

Exploring Sustainable Energy Consumption Practices: An Extended Environmental Value-Belief-Norm Framework **Using SEM Analysis**

Abstract

With increasing global emphasis on sustainable energy development and the transition to a low-carbon economy, understanding the drivers behind consumer adoption of eco-friendly products is crucial. This paper attempts to respond to this need by analyzing the economic implications of sustainable energy consumption habits. Utilizing an extended environmental Value-Belief-Norm (VBN) model, the research examines how values, beliefs, and a sense of obligation influence consumers' Willingness to Pay More (WTPM) for eco-friendly home products, Word-Of-Mouth intention (WOM) and sustainable consumption behaviors. The study employs survey data from 517 participants across India, analyzed through structural equation modeling (SEM) and complemented by insights from semi-structured interviews. The findings suggest that the biospheric, altruistic, and egoistic values subsequently create an ecological worldview in consumers. Ecological worldviews, in turn, impact consequences such as consumers' responsibility and subsequent behaviors, including WOM and WTPM, and the adoption of eco-friendly products. **The study refines the VBN model and identifies key motivators and barriers to sustainable consumption. It guides policymakers and businesses to promote eco-friendly practices by highlighting the benefits of sustainable products and leveraging advanced technology to create eco-friendly home solutions.**

Keywords: Sustainable consumption; **Eco-friendly home products;** Value-Belief-Norm; Willingness to pay more; Behavioural intention; **Structural equation modeling; Survey.**

1. Introduction

The global rise in affluence has spurred an unprecedented demand for goods and services, leading to unsustainable hyper-consumption patterns worldwide (Truong et al., 2024; Kapoor and Dwivedi, 2020). Since the 1970s, the consumption of food, fuels, and materials has tripled, causing a 90% loss in biodiversity and a 50% increase in global greenhouse gas emissions (International Resource Panel, 2019). Among these challenges, household plastic waste stands out due to its pervasive and persistent nature. Alarming, only 9% of the plastic produced since its inception has been recycled, with the remainder polluting landfills, oceans, and food systems (Brooks et al., 2018). This accumulation has contributed to environmental disasters such as the Great Pacific Garbage Patch, which spans 1.6 million square kilometres and continues to grow (Nguyen, 2022; Lebreton et al., 2018).

The environmental implications are staggering—by 2050, humanity may require resources equivalent to three Earths to sustain current lifestyles (United Nations, 2022; Lim, 2017). Addressing this crisis requires significant shifts in consumption behavior, particularly in replacing plastic with eco-friendly products (EFPs) such as paper straws, LED bulbs, biodegradable utensils, and compostable bags (Viera et al., 2020; Yadav et al., 2020). While legislative measures, such as bans or taxes on single-use plastics, have been implemented in many countries, household-level plastic pollution persists as a critical concern (Evans et al., 2020). Understanding the determinants of sustainable consumption (SC) behaviors at the household level is thus vital to mitigate this problem and advance sustainability goals.

Extensive research has investigated pro-environmental behavior (PEB) and its determinants, often drawn from established theoretical frameworks such as the “Theory of Planned Behavior” (TPB) and the “Value-Belief-Norm” (VBN) theory. For instance, Singh and Alok (2022) examined factors influencing the repurchase of organic food in India, focusing on consumer responsibility, price, and product quality. Zhang et al. (2020) compared the TPB and VBN frameworks to predict climate change mitigation behavior among agricultural producers. Similarly, Truong et al. (2024) explored the influence of environmental concerns and social motivations on Vietnamese consumers' use of reusable shopping bags. Studies like those by Aguilar et al. (2012) focused on recycling behaviors, while others explored broader constructs such as environmental consciousness (Rezaei et al., 2020) and PEB (Ghazali et al., 2019; Kiatkawsin and Han, 2017). While these studies provide valuable insights into general PEB, they often lack product-specific analyses, which limits their applicability to specific contexts such as household SC. Notably, previous research has frequently generalized findings

without addressing the nuanced differences between the products and their environmental impacts. However, the absence of product-specific models represents a significant gap in the literature, underscoring the need for targeted investigations into household SC practices and their role in adopting EFPs.

Moreover, although household SC behaviors have been discussed, there is limited understanding of how these behaviors can be systematically influenced. Addressing this gap requires a deeper exploration of the psychological and social drivers underpinning SC behaviors, mainly through the lens of the VBN model. This study bridges the existing research gap by applying the VBN model to investigate the factors influencing household SC behaviors and their adoption of EFPs. The VBN model, derived from classical theories such as TPB (Ajzen, 1991) and the “Norm Activation Model” (Schwartz, 1977), offers a comprehensive framework for understanding how values, beliefs, and norms shape consumer behavior (Van and Steg, 2016). While the VBN model has been widely employed in environmental psychology and sociology, its application to household SC remains underexplored. By extending the VBN model, this study integrates values (biospheric, altruistic, and egoistic), ecological worldview, ascribed responsibility, and sense of obligation to understand SC behaviors. Unlike previous research, this study specifically examines the adoption of EFPs, addressing a critical gap in product-specific analyses within SC literature. The study explores the influence of SC behaviors on “word-of-mouth” (WOM), “willingness to pay more” (WTPM), and behavioral intention (BI), offering actionable insights for promoting sustainable consumption. The study seeks to enhance our understanding of household SC behaviors and their implications for adopting EFPs. Specifically, it addresses the following research questions:

RQ1: What factors influence households' intention to engage in SC behaviors?

RQ2: How do the identified factors interact to influence SC behaviors?

RQ3: How can insights from this research promote the widespread adoption of EFPs?

By systematically addressing these questions, this research aims to contribute to the theoretical and practical advancements in SC and sustainability practices.

The remainder of this paper is organized as follows. The literature review provides a meticulous epitome of existing studies on SC, highlighting theoretical underpinnings and empirical findings. The methodology section outlines the research design, sampling strategy, and data collection methods. The results and discussion sections present and interpret the findings, focusing on the relationships between values, beliefs, norms, and SC behaviors.

Finally, the conclusion summarizes the study's contributions, implications, and limitations, offering directions for future research.

2. Literature Review and Hypotheses Development

2.1 Sustainable consumption through eco-friendly products (EFPs)

EFPs are produced to minimize their negative impact on nature. EFPs are made from sustainable materials or are biodegradable or compostable. They help to reduce waste and pollution (Moktadir et al., 2020; Joshi and Rahman, 2019; Lemaire and Limbourg, 2019; Lim, 2017). This study employs several EFPs to examine households' sustainable consumption patterns. *First*, a kitchen waste compost bin is a container to store food waste and other organic materials before composting. When decomposed, organic waste can become fertile soil for the farmer or gardener. People are buying kitchen waste compost bins for the pile to take the strain from landfill and help us garden more environmentally friendly (Čater et al., 2023; Wakefield and Axon, 2020).

Secondly, cleaning brushes and sponges made of coir (a natural fiber obtained from the coconut husk) are also environmentally sound substitutes for manufactured materials. A coir cleaning kit usually includes a brush and a scrub pad, both made from coir (Yadav et al., 2020). *Thirdly*, compostable shopping bags occur in a composting environment rather than over decades or hundreds of years like plastic bags. Compostable bags can collect foods and other organic materials for their later composting process (Abou and Farooque, 2021). *Finally*, Water-saving taps are likewise modern innovations that address profligate domestic water wastage. Usually, these taps come fitted with aerators that introduce some air into the water to reduce its flow rate while at the same time maintaining a constant pressure. Households can conserve water, reduce costs, and save the environment by having these taps in their homes (White et al., 2019). So, these items deliver a choice for practicing eco-friendly habits. While more efficient use of resources will result in less harm to the planet.

