the goods. Functional value, pricing value, environmental value, and environmental awareness all had a significant and favourable impact on this mind-set. However, neither emotional nor social value had a substantial impact on consumers' opinions about acquiring this equipment.

Chan et al. (2023) in their paper aimed to understand the impact of environmental factors on energy-efficient appliance purchasing and to evaluate the role of ecological attitudes as a moderator. Environmental factors have a favourable influence on both ecological beliefs and ecological activity, according to the findings; ecological beliefs are favourably associated to ecological behaviour. Furthermore, ecological ideas serve as a bridge between environmental conditions and ecological behaviours.

Zhang, Y., and Song, B. (2023) explored users' preferences and WTP for the attributes of online stores, comments, and products relevant to new national standard (NS) ACs. The results demonstrate that the Heckman model estimates the premium for the new NS energy-efficiency designation at 6.24%, which is 23.71% lower than the HPM directly estimates. New NS AC pricing are also affected by online shop attributes and comment elements.

Ferreira et al. (2023) investigated the effects of environmental awareness on individual intentions and behaviour towards smart home devices, a theoretical model based on the extended unified theory of acceptance and use of technology (UTAUT2) was presented. Environmental awareness had a significant influence on all the target variables studied and connected with the adoption of smart houses.

Zhu and Thøgersen (2023) used induction cookers as a case study in which researchers analysed Chinese customers' aspirations to purchase extremely energy-efficient electrical household appliances. According to the SEM investigation, consumers' inclinations to purchase an energy-efficient induction cooker are mostly determined by their attitudes towards doing so, with perceived control also playing a role. Furthermore, multi-group analysis demonstrated that paying attention to energy labels moderates model correlations. For Chinese consumers who do not pay attention to energy labels in general, the intention to buy an energy-efficient induction cooker is only weakly associated to the TPB's proposed antecedents, and only the attitude to doing so is significant.

Adepoju et al. (2023) revealed that socioeconomic factors such as home size, income, number of appliances, and weather have a noteworthy impact on people's energy conservation behavior, with income having the biggest structural weight. The study also reveals that income influences inhabitants' electricity-saving practises, as higher-income households use more electricity and conserve it less.

Mustafic et al. (2023) intended to determine the influence of specific attributes of white appliance manufacturers on customer purchasing decisions. Conferring to the findings, the following aspects are most significant to customers in Bosnia and Herzegovina when selecting a white appliance brand: quality, service and product guarantee; advertising; payment and sales services; and product added value.

Adu Henaku (2023) evaluated how purchasing decisions were influenced for refrigerating appliances (refrigerator and/or freezer) by using The Ghana Energy efficiency guide label. Consumers use many information sources to make

refrigerating appliance purchase decisions, according to the research. They discovered that consumers' acquaintance and sales help are the most often used sources of information before purchasing an appliance and throughout the purchase process, respectively. The research also demonstrated that the energy efficiency guidance label influenced consumers' decision to buy a refrigerator. The study finds that the energy efficiency guidance label has a good impact on customers' purchase selections for refrigerating equipment, contributing to the country's efforts towards energy security, achieving SDG7 and SDG13, and lowering the environmental impact of greenhouse gas emissions.

Chanda et al. (2023) using an extended TBP, researchers investigated the effect of environmental knowledge and environmental sensitivity on Bangladeshi consumers' green purchase intentions. This study's findings show that subjective norms, attitudes towards green items, and perceived behavioural control all have a positive and substantial association with green purchasing intention. Furthermore, environmental knowledge is related to environmental sensitivity in a good and meaningful way. The findings also show that environmental sensitivity influences the association among environmental knowledge and attitudes concerning green products.

Adepoju et al. (2023) revealed that socioeconomic factors such as home size, income, number of appliances, and weather have a significant impact on people's energy conservation behaviour, with income having the biggest structural weight. This shows that income is important in residents' energy-saving habits, as higher-income households consume more electricity and conserve it less.

Nie et al. (2023) explored the adoption of technical and behavioural energy-saving techniques in Northern China and Western Europe as a key approach to achieving carbon neutrality in the residential sector. The findings discovered that the residential sectors in China and Europe are both aiming towards carbon-neutral goals, albeit in different ways. The direct energy-saving subsidy policy in Northern China encouraged residents to implement technical energy-saving solutions. According to our econometric research, differences in respondents' socio-demographic backgrounds, building features, environmental concerns, or views played a role in the observed differences, although not a significant one.

Kumar and Basu (2023) examined the impact of eco-labels on green product buying intention among consumers of electrical/electronic items in an emerging market scenario. To analyse the effects of eco-labels, this study used an extended TPB. Eco-labels have a considerable impact on perceived behavioural control, attitude, subjective standards, and consumers' willingness to pay higher costs for ecologically friendly green items, according to the findings.

Issock Issock and Muposhi (2023) scrutinized how consumption values influence consumers' purchase intentions of energy-efficient home equipment in South Africa, a developing market. The study also looks into the mediating impact of customers paying attention to energy-efficient labelling on home appliances when making a purchasing decision, as well as the moderating effect of consumer trust in environmental claims. The findings demonstrated that economic, emotional, and social values can only affect customers' aims to purchase energy-efficient appliances if consumers pay attention to the appliance's energy-efficiency label. Furthermore, the findings suggest that consumer faith in energy-efficiency labels amplifies the effect of functional and emotional values on their attention to energy-efficiency labels.