2.2 Value-Belief-Norm (VBN) model

Previous literature overlooks deeper psychological drivers of sustainable consumption and the adoption of eco-friendly products and focuses on surface factors such as price and perceived quality. For instance, Truong et al. (2024) examine how environmental concern and social motivation relate to the use of their shopping bags. Singh and Alok (2022) explore the drivers for organic food repurchase in India. Carfora et al. (2021) combine TPB, VBN and trust in an

attempt to explain natural food purchase intentions. Hwang et al. (2020) apply VBN to eco-friendly drone delivery services. Megeirhi et al. (2020) used VBN to measure the support of the residents of Carthage for sustainable tourism. Zhang et al. (2020) compare TPB and VBN in predicting climate change behaviors among agricultural producers. Higuera-Castillo et al. (2023) combined UTAUT2 and VBN models to underscore the cultural differences in electric vehicle adoption by highlighting the moderating effect of national culture on behavioral determinants in India and Spain. Onel (2024) effectively predicts sustainable purchase behavior using VBN theory but demonstrates lower explanatory power for other behaviors (e.g., recycling). Mahpour et al. (2023) expanded VBN theory and corroborated sustainable transportation planning in Tehran by underpinning biospheric values and ascription of responsibility as key predictors of car-use reduction policies. Burton and Eike (2023) stated that sustainability-conscious garment practices link motivations like empowerment and creativity with environmental beliefs. Yeow and Loo (2022) found that Malaysian consumers prioritize subjective norms over personal norms in high-cost green purchases. Jahari et al. (2022) integrated “Social Cognitive Theory” (SCT) and VBN theories and highlighted the role of enabling environments to foster sustainable behaviors among young Malaysian consumers. Chen (2021), by combining VBN and TPB models, enhances explanatory power for local organic food consumption. Key drivers include biospheric values, altruism, and “perceived behavioral control” (PBC), supporting the integration of stable values and behavioral theories. Thus, these studies collectively examined SC behavior and related practices through diverse theoretical lenses, focusing on BI, values, and cultural influences. However, these works could be more consistent due to the different applied theoretical frameworks, which cannot explain the motives of consumers. This can be explained by the VBN model, which includes personal values and environmental beliefs in relation to pro-environmental norms. Hence, the VBN model provides a holistic understanding of SC. This model focuses on eco-friendly values that make a person demonstrate consistent and sustainable behaviors over time through internalization. Adoption of EFP can be better predicted and promoted by applying the VBN model. Sustainable consumption means meeting basic human needs and improving quality of life while minimizing emissions of waste and toxic chemicals or other pollutants that put future generations in danger (Čater et al., 2023; Lavuri et al., 2023; Fifita et al., 2020; NMOE, 1994). The VBN framework was developed by Stern et al. (1999), based on the "Norm Activation Framework" (NAM) focused on altruistic attitudes and pro-social behavior. Thus, Stern et al. (1999) combined the NAM model with value and new environmental paradigm theories, hence

developing the VBN model, which outperforms all previous theories in predicting the SC of PEB.

Although theoretically rich and empirically sound, some gaps in the VBN model remain open. We used PRISMA 2020 guidelines to search and select the research article we reviewed to identify literature gaps (Sohrabi et al., 2021). Google Scholar, Scopus, and “Web of Science” (WOS) databases were used to find research articles for different scientific fields. Keywords “Value-Belief-Norm” (VBN) and sustainable consumption were used to search for Title-ABS-Key Query. Among the identified 1568 articles, 298 were removed due to duplication, and 1032 were removed based on the review of abstracts in the post-screening stage. In the eligibility stage, the conceptual review of the articles based on relevancy as per the study context led to the exclusion of 302 articles. Finally, 35 research articles and two reports were considered for the in-depth review (Appendix 1).

Table 1 presents an overview of the key concepts and contexts examined in the existing VBN literature. While the VBN framework was developed to explore PEB, this framework incorporates various essential concepts, as verified by previous studies (Awais et al., 2022; Han et al., 2017). It has been applied to study green behavior, the intention of recycling, ecological worldview, green products or services consumption, WTPM for solar energy, and customers PEB (Mahn et al., 2024; O'Shaughnessy et al., 2023; Awais et al., 2022; Kim et al., 2022; Han et al., 2017). In this study, authors examine how values and beliefs are related to WTPM, word of mouth, and adopting sustainable products for household use (Fornara et al., 2020; Ghazali et al., 2019; Gkargkavouzi et al., 2019). The addition of these constructs, individuals' values, beliefs, and obligations for SC practices play an important role in psychological processes underlying SC behavior (Sonar et al., 2023; Shin et al., 2017). It also investigates the reasons and barriers to the adoption of EFPs and how they influence BI. The present study also contributes to the literature by adopting a developing country like India. It provides valuable and helpful information about the implementation of SC practices in emerging economies, thereby further widening the geographical base for research and improving broad applicability.

Table 1: Previous literature related to the VBN model.

Author(s)	Context	Biospheric-Value	Altruistic-Value	Egoistic-Value	Ecological worldview	Adverse consequence	Ascribed responsibility	Sense of obligation	WTPM	WOM intention	Behavioral intention
Aguilar et al. (2012)	Recycling behaviour	√	√	√	√	√	√	-	-	-	-
Carfora et al. (2021)	Natural foods	-	-	-	-	√	√	-	-	-	√
De Groot et al. (2007)	Park and ride facility	√	×	√	-	-	√	√	-	-	√
De Groot and Steg (2008)	Environmental behaviour	√	√	√	-	-	-	-	-	-	-
Fornara et al. (2020)	Action for biodiversity	√	-	-	-	√	√	-	-	-	-
Ghazali et al. (2019)	PEB	√	√	√	-	√	√	-	-	-	-
Gkargkavouzi et al. (2019)	PEB	√	-	-	√	√	√	-	-	-	√
Han (2015)	Green lodging policy	√	-	-	√	√	√	√			√
Han et al. (2017)	Eco-friendly behavior	√	√	×	√	-	-	√	√	√	√
Hiratsuka et al. (2018)	Car pricing policy	-	√	√	-	√	√	-	-	-	-
Hwang et al. (2020)	Drone delivery facility	-	-	-	-	-	√	√	-	-	√
Kaiser et al. (2005)	Conservation behaviour	-	-	-	√	√	√	-	-	-	-
Kiatkawsin and Han (2017)	PEB	√	√	×	√	√	√	-	-	-	√
Kim et al. (2022)	Travel behaviour	-	√		-	-	-	-	-	-	-
Liobikienė and Poškus (2019)	PEB	-	-	-	√	√	√	-	-	-	-

López and Sánchez (2012)	Suburban Park	√	√	×	√	√	√	-	√	-	-
Megeirhi et al. (2020)	Sustainable cultural heritage tourism	√	√	√	-	√	√	-	-	-	√
Onwezen et al. (2013)	PEB	-	-	-	-	-	√	√	-	-	-
Poortvliet et al. (2018)	New sanitation	√	√	√	√	√	√	-	-	-	√
Rezaei et al. (2020)	PEB	-	-	-	-	-	-	-	-	-	√
Nguyen (2022)	Bringing own bag	-	-	-	-	√	√	-	-	-	-
Singh and Alok (2022)	Organic food	-	-	-	-	-	-	-	-	-	√
Stern et al. (1999)	Environmentalism	-	√	-	√	-	√	-	-	-	-
Stern et al. (1993)	Environmentalism	√	√	√	-	-	-	-	-	-	-
Werff and Steg (2016)	Smart energy systems	√	√	√	-	-	-	-	-	-	-
Wynveen et al. (2015)	PEB	-	-	-	√	√	√	-	-	-	√
Yan and Chai (2021)	Green hotels	-	-	-	-	√	√	-	-	-	√
Zhang et al. (2020)	Climate change"	√	√	√	√	√	√	-	-	-	-

2.3 Hypotheses and conceptual framework

According to the VBN model, values are considered a perceptual manifestation of the underlying purposes and basic needs of consumers; it defines how significant a particular object is in consumers' day-to-day lives (Hwang et al., 2020; Hiratsuka et al., 2018; Aguilar et al., 2012). The values are biospheric, altruistic, and egoistic. They are drivers for ecological worldviews. It refers to values and ideas held by people or societies that protect the environment and its ecosystems at all costs. These values are founded on the concept that

humans and nature are one, and their protection is founded on survival grounds (Megeirhi et al., 2020; Kiatkawsin and Han, 2017).

On the other hand, BV plays a vital role in explaining the behaviors of people, either as individuals or as groups, in relation to the environment, as is the case in environmental psychology and sociology. Furthermore, societies with higher BVs are more likely to promote green practices. Altruistic value refers to how an individual perceives himself concerning society and his thinking about the well-being of society. It stimulates an individual to perform pro-environment behaviors such as SC and concern for the well-being of others (Awais et al., 2022; Han et al., 2017). It points to a system of values or principles that places the welfare of others over the self. Individuals who adhere to these values may be motivated by compassion, empathy, or a drive to contribute to the larger good. Altruistic value is often seen as the opposite of selfishness, as they prioritize the welfare of others, even at personal cost (Hiratsuka et al., 2018; Han et al., 2017).

Egoistic values (EV) comprise pursuing self-interest, power, and achievement. Self-inspirational value leads individuals to act in their interest rather than society's (Kim et al., 2022). While egoistic values based on self-interest and selfishness encourage a person to ignore that human activities have ill effects on the environment (Awais et al., 2022; Hiratsuka et al., 2018; Zhang et al., 2020). Thus, an ecological worldview favorably correlates with altruistic and biospheric values, whereas egoistic values are adversely correlated (Poortvleit et al., 2018). The study proposes that:

H1-H3: Biospheric (H_1), altruistic (H_2), and egocentric (H_3) values positively impact ecological worldviews.

A belief is concerned with the judgment of a person about particular circumstances and behavior given external conditions (Zhang et al., 2020). According to the VBN model, beliefs contain three components: ecological worldview, Adverse Consequences (ACON), and Ascribed Responsibility (ARES) (Gkargkavouzi et al., 2019). An ecological worldview is based on the assumption that human activities have distorted nature's balance and plundered natural resources (Gkargkavouzi et al., 2019; Van and Kyle, 2016). ACON describes a person's attitude towards the harm he does. This term refers to harmful effects or loss of objects, persons, and social values. Things of value can be concrete, such as personal property, cultural artifacts, and natural resources, or abstract, including social norms, identities, and cultural practices (Han, 2015; Wynveen et al., 2015). In addition, ascribed responsibility is the feeling of

responsibility for not carrying out pro-environmental actions (Fornara et al., 2020). Because of the unpleasant thought that humans are destroying the environment, primarily through irresponsible and unsustainable actions, a person becomes aware that objects valued by human beings, E.g., many plastic products themselves, bring about harmful effects (Aguilar et al., 2012). Further, the knowledge of the harmful effects of valued objects on one's life confines an individual to bear responsibility for his actions (López and Sánchez, 2012). Thus, the VBN model holds that ecological worldview is a significant determinant of ACON and affects ascribed responsibility (Kiatkawsin and Han, 2017; Aguilar et al., 2012). Hence:

H4: *Ecological worldview has a positive impact on ACON.*

H5: *ACON has a positive impact on ascribed responsibility.*

The ethical obligation to protect the environment refers to ascribed responsibility. It includes prudent use of natural resources, avoiding products that cause pollution and harm to the environment, making reasonable use of energy, maintaining a balance in nature, controlling input-output structure, and reducing waste (Grappi et al., 2024; Priya and Sharma, 2024; Awais et al., 2022). It predisposes people to promote PEB in public and private life (Rowe et al., 2019; De Groot et al., 2007). If a person takes responsibility for his actions, it makes them morally obligated to adopt PEB (Hwang et al., 2020; Wang et al., 2021). People with a deep concern for the environment may feel some individual responsibility to save energy, cut waste, or support environmental policies. It motivates households to conduct PEB whenever it is troublesome, time-consuming, or demanding of effort and resources. It urges personal behavior and social change toward a sustainable, environment-friendly future (Awais et al., 2022; Han, 2015). Hence:

H6: *Ascribed responsibility positively influences the “Sense of Obligation to take Pro-Environmental Action”.*

The three PEBs for adopting EFPs are WTPM, WOM, and BI (Awais et al., 2022; Shin et al., 2017). WTPM refers to the maximum or minimum amount an individual is willing to pay for a product (Hwang et al., 2020; López and Sánchez, 2012). Usually, the price of ecological products is higher than that of traditional products. Hence, consumers are expected to pay a premium (Han et al., 2017). Factors influencing one's intention to pay more include personal values, social norms, and perceptions about the value of EFPs (Fesenfeld et al., 2021; Duan and Aloysius, 2019; Han et al., 2017). For example, those who value environmental values

more should be willing to pay more for the EFPs. Another reason may be to do with social status or prestige, whereby a consumer pays more for a product that has a green appeal (Awais et al., 2022; Hwang et al., 2020; López and Sánchez, 2012). WTPM is the premium amount a consumer should be WTP for a green product, and the feeling of obligation has a reasonably significant influence on WTPM (Awais et al., 2022; Hwang et al., 2020). WOM relates to communication concerning people's positive experiences and encouragement with respect to particular products or services. Consumer values, beliefs, and benefits derived from EFPs have a positive effect on WOM about EFPs. For instance, those with strong environmental values and care for the environment will likely pass the positive WOM about EFPs. Previous literature has also shown that a sense of obligation significantly affects WOM (Han et al., 2017). Ajzen and Fishbein (1980) state that BI significantly predicts human behavior. It explains how an individual will act in the future. If someone expresses an intention to engage in a particular activity, there is a high likelihood that they will follow that behavior (Gkargkavouzi et al., 2019; Fornara et al., 2020; Putz et al., 2018). Sustainable Consumption (SC) is relevant not only to an individual's perception of environmental issues but also to his behavior. A person's willingness and plan to adopt SC depict BI toward SC (Bai et al., 2020; Rezvani et al., 2018). Suppose an individual undertakes the obligation to behave sustainably and undertake pro-environment activities. In that case, s/he will be willing to adopt sustainable products, pay more if sustainable products are expensive, and spread positive views about these products (Han et al., 2017). Studies have found that a sense of obligation significantly influences BI to adopt SC (Awais et al., 2022; Han et al., 2017). Individuals' sense of obligation towards the environment significantly impacts their WTPM, WOM, and BI. Hence, we propose the following hypotheses:

H7-H9: *“A sense of obligation to undertake pro-environmental behavior” has a significant impact on WTPM (H₇), WOM (H₈), and BI (H₉).*

This investigation contributes significantly on multiple fronts. *Firstly*, by extending the VBN model to the domain of SC practices among households, this study addresses identified gaps and makes a pioneering contribution to the theoretical development of the VBN model. The inclusion of new constructs, such as "Willingness to Pay More" (WTPM) for eco-friendly home products and WOM communication, enriches the model and offers profound insights into the complex drivers of PEB within the context of household consumption. Moreover, this study delves into the depths of human psychology, unraveling the intricate relationships between deeply ingrained values, core beliefs, a sense of obligation, and personal norms. By

exploring how individual characteristics, such as age, gender, education, and income, intricately influence these relationships, the study uncovers additional factors that reinforce the vital connections within the VBN model.

Further, the research proposed a model representing biospheric, altruistic, and egoistic values influencing ecological worldviews. The ecological worldview impacts ACON and affects ascribed responsibility. Additionally, ascribed responsibility influences the “sense of obligation to take pro-environmental actions”. The sense of obligation impacts WTPM, WOM, and BI. Lastly, gender, age, income, occupation, and education influence BI toward SC (see Figure 1).