Xin and Long (2023) attempted to fill this gap and contributes by incorporating three additional factors (eco-label knowledge, environmental attitudes, and customer belief) into the TPB, allowing for a more detailed analysis of sustainable consumption in Chinese culture. The study's findings also reveal that consideration of environmental labels is positively and significantly influenced by purchase intent. These findings add to the body of information on sustainable purchasing behaviour and open up new possibilities for researchers and policymakers to change societal norms, raise consumer awareness, and restructure regulatory frameworks through coordinated and integrated initiatives.

Sabitha et al. (2023) carried out research in order to ascertain the level of consumer knowledge of green marketing. Customers were informed about the use of environmentally friendly packaging, manufacturing procedures, and materials. According to the survey, people who spend more money on ecologically friendly products are more aware about green marketing. The emphasis of green marketing is on advertising products and services that are either ecologically benign or have no negative environmental effects.

Ferreira et al. (2023) investigated the effects of environmental awareness on individual intentions and behaviour towards smart home devices, a theoretical model based on the extended unified theory of acceptance and use of technology (UTAUT2) was presented. The findings confirm that environmental awareness increases the importance of facilitating conditions in explaining use behaviour, reinforcing the idea that product developers and marketing managers must emphasise the role of energy-saving features in their smart home products and services to promote consumer use.

Asif et al. (2023) intended to find the determinants of customers' inclinations to buy eco-friendly appliances for their residences. In the context of an emerging economy, this study analyses the association between environmental knowledge (EK), consumer attitude (CAT), green trust (GT), and buying intention (PI). This research looks at survey data from 331 Pakistani consumers who utilise energy-efficient household items. According to empirical results, EK has a favourable and considerable influence on CAT and green trust. CAT has a similar negative and negligible effect on PI. Green trust, on the other hand, is considerably and positively associated to PIs.

Ekawati et al. (2023) proposed to analyse society's awareness of the natural environment, particularly the awareness of living a healthy existence, which leads to an awareness of using a natural-based product (environmentally friendly product). This study focused on the factors that affect green purchasing behaviour, including social influence, green attitude, green value, and green trust. The findings discovered that social influence had no noteworthy effect on green purchasing behaviours. Green attitudes, values, and trust all had a favourable and significant influence on green purchasing behaviours. Green trust was influenced favourably and significantly by social influence, green attitude, and green value. Green trust acted as a mediator between social impact, green attitude, and green value and green buying behaviour.

Kennedy and Adhikari (2023) explored the parameters that influence customers' green purchasing intentions towards green products, with a focus on the Nikaweratiya Divisional Secretary region in Kurunegala District. This study employs four antecedent characteristics as independent variables: green buying attitudes, green perceived values, green perceived trust, and ecological knowledge, with green purchase intention as the dependent variable. The findings show that green buying attitudes, perceived values, perceived trust, and ecological knowledge have a moderately favourable association with green purchase intention. There was also a strong favourable impact on green buying intention towards green products. As per the findings of the study, antecedents have a resilient beneficial influence on Green Purchase Intention towards Green Products, with special reference to Nikaweratiya Divisional Secretary. According to the findings, green perceived trust has the greatest influence on green purchasing intention.

Saini et al. (2023) aimed to examine at the environmental perception of urban people in the Indian state of Rajasthan, with a specific emphasis on their attitudes in relation environmentally friendly goods and practises. According to the study, due of the COVID-19 outbreak in Rajasthan, buyer's attitude and intentions towards green restaurants are becoming more relevant. Furthermore, the buyer is alert of environmental issues and their negative consequences. Furthermore, they were aware of ecological items but had no idea how they could benefit the ecology.

Zhou et al. (2023) explored potential aspects influencing green purchasing behaviour and aids in the disclosure of influential processes from a methodical standpoint. Exogenous driving forces, as opposed to endogenous variables, are more likely to push household appliance manufacturers to pursue green buying strategies. Furthermore, business strategy, government legislation, and customer knowledge have a stronger effect on green purchasing behaviour than corporate culture, manufacturing system, and suppliers.

Hossain et al. (2022) intended to forecast customer purchase intentions for energy-efficient household appliances using an enhanced model of the TPB. Under this study, two extra components, moral norms and environmental concern, were introduced into the TPB model. The findings exposed that customer purchase intentions of energy-efficient appliances (EEAs) are highly influenced by attitude, subjective standards, and perceived behavioural control. According to the classic TPB, the extension of moral norms is a strong interpreter of consumer purchasing intention. However, environmental concerns had no substantial impact on Bangladesh. The findings imply that customers' attitudes towards energy-efficient household products (EEHA) positively connect with consumers' purchase intentions of energy-efficient appliances, because EEAs are typically purchased by customers who are environmentally conscious. The study discovered a significant relationship between perceived norms and purchase intention of energy-efficient equipment.