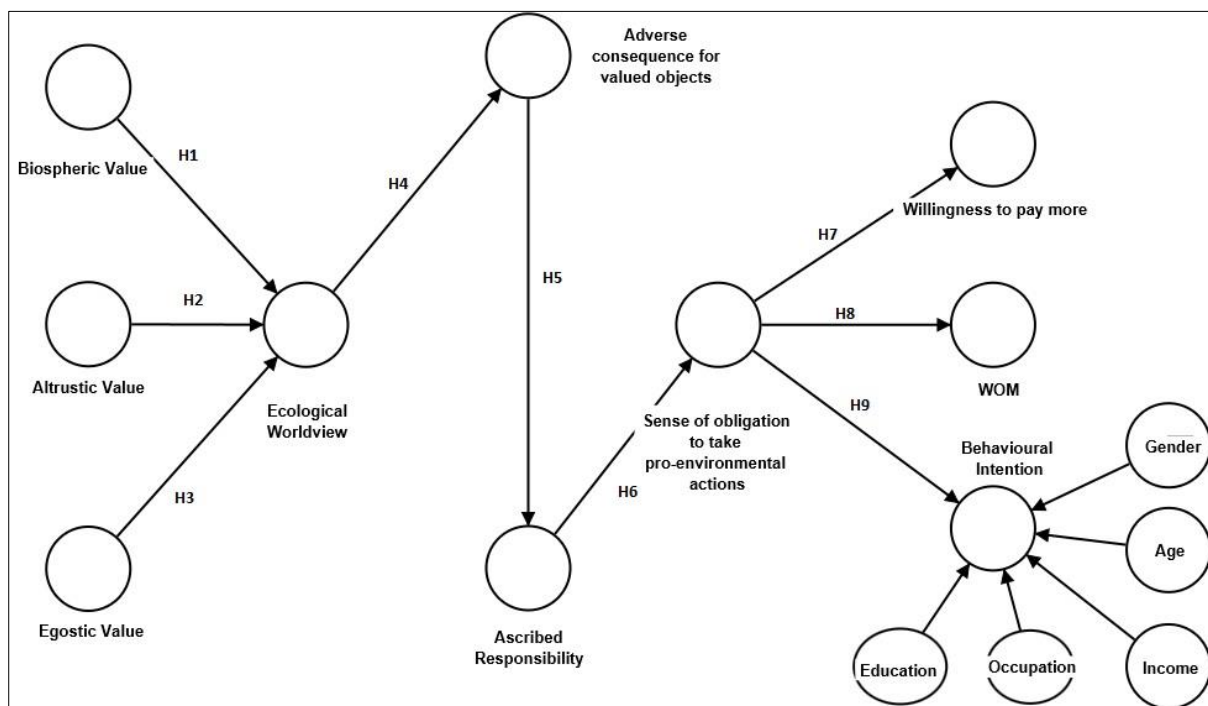


Fig. 1. Conceptual framework.

3. Sampling and methodology

The current study used a mixed-method approach that included the analysis of quantitative and qualitative data to evaluate SC thoroughly. In stage 1, a systematic literature review was conducted to identify critical factors influencing SC and the development of the research model. This model guided the preparation of a questionnaire and data collection from respondents. In stage 2, quantitative analysis (study 1) utilized “Structural Equation Modeling” (SEM) via the SmartPLS software to examine the conceptual model explaining factors influencing households' intention toward SC. Purposive sampling was used to target specific

respondents who are knowledgeable or involved in SC and eco-friendly products. This method ensures that data is collected from individuals who can provide relevant insights, enhancing the research's accuracy and relevance. Data was collected through a survey administered to 517 participants residing in 22 different states across India such as Punjab (29.2%), Rajasthan (13.2%), Haryana (11.3%), Himachal Pradesh (7.0%), Delhi (7.1%), Uttar Pradesh (4.0%), Chandigarh (4.7%), Gujarat (2.4%), Jammu and Kashmir (2.9%), Uttarakhand (2.8%), Assam (2.1%), Kerala (1.8%), Madhya Pradesh (1.7%), Maharashtra (1.5%), Bihar (1.3%), Meghalaya (1.3%), West Bangal (1.3%), Tamil Nadu (1.2%), Jharkhand (0.8%), Karnataka (0.8%), Odisha (0.8%), and Sikkim (0.8%).

Stage 3 involved conducting unstructured interviews (study 2) to gain deeper insights into the statistical results and validate whether the knowledge gained can promote the adoption of EFPs in Indian households. The research design and execution are illustrated in Figure 2.

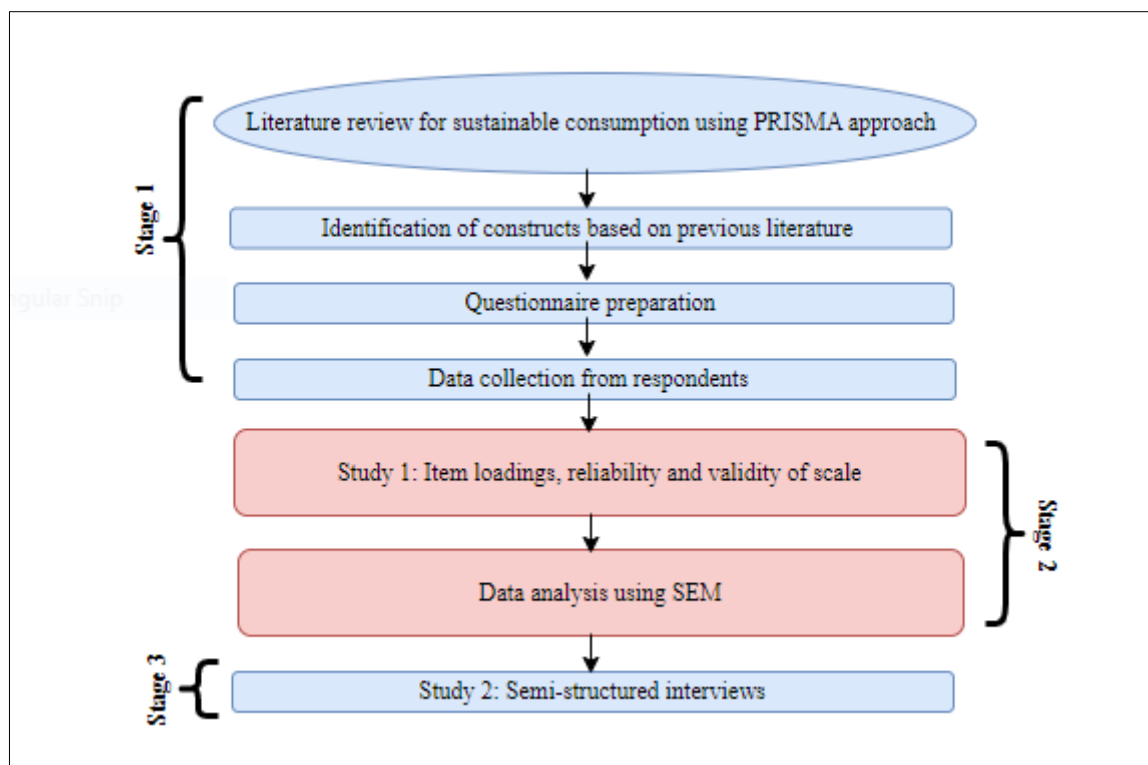


Fig. 2. Flow chart of the research design

4. Study 1: Hypotheses analysis with survey data

4.1. Procedure and data

For study 1, a survey questionnaire was created to gather data using a 7-point Likert scale, with constructs and items adapted from established studies, including De Groot et al. (2007), Stern et al. (1999), and Hwang et al. (2020), as detailed in Table 3. This ensured alignment

with validated frameworks for biospheric, altruistic, and egoistic values, among others (Likert, 2017). Validation of the questionnaire involved multiple steps: first, Cronbach's alpha was calculated during pilot testing to ensure reliability; second, the questionnaire underwent rigorous review by 10 experts specializing in marketing and sustainability to ensure content validity. Additionally, all sources of adapted items are appropriately cited to maintain academic rigor. For further transparency, all questionnaire items are listed in Appendix 2 to ensure the standardization and robustness of the measurement method.

To align with the study's objective of understanding sustainable living practices, we purposively selected households where eco-friendly products were already in use, such as kitchen waste compost bins, coir-based cleaning brushes, water saving taps, and compostable shopping bags. This approach ensured our sample comprised individuals actively engaging in sustainable living practices, providing a reliable basis for assessing attitudes, behaviors, and challenges in adopting environmentally sustainable lifestyles. Additionally, the sample included respondents to explore their unique perspectives on sustainability within household management.