Sureshkumar et al. (2022) examined the common household items in rural Chengalpattu, such as a television, a mixer grinder, a refrigerator, a washing machine, and an air conditioner. Based on their location, the study examines the purchase behaviours of customers in rural Chengalpattu districts. The study found that a customer's decision to buy a certain good or service is significantly influenced by their habits. The report recommends that companies focus more on developing marketing strategies, promoting their products, and providing high-quality goods and services. The report claims that there are significant differences between the respondents' sources of certain household equipment and their personal criteria, such as degree of education, in one instance.

Vani and M. M. P. (2022) examine Bangalore customers' opinions and preferences about green marketing strategies and goods. The statistical data indicates a strong correlation between customer perception, consumer green

values, product variables, and marketing strategies. The study finds that consumer purchasing behaviour is significantly impacted by consumer awareness of green marketing. Gender, educational attainment, and awareness of green marketing are related. Age group, monthly income, and awareness of green marketing are uncorrelated. The study's conclusions indicate that most Bangalore consumers are aware of green marketing ideas and offerings.

Tran et al. (2022) used a mixed-methods approach, including thematic examination and the SEM-PLS technique, to examined how Vietnamese Gen Z's perceptions of product-service quality, environmental knowledge, and pro-environmental behaviour influence their purchase intention and loyalty towards eco-friendly fashion products. The qualitative findings revealed that young customers' knowledge of and attitudes in relation to eco-friendly fashion practises were insufficient to persuade them to buy eco-friendly fashion products. The findings suggest that for fashion production, perceived behavioural control has a greater impact on purchase intention than customer fulfilment and environmental concerns. The SEM-PLS results, on the other hand, show that Gen Z's knowledge and awareness are minimal when compared to perceived product quality and control practises. When attracting Vietnamese Gen Z, the study indicated that enterprises should prioritise increasing service and product quality over spending green marketing.

Prigita and Alversia, Y. (2022) intended to investigate factors that may impact green product buying intentions among Indonesia's generation Y and generation Z. Generations Y and Z are known for their environmental concerns, and they are potential current and future consumers. The TPB framework was enhanced with additional factors, including environmental concern, environmental knowledge, readiness to pay premium, moral attitude, and health consciousness, for this study. According to the findings, all variables, with the exception of environmental concern, had a positive influence on purchase intention.

Harun et al. (2022) examined consumer purchasing of energy-saving appliances (EEAs). The implementation of EEA would lessen the negative impact of the environment on consumer behaviour. The theory of planned behaviour (TPB), environmental considerations, and consumer energy-efficient behaviour (EEB) are used to analyse consumer purchases of EEA in this study. The findings presented that EEB had a strong influence on EEA purchase intentions and subsequent purchasing activity. Except for attitude, the TPB variables were important predictors of EEB and desire to purchase. Meanwhile, only environmental awareness was important among the environmental components.

Dutta et al. (2022) aimed to investigate factors influencing customers' green purchasing behaviour in the setting of a developing country, India. The study proposed an integrated model based on TPB and Social cognitive theory, combining perceived environmental knowledge, personal norm, recycling participation, perceived value, and willingness to pay as independent factors to predict individuals' green purchase intention. The data revealed that three TPB characteristics, recycling involvement, personal norm, perceived value, and environmental awareness, all had a substantial impact on consumers' green purchasing intention. A favourable mediation effect was also discovered in terms of customers' green purchasing intentions. However, consumers' willingness to pay had a negative impact on their green purchase intention. There is a connection between perceived environmental knowledge and consumers' behaviour intention to buy green products. The perceived behavioural control was seen to be the most important element influencing customers' behavioural intentions, followed by attitudes in relation to green purchases and subjective norm.

Tian et al. (2022) invested elements influencing green purchase intention. Based on an ethical decision-making perspective, this study investigates the effects of perceived quality and perceived price on moral intensity and moral judgement, as well as the effects of moral intensity and moral judgement on green purchase intention. This study delves deeper into the impact of customers' perceived quality and price on moral judgement and moral intensity, giving a more comprehensive framework for understanding the influencing elements influencing consumers when choosing green products. The empirical findings show that moral intensity and moral judgement both strongly influenced green purchase intention. Moral intensity and moral judgement were both positively affected by perceived quality and perceived price. The green degree of a product impacted both the association between perceived price and moral judgement and the relationship between perceived quality and moral judgement. According to the findings, moral intensity and moral judgement both significantly increase green buying intention. Both perceived quality and perceived price influenced moral judgement and moral intensity positively.

Singh et. al (2022) provided a detailed perspective of green energy appliances, which helps to reduce electricity bills and dependency on utilities. The efficiency of the fundamental elements of grid-like grid-tied inverters, battery bank, and solar charge controller is demonstrated. The green appliances are separated into two categories, the first of which contains the appliances that are fundamental pieces of the system and function between the source and the load, such as the battery, charge controller, fuses, and so on. The second section comprises common domestic AC or DC appliances.

Jamil et al. (2022) focused on energy efficiency on Pakistan's young population in the post COVID-19 Era. The findings revealed that knowledge of eco-labels has a significant influence on perceived functional values, green trust, and buying intent of energy efficient household equipment. The findings also show that consumers' social duty has a substantial impact on their personal norms and purchasing intentions for energy-efficient household appliances. Although customer attitudes towards energy efficient appliances moderate the association between consumer social responsibility and purchase intention, there is no mediating impact between consumer social responsibility and buy intention of energy efficient household appliances.

Stasiuk and Maison (2022) aimed to investigate and discover the extent to which consumers are conscious of the new labelling system, along with the impact that the new labels have (in comparison to the previous ones) on the perception of household appliances and consumer decision-making. The findings revealed that most individuals are now unaware of the new energy classes. Furthermore, products with the new labels are seen as being less energy efficient than products with previous labels, indicating that customers are confused about the new energy efficiency labelling scheme.

Hossain et al. (2022) in their study seeked to forecast consumer purchasing intentions for energy-efficient household equipment using an enhanced model of the TPB. In this study, two extra components, moral norms and environmental concern, were introduced in the TPB model. According to the classic theory of planned behaviour (TPB), the extension of moral norms is a strong forecaster of consumer purchasing intention. However, environmental concerns had no substantial impact on Bangladesh.

Mansoor et al. (2021) investigated the direct and indirect effects of green advertisement as an external stimulus and pro-environmental self-identity and perceived environmental responsibility as internal stimuli on consumers' pro-environmental behaviours via an underlying mechanism of their engagement in sustainable consumption for green electronics. The findings revealed a favourable relationship between environmental advertising, pro-environmental self-identity, and perceived environmental responsibility and consumers' pro-environmental behaviours. Furthermore, the findings demonstrated that consumers' participation in sustainable consumption functions as an internal conduit, transmitting the effect of numerous internal and external stimuli to consumers' responses in the form of green purchasing and restriction behaviours.

Shukla et al. (2021) emphasised the environmental impacts of reduced energy consumption. The aim of this study is to look into the result of green marketing and its tactics on domestic energy-saving and green product buying habits. Green packaging and environmental beliefs have a considerable impact on respondents' purchasing and energy-saving behaviours, highlighting the significance of green marketing in influencing purchase and energy-saving behaviour. It should also be emphasised that, while advertising is efficient at raising knowledge among respondents, it has little influence on their views about purchasing Green products.

3. CONCEPTUAL BACKGROUND OF THE RESEARCH STUDY

1) Sustainable Development Practices

Sustainable development is often defined by the classic description from the Brundtland Report, which states, "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Whereas, Environmental sustainability involves protecting natural systems, reducing carbon footprints, and conserving biodiversity. Robert Goodland and Herman Daly assert, “Environmental sustainability requires the maintenance of natural capital and the minimization of pollution and resource depletion to maintain ecosystem services essential to life” (Goodland & Daly, 1996).

Sustainable development practices are critical to ensuring a balanced approach to growth that considers economic viability, social inclusiveness, and environmental stewardship. The combined efforts of governments, businesses, and individuals are essential in advancing these practices to create a sustainable future for all.

Sustainable consumer behaviour refers to the actions and decision-making processes of consumers that aim to minimize their environmental and social impact. This behaviour encompasses purchasing, using, and disposing of products in a way that is mindful of environmental sustainability, ethical considerations, and long-term ecological balance. Adopting a minimalist lifestyle by buying fewer, higher-quality items reduces waste and lowers environmental impact. This also extends to reducing food waste, recycling, and reusing products whenever possible. Increased

awareness of climate change, pollution, and resource depletion drives consumers toward more sustainable choices. As John Thøgersen, a prominent researcher in environmental psychology, notes, "Awareness of environmental consequences is a strong predictor of sustainable consumer behaviour" (Thøgersen, 2014).

2) Green Purchase Behavior

Green purchase behaviour refers to the actions and decisions of consumers who prioritize buying products and services that are environmentally friendly, sustainable, or have a reduced impact on the planet. This behaviour encompasses choosing goods that are made with minimal environmental harm, using eco-friendly materials, and supporting companies that uphold sustainable practices.

Following are some of the behaviour pattern of consumers:

- **Eco-Friendly Products:** Green consumers prefer products that are biodegradable, recyclable, energy-efficient, or made from sustainable materials. Examples include organic foods, electric vehicles, solar panels, and products with minimal or recyclable packaging.
- **Reduced Carbon Footprint:** Consumers exhibiting green purchase behaviour actively seek out products with a lower carbon footprint, such as locally sourced goods that reduce transportation emissions or products manufactured using renewable energy sources.
- **Sustainable Packaging:** Opting for products with minimal, reusable, or compostable packaging is a significant aspect of green purchasing. Consumers often choose items packaged in glass, paper, or biodegradable materials over plastic.
- **Ethical and Social Responsibility:** Green consumers also consider the ethical implications of their purchases, supporting companies that uphold fair labour practices, animal welfare, and responsible sourcing of raw materials.
- Green purchase behaviour is a crucial component of sustainable consumerism, playing a significant role in driving demand for environmentally friendly products and encouraging businesses to adopt greener practices. By understanding the factors that influence this behaviour and addressing the barriers, stakeholders can promote more sustainable purchasing decisions that contribute to the broader goals of environmental protection and sustainable development.

3) Green Household Appliances

Green household appliances refer to energy-efficient and environmentally friendly home appliances designed to minimize energy consumption, reduce greenhouse gas emissions, conserve water, and have a lesser impact on the environment throughout their lifecycle. These appliances are part of the broader category of green or sustainable products aimed at reducing the overall ecological footprint of households.