The survey was conducted across India, covering almost all states to ensure geographic and demographic diversity. Participants were initially contacted at their homes through field visits and referrals. Email addresses and phone numbers were compiled through personal networks and community groups. No rewards or incentives were offered, as the focus was on engaging genuinely motivated individuals who shared an interest in the subject matter.

The survey was administered using both online and offline formats to accommodate various preferences. The instrument was designed to be simple and accessible, ensuring participation from individuals across age groups and literacy levels.

Out of the 1,000 surveys distributed, 618 responses were received, achieving a response rate of 61.8%. After carefully screening responses for incomplete or missing data, 517 valid samples were finalized for analysis. This rigorous and diverse sampling approach ensured the reliability of the data, capturing a comprehensive view of sustainable household practices and enabling meaningful insights into the factors driving and hindering environmental sustainability.

The descriptive statistics of the research sample provide key insights into the socio-demographic characteristics of the respondents. Gender distribution indicates that men constituted the majority, accounting for 61.3% of the sample. In terms of age, most participants were between 31 and 50 years (59.4%), with a detailed breakdown as follows: 18–30 years (22.2%), 31–40 years (29.4%), 41–50 years (30.0%), and above 51 years (18.4%).

Employment data revealed that 40.4% of respondents were employed in the service sector, followed by 30.9% who were business owners. Regarding educational qualifications, 33.1% of the participants held a postgraduate degree. Marital status data showed that the majority of respondents (72.5%) were married, and 65.2% had children.

Income levels demonstrated that a significant proportion of respondents (70.4%) reported a monthly income exceeding INR 30,000, indicating a predominantly middle-to-upper-income group. These socio-demographic characteristics suggest that the research sample was predominantly composed of younger to middle-aged, well-educated, married men with children, reflecting a demographic likely to be active in sustainable household practices. This composition aligns well with the study's aim to explore sustainability behaviors among individuals with established family and professional responsibilities.

Table 2 provides a comprehensive summary of these statistics, offering a clearer understanding of the sample's profile. The emphasis on higher education levels, family orientation, and middle-to-upper-income brackets adds robustness to the findings, as these groups are more likely to engage in sustainable practices and provide informed responses. The diversity in age and employment also enhances the generalizability of the results to various professional and social contexts.

Table 2: Respondents' demographics.

Indicator	<i>n</i>	%	Indicator	<i>n</i>	%
<i>Gender</i>			<i>Occupations</i>		
Male	317	61.3	Services	209	40.4
Female	200	38.7	Business	160	30.9
<i>Age</i>			Others	148	28.6
18-30	115	22.2	<i>Educational Qualification</i>		
31-40	152	29.4	Undergraduate	102	19.7
41-50	155	30.0	Graduate	143	27.7
Above 51	95	18.4	Post-graduate	171	33.1
<i>Marital status</i>			Others	101	19.5
Married	375	72.5	<i>Monthly Income (INR)</i>		
Unmarried	142	27.5	Less than 30,000	153	29.6
<i>Children</i>			30,001-40,000	105	20.3
Yes	337	65.2	40,001-50,000	176	34.0
No	180	34.8	Above 50,000	83	16.1

All latent constructs were measured on a seven-point Likert scale. The number of items and the construct sources are depicted in Table 3.

Table 3: Item sources.

Constructs	Items	Source
Biospheric value	4	De Groot et al. (2007); Stern et al. (1999)
Altruistic value	3	De Groot et al. (2007); Stern et al. (1999)
Egoistic value	3	De Groot and Steg (2008), Stern et al. (1993)
Ecological worldview	3	Stern et al. (1999)
ACON	3	Han (2015)
Ascribed responsibility	3	Onwezen et al. (2013); De Groot et al. (2007)
SO	3	Onwezen et al. (2013); De Groot et al. (2007)
Willingness to pay more	3	Hwang et al. (2020)
WOM	3	Hwang et al. (2020)
Behavioral intention	4	Han (2015)

Note: ACON=Adverse consequence for valued objects, SO= “Sense of obligation to take pro-environmental actions,” WOM=Word of mouth intention

“Partial Least Squares Structural Equation Modeling” (PLS-SEM) is a robust statistical technique for analyzing complex models, particularly advantageous for research scenarios involving small sample sizes, non-normal data distributions, and formative constructs. Unlike Covariance-Based SEM (CB-SEM), which emphasizes model fit, PLS-SEM focuses on predictive accuracy, making it ideal for exploratory studies and theory development. Furthermore, it allows simultaneous evaluation of measurement and structural models, providing flexibility in handling complex relationships among latent variables, which makes PLS-SEM a preferred choice for studies requiring robust parameter estimation and data adaptability (Sarstedt et al., 2021; Hair et al., 2020). However, PLS-SEM has limitations as it lacks stringent goodness-of-fit measures, is often considered a hallmark of SEM techniques, and may overestimate path coefficients due to its reliance on explained variance. Additionally, the method's flexibility may lead to model specification issues if not properly guided by theoretical underpinnings. Despite these drawbacks, PLS-SEM’s ability to accommodate non-normal data and small samples ensures its relevance for diverse research contexts (Dash and Paul, 2021; Afthanorhan, Awang and Aimran, 2020; Hair et al, 2017). Thus, PLS-SEM was employed using SmartPLS software to analyze the collected data effectively.

4.2. Results and Analysis

Firstly, the item loadings and "Average Variance Extracted" (AVE) were used to evaluate "Convergent Validity" (CV). Items loadings reflect how well the items represent some underlying construct. Item loadings ranged from 0.782 to 0.930. According to Chin (1998), item loadings should be over 0.5, which is the case. Besides, the AVE estimates how much variation is attributable to different constructs compared with that due to measurement error. The AVE ranged from 0.671 to 0.853, higher than the suggested value of 0.5 (Fornell and Larcker, 1981). To ensure the internal consistency of the item scale, we measured its "Composite Reliability" (CR). This metric assesses the actual score variance to the scale variance. In the current research, CR values ranged from 0.859 to 0.946, depicting internal consistency (Bagozzi and Yi, 1988). Cronbach alpha (α) measures the model's reliability by determining whether the set of items consistently measures a construct. The prescribed value α should be more than 0.7, and α values in the present research lie between 0.759 and 0.915 (see Table 4). Thus, the present model satisfies the necessary conditions of reliability and validity (Bagozzi and Yi, 1988).

Table 4: Item loadings, construct reliability

Construct and items	Loadings	α	CR	AVE
Biospheric value (BV1-BV4)	0.874-0.919	0.915	0.940	0.798
Altruistic value (AV1-AV3)	0.909-0.919	0.903	0.939	0.837
Egoistic value (EV1-EV3)	0.821-0.861	0.798	0.881	0.712
Ecological worldview (EW1-EW3)	0.899-0.912	0.889	0.931	0.818
"Adverse consequences for valued objects" (ACON1-ACON3)	0.897-0.920	0.891	0.932	0.821
"Ascribed responsibility" (ARES1-ARES3)	0.782-0.836	0.759	0.859	0.671
"Sense of obligation to take pro-environmental actions" (SO1-SO3)	0.916-0.930	0.914	0.946	0.853
Willingness to pay more (WTPM1-WTPM3)	0.860-0.884	0.847	0.907	0.766
WOM (WOM1-WOM3)	0.865-0.910	0.873	0.922	0.797
Behavioural intention (BI1-BI4)	0.855-0.892	0.892	0.925	0.756

Note: Items details are attached in Appendix 2

The Fornel-Larcker criteria were also applied to understand the discriminant validity of the model. Fornell and Larcker (1981) suggested that the AVE value for a construct has to be

higher than its correlation with other constructs, and this model satisfies their recommendation (Table 5).

Table 5: Discriminant validity.

Constructs	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. ACON	0.906									
2. AV	0.762	0.915								
3. ARES	0.302	0.335	0.819							
4. BI	0.852	0.781	0.324	0.869						
5. BV	0.748	0.883	0.306	0.756	0.893					
6. EW	0.763	0.862	0.336	0.769	0.869	0.905				
7. EV	-0.818	-0.813	-0.347	-0.849	-0.783	-0.805	0.844			
8. SO	0.694	0.731	0.281	0.661	0.678	0.679	-0.658	0.923		
9. WOM	0.397	0.334	-0.089	0.369	0.28	0.293	-0.341	0.372	0.893	
10. WTPM	0.342	0.287	0.051	0.311	0.317	0.312	-0.317	0.391	0.046	0.875

Note: ACON=Adverse consequence for valued objects; SO=Sense of obligation to take pro-environmental actions; AV=Altruistic value; ARES=Ascribed responsibility; BI=Behavioural intention; EW=Ecological worldview; EV=Egoistic value; WOM=World of mouth intention; WTPM = willingness to pay more.

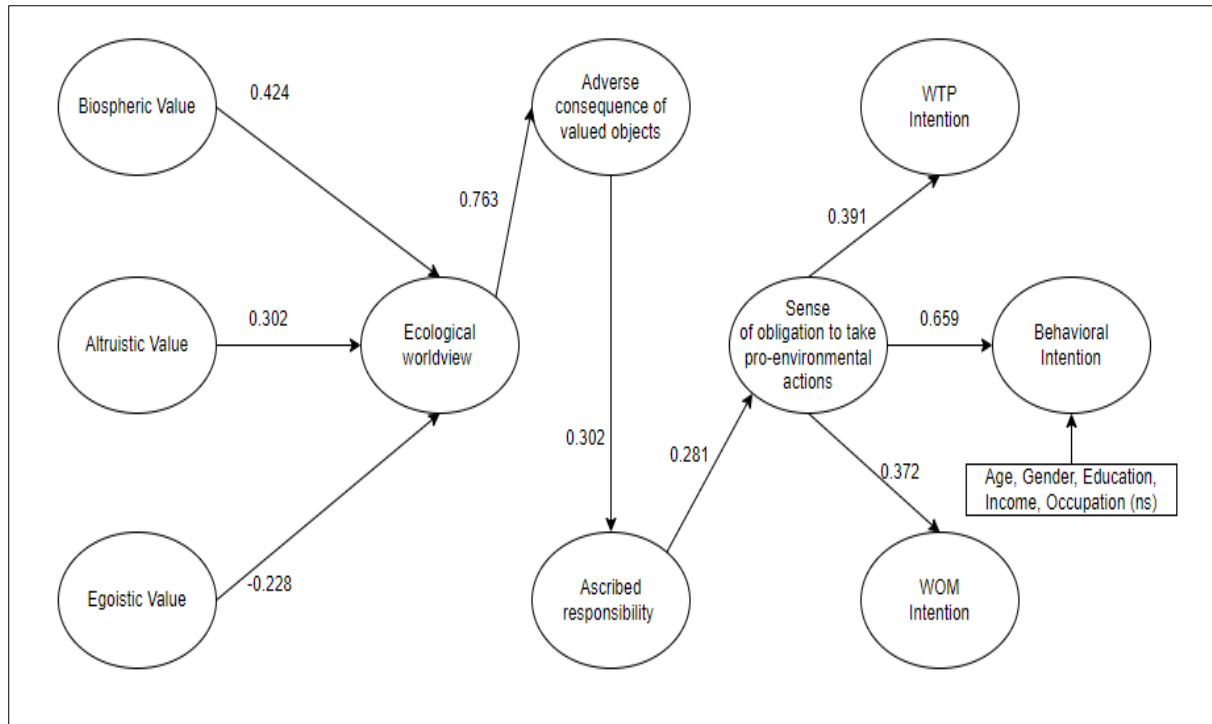


Fig. 3. Structural Model Results

Table 6: Path analysis.

Paths and relationships		<i>t-value</i>	<i>β-value</i>
H₁	Biospheric value -> Ecological Worldview	9.904	0.424***
H₂	Altruistic value -> Ecological Worldview	6.898	0.302***
H₃	Egoistic value -> Ecological Worldview	6.355	-0.228***
H₄	Ecological worldview -> ACON	18.999	0.763***
H₅	ACON -> Ascribed responsibility	4.545	0.302***
H₆	Ascribed responsibility -> SO	4.649	0.281***
H₇	Sense of obligation -> WTPM	6.379	0.391***
H₈	Sense of obligation -> WOM	5.797	0.372***
H₉	Sense of obligation -> Behavioural intention	13.402	0.661***

Note: *** $p < 0.001$

Figure 3 illustrates the structural model results, while Table 6 summarizes the hypotheses testing outcomes using β -values, t -values, and p -values. The findings reveal significant influences of biospheric values ($\beta = 0.424$, $t = 9.904$, $p = 0.000$) and altruistic values ($\beta = 0.302$, $t = 6.898$, $p = 0.000$) on the formation of an ecological worldview, thereby supporting hypotheses H1 and H2. Biospheric values emphasize respect for and protection of the environment, including controlling pollution, leading to a stronger ecological worldview. Similarly, altruistic values, which focus on societal welfare through equality, peace, and social justice, also contribute to building an ecological worldview (Awais et al., 2022; Megeirhi et al., 2020). These findings align with previous studies by Zhang et al. (2020), Poortvliet et al. (2018), and Aguilar et al. (2012). Hypothesis H3, which posits a negative impact of egoistic values on the ecological worldview, is supported ($\beta = -0.228$, $t = 6.355$, $p = 0.000$). Egoistic values, such as prioritizing social power, wealth, and authority, deter individuals from adopting an ecological worldview, as they focus more on personal benefits rather than environmental preservation. This result is consistent with studies by Zhang et al. (2020) and Poortvliet et al. (2018).

The relationship between the ecological worldview and awareness of consequences (H4) is supported ($\beta = 0.763$, $t = 18.999$, $p = 0.000$). Recognizing the disruption of natural balance and depletion of resources encourages individuals to acknowledge the adverse effects of valued objects like plastic products (Lebreton et al., 2018). Hypothesis H5 examining the impact of ACON on ascribed responsibility is also supported ($\beta = 0.302$, $t = 4.545$, $p = 0.000$). Awareness of the environmental harms caused by plastic products fosters environmentally responsible behavior, which aligns with findings from Çakır and Karaarslan (2019), Kiatkawsin and Han (2017), and Aguilar et al. (2012). Collectively, predictors of ACON and ARES explain 58.2% of the variance. The significant relationship between ARES and sense of obligation further supports H6 ($\beta = 0.281$, $t = 4.649$, $p = 0.000$). Previous research highlights

that ascribed responsibility and a sense of obligation promote pro-environmental actions (Wang et al., 2021).

Sense of obligation to take pro-environmental actions significantly influence WTPM, WOM, and BI to adopt eco-friendly products (EFPs), supporting H7 ($\beta = 0.391$, $t = 6.379$, $p = 0.000$), H8 ($\beta = 0.372$, $t = 5.797$, $p = 0.000$), and H9 ($\beta = 0.661$, $t = 13.402$, $p = 0.000$), respectively. Engaging in pro-environmental actions fosters a greater inclination to adopt and promote EFPs, driving demand for sustainable products. These findings corroborate earlier studies (Hwang et al., 2020; Han et al., 2017; Fesenfeld et al., 2021).

The study's findings reveal that biospheric and altruistic values positively influence ecological worldviews, while egoistic values have a negative impact. In the Indian context, cultural factors such as collectivism, respect for traditions, religiosity, and local customs play a significant role in shaping these values and, consequently, sustainable consumption behaviors (De Groot and Steg, 2008; Stern et al., 1999; Schwartz, 1977). For instance, the collectivist orientation prevalent in India emphasizes community well-being over individual gains. This cultural trait can enhance the adoption of EFPs like kitchen waste compost bins, as households may feel a collective responsibility towards environmental conservation. Such communal values align with altruistic motives, reinforcing positive ecological worldviews and a sense of obligation towards SC. Additionally, respect for traditions and hierarchical structures in Indian society often involves adherence to age-old practices that are inherently sustainable. Traditional cleaning tools, such as coir-based brushes and sponges, are eco-friendly alternatives that resonate with cultural preferences for natural materials. The continued use of these items reflects a biospheric value orientation, where harmony with nature is prioritized (Awais, Fatima, and Awan, 2022; Carfora et al., 2021). Furthermore, the importance of religion and spirituality influences consumption choices. Many Indian festivals and rituals promote the use of compostable shopping bags and biodegradable materials, aligning with religious teachings

advocating for environmental stewardship (Truong et al., 2024; Nguyen, 2022). Such practices strengthen ecological worldviews and the ascribed responsibility to protect nature, thereby fostering sustainable consumption intentions (Cakır and Karaarslan, 2019).