Characteristics of Green Household Appliances

Energy Efficiency: Green appliances consume significantly less energy compared to conventional models, helping to lower electricity bills and reduce overall energy demand. They are often labelled with energy ratings, such as Energy Star (in the U.S.), EU Energy Label, or other regional certifications that indicate superior energy performance.

Water Conservation: Many green appliances, such as washing machines and dishwashers, are designed to use less water while maintaining performance. This helps conserve water resources, which is especially important in areas experiencing water scarcity.

Low Emissions and Reduced Environmental Impact: Green appliances are engineered to produce fewer emissions and pollutants. For instance, they use refrigerants with a lower global warming potential (GWP) and avoid harmful chemicals that can damage the ozone layer.

Sustainable Materials and Durability: These appliances often incorporate recycled or sustainable materials, reducing the demand for virgin resources. They are also built to last longer, which reduces the frequency of replacements and the associated environmental impact of manufacturing new products.

Smart Technology Integration: Smart appliances that can be controlled via apps or connected to home energy management systems allow users to optimize their energy use, schedule operations during off-peak hours, and receive alerts for maintenance, further enhancing their green credentials.

Green appliances reduce the carbon footprint of households, contributing to efforts to combat climate change by lowering greenhouse gas emissions. They are often built with higher-quality materials and advanced technology, ensuring they last longer and perform better than traditional counterparts. By conserving water and energy, these appliances help reduce the strain on natural resources, promoting sustainability. Many green appliances, especially those with advanced filtration systems, can improve indoor air quality by reducing pollutants, which is beneficial for health.

Green household appliances are a crucial component of sustainable living, offering significant environmental and financial benefits. As technology advances and awareness grows, these appliances are becoming more accessible, helping households reduce their impact on the planet while enjoying improved performance and efficiency.

4. RESEARCH OBJECTIVES

1) To understand the behavior pattern of consumers in relation of appliances.
2) To understand consumers' perception and reasons for purchasing Eco-friendly products.
3) To explore the relationship between Green Marketing Tools and Green Purchase Behavior.
4) To explore the consumer's demographic behavior towards Sustainable Development Practices.

5. RESEARCH METHODOLOGY

The study undertaken is descriptive in nature. The researcher has used the convenience sampling technique to collect primary data from people through a survey. To acquire primary data, a systematic, non-disguised questionnaire was used, which was then conducted questionnaire distribution. This survey was passed on to 350 people known to the researcher. Out of which, 310 responded correctly. Questionnaires that were incomplete were excluded from the data collection. This data was collected from Gandhinagar, Gujarat. The questionnaire was divided into two sections: demographic information and responses in relation to appliance ownership and usage, sustainable consumption behaviour and green marketing tools.

Five point Likert scale was used to determine consumer's perception and reasons for purchasing eco-friendly products. Likert scale of level of agreement was used to administer statements relating to 'Sustainable Development Practices' and 'Green Marketing Tool'. Before delivering the final questionnaire to the targeted respondents, a pilot survey of 30 people was conducted locally. The final questionnaire was administered following minor revisions to the original draft. The researcher has applied statistical tools like Descriptive Statistics, Frequency counts, Correlation, Cronbach Alpha and Analysis of Variance (ANOVA).

Data Analysis and Interpretation:

Table 1: Demographic Characteristics of Respondents

Respondents Profile	Particulars	Respondents	Percentage
Gender	Male	90	29%
	Female	220	71%
Age Group	20-30 years	162	52.3%
	30-40 years	105	33.9%
	40-50 years	23	7.4%
	50 years or more	20	6.5%
Respondents Status	Student	49	15.8%
	Employed	130	41.9%
	Self-employed	81	26.12%
	Home-maker	39	12.5%
	Retired	11	3.54%
Education	Below High School	13	4.2%
	Graduate	164	52.9%
	Post Graduate	109	35.2%
	Doctorate	24	7.7%
Household Size	Less than 3 members	122	39.4%
	3 to 5 members	144	46.5%
	More than 5 members	44	4.2%

Income	Rs. 50,000/- to Rs. 1,00,000/-	180	58.06%
	Rs. 1,00,001/- to Rs. 1,50,000/-	72	23.22%
	More than Rs, 1,50,000/-	58	18.7%

Source: Authors' calculation based on primary data

Table 1 demonstrates the demographic responses of the respondents, where 29% are male and 71% are female. Majority of the respondents are from the age group of 20-30 years with 52.3% followed by 30-40 years with 33.9%, followed by 40-50 years with 7.4% and 50 years or more with 6.5%. for education level, majority of the respondents' hold bachelor's degree with 50.9% followed by Post Graduate with 35.2%. For respondent's status, it was observed that 130 respondents are employed with 41.9% and the least were found to be retired with 3.54%. When asked about income, it is observed that 180 respondents (58.06%) had income ranging from Rs. 50,000/- to Rs. 1,00,000/- followed by 72 respondents (23.22%) with an income between Rs. 1,00,001/- to Rs. 1,50,000/- and 58 respondents had income more than Rs, 1,50,000/-.

Objective 1: To understand the behavior pattern of consumers in relation of appliances.