Demographic variables such as age, gender, education, income, and occupation exhibited no statistically significant relationship with BI (age: $\beta = 0.045$, $t = 1.285$; gender: $\beta = 0.012$, $t = 0.168$; education: $\beta = 0.007$, $t = 0.191$; income: $\beta = 0.023$, $t = 0.712$; occupation: $\beta = 0.024$, $t = 0.668$). This indicates that factors like environmental and perceived benefits play a more decisive role in shaping BI towards EFPs (Joshi and Rahman, 2019; Lemaire and Limbourg, 2019).

Mediation Analysis

Mediation effects were evaluated using the bias-corrected bootstrap method (Hayes and Scharkow, 2013). Ecological worldview fully mediates the relationship between altruistic values and ACON (VAF = 88.04%), consistent with findings by Poortvliet et al. (2018). Partial mediation was observed between egoistic values and ACON (VAF = 40.88%). Similarly, ascribed responsibility partially mediated the relationship between adverse consequences and pro-environmental actions (VAF = 32.65%), and pro-environmental actions partially mediated the link between ascribed responsibility and WOM (VAF = 56.28%) see Table 7. These findings align with previous studies by Çakır (2019), Poortvliet et al. (2018), and López and Sánchez (2012).

Table 7: Mediation results.

IV	M	DV	IV→DV	IV→M	M→DV	Indirect effect	VAF	Mediation
AV	EW	ACON	0.410	0.886	0.418	0.361	88.04%	Full
EV	EW	ACON	-0.636	-0.869	0.300	0.260	40.88%	Partial
ACON	AR	SO	0.830	0.271	0.100	0.271	32.65%	Partial
AR	SO	WOM	-0.183	0.364	0.285	0.103	56.28%	Partial

Note: EW = Ecological Worldview; IV = Independent Variable, M = Mediator, and DV = Dependent Variable; VAF = Variation accounted for; $VAF < 20\%$ represents no mediation, $20\% \leq VAF \leq 80\%$ represents partial mediation, and $VAF > 80\%$ represents full mediation.

5. Study 2: Relevance assessment with semi-structured interviews

5.1. Procedure and data

Study 2 aims to delve deeper into the statistical results obtained in a prior study. In order to accomplish this objective, we conducted semi-structured face-to-face interviews with a carefully selected sample of 20 Indian households. Selecting a sampling size of 20 resulted from careful consideration and several justifications. Firstly, qualitative research methods, such as semi-structured interviews, prioritize in-depth exploration and understanding of the participants' perspectives and experiences. They are grounded in deep rather than broad readings. A small sample can still be insightful and meaningful, capturing the depth and complexity of individual experiences within the given context. The twenty households were purposively selected because of their unique viewpoints, histories, and socio-economic statuses. This method expanded the comprehensiveness and range of the obtained data by capturing the various perspectives and experiences. A sample size of 20 was deemed sufficient, given the aim of the study, the resources available, and the methodology (Boddy, 2016; Burns, 2000). Participants are purposive, and an ideally representative sample of respondents for interviewing is selected in order to maximize any relevant data gained—purposive sampling is utilized for participants with actual SCs toward EFPs. The qualitative data from the semi-structured interviews revealed significant insight into individual motivations and behaviors. The qualitative results were merged with the quantitative data of the survey in accordance with the validation and complementing of the statistical results of the survey. Mixing the methods provided the possibility to compare the themes in the interviews with the trends of the survey and enhanced understanding of the research questions. The qualitative data generated by interviews enriched this quantitative data with personal, in-depth experiences and views to ensure then a robust and sophisticated analysis in which the strengths of both methodologies are combined. The interviews took place in September 2023 and interviews lasted for 30 to 45 minutes. Respondents were asked about their intentions and reasons for using EFPs at home. Their quotes and significant findings are described in Appendix 3.

5.2. Findings and Analysis

Value: Some interviewees (8, 11, and 18) stated that they use EFPs at their home based on biospheric, altruistic, and egoistic values. Biospheric value refers to a general concern with the environment and an interest in preservation (Hwang et al., 2020; Hiratsuka et al., 2018.) Altruistic value refers to concern for others, the desire to help those in need, and the desire to help future generations (Awais et al., 2022; Hiratsuka et al., 2018). Based on altruistic values, individuals aim for a better society by lowering their carbon footprint on the environment. Households believe their efforts can make a difference in human life and are responsible for their actions. Egoistic values include reducing energy and water use or moving away from a reliance on chemical cleaning agents (Zhang et al., 2020). Indian households consider EFPs as a way to prove their social status and environmental realization, consequently using them based on egoistic values.

Belief. Based on the results of interviewees (4, 5, 6, and 17), we found that EFPs are used for various reasons, such as ecological worldview, ACON, and ascribed responsibility. We reported the same facts with Zhang et al. (2020), Gkargavouzi et al. (2019), and Van and Kyle (2016), who claimed that the ecological worldview was established from the theory that man is a primordial part of nature and man needs to keep the ecology. Additionally, they accept EFPs as a result of ACON. They are aware of the negative impact that environmental degradation has on their health, happiness, and cultural heritage. Finally, they use EFPs based on ascribed responsibility, which is the idea that they are responsible for protecting and preserving the environment because of their societal or cultural positions (See Appendix 4).

Norms: According to the results, Indian households rely on EFPs because they feel obligated to undertake PEB. This responsibility for doing so can come from various sources, such as moral or ethical values and social norms (Grappi et al., 2024; Awais et al., 2022; Han et al., 2017). They recognize their responsibility towards the environment and believe in reducing their ecological footprint to contribute to sustainable living (Rowe et al., 2019; De Groot et al., 2007). Moreover, they feel social pressure to conform to PEB, influenced by their peers, family, or community. Additionally, they are motivated to comply with environmental regulations or policies that mandate EFPs (Appendix 4).

Behaviour. Most interviewees unanimously agreed that they use EFPs based on their WTPM, which refers to their readiness to spend more on EFPs. Interviewees (13 and 14) said they are WTPM for EFPs because they believe they are better for the environment and their health (Appendix 4). They are also willing to support companies prioritizing sustainability and

eco-friendliness (Hwang et al., 2020). Another factor that motivates Indian households to use EFPs is WOM. Based on the interviewees' (2, 3, 7, 9, and 16) responses, they are influenced by recommendations from family, friends, or colleagues who have used EFPs and had positive experiences with them (Appendix 4). Positive WOM increases their confidence in EFPs and encourages them to try them out (Awais et al., 2022; Han et al., 2017). Finally, Indian households are motivated by their BI, which refers to their intention for PEB, such as using EFPs. Based on interviewees' (1, 10, 12, 15, 19, and 20) responses, they are more likely to use EFPs if they have a positive attitude towards sustainability, believe that their actions can make a difference, and have a sense of responsibility towards the environment. While adopting EFPs, they think about whether these products are convenient and readily available in the near market (Gkargkavouzi et al., 2019).

6. Conclusions

6.1. Conclusions

The results of this study indicate that biospheric, altruistic, and egoistic values each occupy an essential place in shaping people's ecological worldviews. This research further points to the significance of ecological worldviews in predicting how people will respond when something they treasure is taken from them. This indicates that those with a high environmental consciousness are more sensitive to the possible drawbacks of their favorite possessions. ACON also strongly affects ARES. People see that what they care most about is harming others; when people sense this, they feel a greater responsibility to do something about it. People's sense of responsibility for a particular problem determines their willingness to engage in PEB. A more intense sense of responsibility leads individuals to assume they should engage in PEB. In addition, people's sense of obligation is imperative in their WTPM, WOM, and BI for EFPs, which concluded that customers with more responsibility are ready to pay more for ecologically responsible alternatives and products/services.