Table 2 (a): Ownership and Usage of Entertainment Appliances

Sr. no.	Product			Frequency	Percentage
Ownership of Entertainment Appliances					
1	LCD/ Plasma TV			310	100
2	Computer (Desktop/ Laptop)			298	96.13
3	Home Theatre			28	9.3
4	Over Head Projector			22	7.1
Usage of Entertainment Appliance					
Sr. no.	**Entertainment Appliance**	**Ownership**	**Less than 2 hours**	**2 to 4 hours**	**More than 4 hours**
1	LCD/ Plasma TV	310	56	160	94
2	Computer (Desktop/ Laptop)	298	116	122	60
3	Home Theatre	28	20	08	00
4	Over Head Projector	22	18	04	00

Source: Authors' calculation based on primary data

Table 2 (b): Ownership and Usage of Utility Appliances

Sr. no.	Product			Frequency	Percentage
Ownership of Utility Appliances					
1	Dishwasher			17	5.4
2	Air Conditioner			292	94.19
3	Washing Machine			270	87.09
4	Tumbler Dryer			5	1.6
5	Steam Iron			304	98.06
6	Electric Shower			112	36.13
7	Electric Hot Water System			299	96.45
Usage of Utility Appliance					
Sr. no.	**Utility Appliance**	**Ownership**	**Less than 2 hours**	**2 to 4 hours**	**More than 4 hours**
1	Dishwasher	17	14	03	00
2	Air Conditioner	292	26	26	240
3	Washing Machine	270	160	80	30
4	Tumbler Dryer	5	05	00	00
5	Steam Iron	304	259	41	04
6	Electric Shower	112	69	38	05
7	Electric Hot Water System	299	242	49	08

Source: Authors' calculation based on primary data

Table 2 (c): Ownership and Usage of Kitchen Appliances

Sr. no.	Product	Frequency	Percentage
Ownership Kitchen Appliances			
1	Microwave	195	62.9

2	Electric Oven	98	31.6
3	Mixer/Grinder	300	96.77
4	Juicer	69	22.5
5	Kettle	94	30.3
6	Refrigerator	310	100
7	Deep Freezer	310	100

Usage of Kitchen Appliance

Sr. no.	Kitchen Appliance	Ownership	Less than 2 hours	2 to 4 hours	More than 4 hours
1	Microwave	195	152	38	05
2	Electric Oven	98	66	20	12
3	Mixer/Grinder	300	274	26	00
4	Juicer	69	60	09	00
5	Kettle	94	57	37	00
6	Refrigerator	310	00	00	310
7	Deep Freezer	310	00	00	310

Source: Authors' calculation based on primary data

Objective 2: To understand consumers' perception and reasons for purchasing Eco-friendly products.

Table 3 (a): Perception Towards Eco-Friendly Products

Product Code	Eco friendly Products	Level of Agreement(1 = Strongly Disagree, 2 = Disagree, 3 = Neither Disagree nor Agree, 4 = Agree, and 5 = Strongly Agree)					Mean Score	S.D.	Cron-bach Alpha (α)
		Frequency Count							
		1	2	3	4	5			
PE1	Are beneficial for the environment	1	00	11	126	172	4.510	.6006	0.628
PE2	Are healthy	0	03	03	139	165	4.503	.5731	
PE3	Are dependable and trustworthy	01	07	17	151	134	4.323	.7099	
PE4	Have a decent quality/performance	00	06	11	147	146	4.397	.6541	
PE5	Have a better quality/performance when compared to traditional products	00	09	31	81	189	4.452	.7899	
PE6	Have a decent taste and/or good fragrance	5	13	75	121	96	3.935	.9291	
PE7	Have rationally price	30	105	24	33	52	3.123	1.306	
PE8	Are well advertised	57	152	23	36	42	2.529	1.291	
PE9	Are available nearby my community / supermarket	52	132	24	35	67	2.748	1.426	

Source: Authors' calculation based on primary data

To understand perception of consumers towards Eco-friendly products, nine statements were asked to them. About 270 respondents agreed that eco-friendly products have a better quality/performance when compared to traditional products. 304 respondents also agreed that eco-friendly products are healthy. A negligible number of respondents disagreed that eco-friendly products have a decent taste and/or good fragrance.

Table 3 (b): Reasons for Purchasing Eco-Friendly Products

Table 3 (b): Reasons for Purchasing Eco-Friendly Products

Product Code	Reasons for purchasing Eco-Friendly Products	Level of Agreement (1 = Strongly Disagree, 2 = Disagree, 3 = Neither Disagree nor Agree, 4 = Agree, and 5 = Strongly Agree)					Mean	S.D.	Cron-bach Alpha (α)
		Frequency Count							
		1	2	3	4	5			
RP1	They present a positive image of myself.	00	01	15	226	68	4.165	.5044	
RP2	I wish to preserve the world	00	01	06	211	92	4.271	0.564	
RP3	I choose eco-friendly products.	00	03	07	196	104	4.294	.5582	

RP4	I feel trendy/fashionable when I buy eco-friendly things.	20	22	13	162	93	3.923	1.097	0.641
RP5	If I do not purchase, others may judge me.	107	68	38	79	18	2.461	1.342	
RP6	I make an spontaneous purchase of eco-friendly products in a supermarket.	18	36	20	14	95	3.835	1.155	
RP7	I was delighted with the majority of the eco-friendly things I purchased.	01	03	08	116	182	4.532	.6314	

Source: Authors' calculation based on primary data

The reason of purchasing an eco-friendly product plays a crucial role in their decision to purchase green household appliances. When respondents were asked questions in relation to their purchase of eco-friendly products, it was observed that 294 respondents agreed that such products present a positive image of myself. 298 respondents were delighted with the majority of the eco-friendly things they purchased. All the respondents in the study disagreed to the fact that they will not recommend that If they do not purchase, others may judge me.

Objective 3: To explore the relationship between Green Marketing Tools and Green Purchase Behavior.

HO1: There is no significant relationship between Green Perceived Product and consumers' green purchase behaviour.

Table 4 (a): Green Perceived Product and GPB

Green Perceived Product		
Green Purchase Behaviour	Pearson's Correlation	0.272
	Sig. (2 tailed)	0.000
	N	310

Source: Authors' calculation based on primary data

Table 4 (a) shows Pearson Correlation between Green Perceived Product and Green Purchase Behaviour The value of Correlation coefficient (r) is 0.272 which indicates that there is a low degree of positive correlation between Green Perceived Product and Green Purchase Behaviour. Also, the correlation coefficient is significant as its p-value is 0.00 and is less than significance level .05. Based on the statistical outcomes of correlation technique, the null hypothesis is rejected, and alternative hypothesis is accepted. Hence, we conclude that though low but there is a positive correlation between Green Perceived Product and Green Purchase Behaviour.

HO2: There is no significant relationship between Green Perceived Price and consumers' Green Purchase Behaviour

Table 4 (b): Green Perceived Price and GPB

	Green Perceived Price	
Green Purchase Behaviour	Pearson's Correlation	0.562
	Sig. (2 tailed)	0.000
	N	310

Table 4 (b) shows Pearson Correlation between Green Perceived Price and Green Purchase Behaviour. The value of Correlation coefficient © is 0.562 which indicates that there is a moderate degree of positive correlation between Green Perceived Price and Green Purchase Behaviour. Also, the correlation coefficient is significant as its p-value is 0.00 and is less than significance level .05. On the basis of statistical outcomes of correlation technique, the null hypothesis is rejected, and alternative hypothesis is accepted. Hence, we conclude that there is a moderate positive correlation between Green Perceived Price and Green Purchase Behaviour.

HO3: There is no significant relationship between Green Perceived Place and consumers' Green Purchase Behaviour.

Table 4 ©: Green Perceived Place and Green Purchase Behaviour

	Green Perceived Place	
Green Purchase Behaviour	Pearson's Correlation	0.668
	Sig. (2 tailed)	0.000
	N	310

Source: Authors' calculation based on primary data

Table 4 (c) shows Pearson Correlation between Green Perceived Place and Green Purchase Behaviour. The value of Correlation coefficient (r) is 0.668 which indicates that there is a moderate degree of positive correlation between Green Perceived Place and Green Purchase Behaviour. Also, the correlation coefficient is significant as its p-value is 0.00 and is less than significance level .05. Based on the statistical outcomes of correlation technique, the null hypothesis is rejected, and alternative hypothesis is accepted. Hence, we conclude that there is a moderate positive correlation between Green Perceived Place and Green Purchase Behaviour.

HO4: There is no significant relationship between Green Perceived Promotion and consumers' Green Purchase Behaviour.

Table 4 (d): Green Perceived Promotion and GPB

	Green Perceived Promotion	
Green Purchase Behaviour	Pearson's Correlation	0.194
	Sig. (2 tailed)	0.000
	N	310

Source: Authors' calculation based on primary data

Table 4 (d) shows Pearson Correlation between Green Perceived Promotion and Green Purchase Behaviour. The value of Correlation coefficient (r) is 0.194 which indicates that there is a very low degree of positive correlation between Green Perceived Promotion and Green Purchase Behaviour. Also, the correlation coefficient is significant as its p-value is 0.00 and is less than significance level .05. Based on the statistical outcomes of correlation technique, the null hypothesis is rejected, and alternative hypothesis is accepted. Hence, we conclude that there is a very low degree of positive correlation between Green Perceived Promotion and Green Purchase Behaviour.

Objective 4: To explore the consumer's demographic behavior towards Sustainable Development Practices.

- **Age and Sustainable Consumption**

HO5: There is no significant relationship between Age of consumers and Sustainable Consumption.

Table 5 (a): ANOVA for Age and Sustainable Consumption

Table 5 (a): ANOVA for Age and Sustainable Consumption

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	41.802	17	2.459	3.748	.400
Within Groups	191.581	293	.656		
Total	233.384	310			

Source: Authors' calculation based on primary data

In case of different age groups, ANOVA analysis indicates that there is statistically insignificant difference between the group means. We can see that the p-value (.400) is greater than the level of significance 0.05. therefore, we accept the null hypothesis and conclude that age does not have any significant impact on Sustainable Consumption Behaviour.

- **Gender and Sustainable Consumption**

HO6: There is no significant relationship between Gender consumers and Sustainable Consumption.

Table 5 (b): ANOVA for Gender and Sustainable Consumption

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.712	17	.512	2.713	.540
Within Groups	55.159	292	.189		
Total	63.871	309			

Source: Authors' calculation based on primary data

In case of different gender groups, ANOVA analysis indicates that there is statistically significant difference between the group means. We can see that the p-value (.540) is greater than the level of significance 0.05. Therefore, we accept the null hypothesis and conclude that gender does not have any significant impact on Sustainable Consumption Behaviour.

- **Income and Sustainable Consumption**

HO7: There is no significant relationship between Income of consumers and sustainable consumption.

Table 5 (c): ANOVA for Income and Sustainable Consumption

Table 5 (c): ANOVA for Income and Sustainable Consumption					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.116	17	1.372	60.56	.000
Within Groups	56.170	293	.189		
Total	63.871	310			

Source: Authors' calculation based on primary data

In case of different income groups, ANOVA analysis indicates that there is statistically significant difference between the group means. We can see that the p-value (.000) is lesser than the level of significance 0.05. therefore, we reject the null hypothesis and conclude that Income has a significant impact on Sustainable Consumption Behaviour.

- **Education and Sustainable Consumption**

HO4: There is no significant relationship between Education of consumers and Sustainable Consumption.

Table 5 (d): ANOVA for Education and Sustainable Consumption					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.353	17	1.256	1.687	.544
Within Groups	217.424	293	.745		
Total	238.777	310			

Source: Authors' calculation based on primary data

In case of different education groups, ANOVA analysis indicates that there is statistically insignificant difference between the group means. We can see that the p-value (.544) is greater than the level of significance 0.05. Therefore, we accept the null hypothesis and conclude that education does not have any significant impact on Sustainable Consumption Behaviour

6. CONCLUSION

- Regarding the respondents' perception towards eco-friendly products, around 60-65 % of respondents have agreed/ strongly agreed that eco-friendly products are beneficial for environment, healthy, dependable and trustworthy, decent quality/ performance and perform better than conventional products. However, around 50% of the respondents disagreed that eco-friendly products are rationally priced, well-advertised and available nearby.
- The current study highlights some important reasons for the purchase of Eco-friendly products. Majority of respondents gave following reasons for purchasing eco-friendly products:

Eco-friendly products give a good image of an individual

Responsibility of preserving the earth

Liking towards eco-friendly products

Satisfaction with most of eco-friendly products bought

- The relationship between green marketing tools and Green Purchase Behaviour (GPB) was explored individually. Following conclusions are arrived at:

There is a positive and significant correlation between Green Perceived Product and GPB. Hence, we reject null hypothesis and accept alternative hypothesis.

There is a positive and significant correlation between Green Perceived Price and GPB. Hence, we reject null hypothesis and accept alternative hypothesis.

There is a positive and significant correlation between Green Perceived Place and GPB. Hence, we reject null hypothesis and accept alternative hypothesis.

There is a positive and significant correlation between Green Perceived Promotion and GPB. Hence, we reject null hypothesis and accept alternative hypothesis.

- Since the data set of all demographic variables – Age, Gender, Income and Education had a normal distribution, the researcher has conducted ANOVA test to explore the relationship between demographic variables and sustainable consumption behaviour. Based on the statistical findings, we conclude that among all four demographic variables viz., age, gender, income, and education, only income is found to have significant impact on sustainable consumption behaviour.

7. RECOMMENDATIONS

- Green-marketing tools were observed to have a significant impact on the purchase intention towards green products. Nevertheless, the feeling of environment protection also further fuels the intent for green purchase. These findings depict that the interest on green product and environment is spreading amongst people, though slow and gradual. However, there still is a need to inform and educate consumers about unique value addition that green features bring, and the benefits associated with it.
- Manufacturers and marketers should continuously strive for Eco-packaging which adds an entire new dimension to green marketing. It has a significant impact on the purchase intention of consumers. Creativity in packaging elements will assist consumers to distinguish and differentiate a green product from a non-green product. Consumers also preferred products that used green medium of packaging to a traditional packaging material.
- In the competition between green and common products, price is still one of the key factors affecting consumers' purchase decisions. High price of eco-friendly/green products act as a major barrier to the adoption of green products and sustainable consumption. If the price is too high, some consumers give up their purchases. Hence, corporates manufacturing green products should focus on the impact of green product pricing in their enterprises' green growth model and analyse the differences in pricing between green products and common products.
- The availability of green products at markets and communities also creates a hindrance in sustainable consumption. Thus, manufacturers should focus on wide distribution and timely supply of green products. Proper logistics and supply chain management play an important role in wider and timely distribution of green products.

Future Scope of the Study

The future scope of this research is extensive and multifaceted, providing multiple chances to expand understanding and encourage action towards sustainable consumption. By expanding research in these areas, scholars, legislators, and businesses can gain useful insights and develop more effective tactics to encourage the use of green household appliances, ultimately contributing to larger environmental sustainability goals.

- The finding of this research, made in Gujarat district, can be used in other states of India to identify difference and to recognize the similarities of consumer behaviour.
- New and emerging green appliances with latest technologies can be studies and included for the purpose of comparison with the traditional appliances.
- The whole study can only be targeted to sub-demographic segments like age, income, education to understand the rational of purchase of GHA.

- Future research can evaluate the efficiency of alternative theories to the TPB model, providing a more comprehensive framework for studying pro-environmental behaviour

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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