6.2. Theoretical insights

The VBN theory provides a foundational framework for explaining PEB by linking values, ecological worldviews, and moral norms to BI. Traditional VBN models often prioritize the role of biospheric values, ecological worldviews, and ascribed responsibility but fail to integrate a more nuanced understanding of egoistic and altruistic values (López and Sánchez, 2012; De Groot et al., 2007; Stern et al., 1993). Our extended VBN model bridges this gap by explicitly examining the interplay of biospheric, altruistic, and egoistic values and their differential impacts on ecological worldviews and behavioral outcomes. Unlike previous

models that predominantly emphasized biospheric values, our approach identifies that altruistic values (e.g., concern for social justice and collective welfare) also significantly influence ecological worldviews. Interestingly, the inclusion of egoistic values (which traditionally focus on self-interest) reveals a negative relationship, further clarifying their distinct role in shaping PEB. Additionally, current research incorporates constructs like "adverse consequences of valued objects" and "sense of obligation to take pro-environmental actions," which deepen the explanatory power of the model by capturing individuals' awareness of environmental harm and moral obligation.

Prior studies, such as Hiratsuka et al. (2018), Aguilar et al. (2012), and Stern et al. (1999), overlooked practical constructs like WTP and WOM intentions, limiting their applicability to real-world contexts. Our model bridges this gap by linking these constructs to BI, highlighting actionable insights for businesses and policymakers. Furthermore, the present extended VBN framework provides a more comprehensive lens for understanding and promoting SC behavior. The research envisages theoretical underpinnings firstly for the fact that the values are indispensable in generating ecological worldviews and the adoption of EFPs, which thereby highlights the values as a significant factor in the formation of SC behavior (Truong et al., 2024; Ghazali et al., 2019; Han et al., 2017; Kiatkawsin and Han, 2017). Second, the study witnesses the influence of these beliefs on the adoption of EEPs by showcasing the impact of individual beliefs on attitudes and intentions towards SC behavior, and the incorporation of these belief factors in the model provides a comprehensive view regarding the mechanism behind the same.

Furthermore, the study aggrandizes insights regarding the influence of social factors on decision-making and BI. Besides, the research underscores the mantle of normative influence to impel PEB, thereby enriching the VBN model (Nguyen, 2022; Wang et al., 2021; Greene, 2018). The study also reveals that WTPM for EFPs and positive WOM recommendations are effective indicators in forecasting EFP use. These results offer insight into the motivational aspects of SC behavior and their relationship to the VBN model. Elucidating the psychological and sentimental factors that affect sustainable consumer choice and understanding how WTPM, WOM, and BI influence EFP adoption contributes to the theoretical development of the VBN model. The empirical evidence of SC behavior in Indian households presented in this study enhances the theoretical understanding of the VBN model. It provides valuable insights for future research and the formulation of effective strategies to promote SC practices.

6.3. Practical implications

From a practical standpoint, the findings reveal that biospheric, altruistic, and egoistic values significantly shape ecological worldviews, which subsequently influence SC behaviors. Biospheric and altruistic values, such as concern for environmental preservation, social justice, and pollution prevention, strongly contribute to an ecological worldview fostering sustainable practices (Singh and Alok, 2022; Megeirhi et al., 2020; Rezaei et al., 2020). Businesses and policymakers can leverage these insights to drive positive change. For instance, companies producing sustainable products can emphasize these values in their branding, marketing, and communication strategies. Campaigns highlighting the role of individual choices in protecting the planet and fostering social equity can resonate with consumers who prioritize these values. Similarly, governments can design policies and educational programs that instill biospheric and altruistic values from an early age, promoting a culture of sustainability. Tax incentives or subsidies for EFPs can encourage SC behaviors among egoistic consumers, appealing to their benefits, such as cost savings or improved quality of life. Policymakers can also collaborate with businesses to set standards for green certifications, making it easier for consumers to identify genuinely sustainable options. By integrating these findings into actionable strategies, stakeholders can drive consumer behavior toward sustainability and create a ripple effect, enhancing ecological consciousness across society. According to our findings, promoting eco-friendly home products as a solution that eliminates resource usage may result in more favorable consumer responses, necessitating the companies to focus more on utilizing advanced technology to produce EFPs (Truong et al., 2024; Zhang et al., 2020). The manufacturing companies should provide directions and lay out the advantages of sustainable products to the consumers. A particular focus should be laid on educating consumers about the current environmental issues and strategies to cope with them. Given the negative impact of egoistic values on ecological worldviews, there is a need to foster a sense of belongingness among consumers. It will make them realize how their actions harm the planet's ecological balance.

Furthermore, the impact of adverse actions of valued objects was found significant on the ARES, signifying the need to educate consumers regarding the ill effects of plastic products. Besides this, strict legislation should be passed to restrict the sale of plastic products. Several nations have banned the sale of single-use plastic bags, and India has taken action in this direction. However, its implementation remains a matter of concern. For instance, the Punjab (India) government banned single-use plastic in July 2022, but it still sells undeterred on the

streets (The Tribune, 2022). The government should order block-level officers to check that, and strict actions should be taken against the shopkeepers selling these products. Besides, the plastic used in products like food containers should be manufactured using less harmful plastic like polypropylene, which is less inflammable and non-cancer-causing.

Moreover, stainless steel, glass, and lead-free ceramic utensils should be used instead of plastic ones. Additionally, linking the adoption of sustainable products with the personal gains of the consumers can be instrumental in their adoption. One aspect could be keeping the price of sustainable products low and attracting consumers. Also, government initiatives in the form of subsidies and tax concessions will play an essential role in lowering the manufacturing cost of these products. Social media can contribute substantially to educating the public about global warming and climate change.

The advertisements should trigger individuals to conserve the environment on moral grounds. The persuasive messages can prompt general curtailment and evoke environmental guilt, thus modulating the behavior of the consumers. Marketing professionals should highlight the distinctive features of EFPs and communicate their superiority over traditional products, particularly in terms of their environmental impact, to potential consumers. Besides, inculcating a sense of pride in using sustainable products by rewarding those who use only these sustainable products can also be effective. Additionally, the current research is based on surveys and semi-structured interviews that could have several practical implications for businesses and policymakers looking to promote EFPs. For example, by understanding the specific values and beliefs that motivate consumers to purchase these products, companies could develop more effective marketing campaigns that appeal to those values and beliefs.

Similarly, policymakers could use this information to design policies and incentives that encourage SC. *Lastly*, the impact of age, gender, income, education, and occupation on BI is insignificant. These findings can guide marketing and communication strategies to promote EFPs and practices by focusing on other factors concerning EFPs rather than demographic characteristics.

6.4. Limitations and Future Research Directions

Despite the researchers' best efforts, this study has certain limitations. *First*, the study has a sampling limitation, as purposive sampling does not represent the entire population. Therefore, future studies could conduct larger-scale studies using other sampling methods to maintain the generalization of the findings, enabling researchers to capture a broader range of

experiences and perspectives on SC. *Second*, the study comprehends the potential BI to adopt SC; how things unfold in real consumption situations cannot be told with certainty. Future studies can employ field surveys to comprehend consumption behaviors better, particularly interaction and co-evolution of society (Evans et al., 2020) and the influence of social-technical change in everyday SC practices (Greene, 2018). *Third*, as the study deals with SC and PEB, the respondent may feel an ethical pressure to respond pro-environmentally while completing the questionnaire. So, the study's results should be generalized and interpreted with caution. *Fourth*, the proposed theoretical model is extensible as certain important constructs like alternatives' attractiveness and attitude can play a significant part in evaluating SC behavior. *Finally*, the results could be more generalizable across nations as SC behaviors of the consumers may vary according to cultures and nationalities. Future research can focus on evaluating the influence of national culture on the model and compare SC practices across different countries, cultures, and socio-economic groups, which would help identify the factors influencing SC in different contexts.

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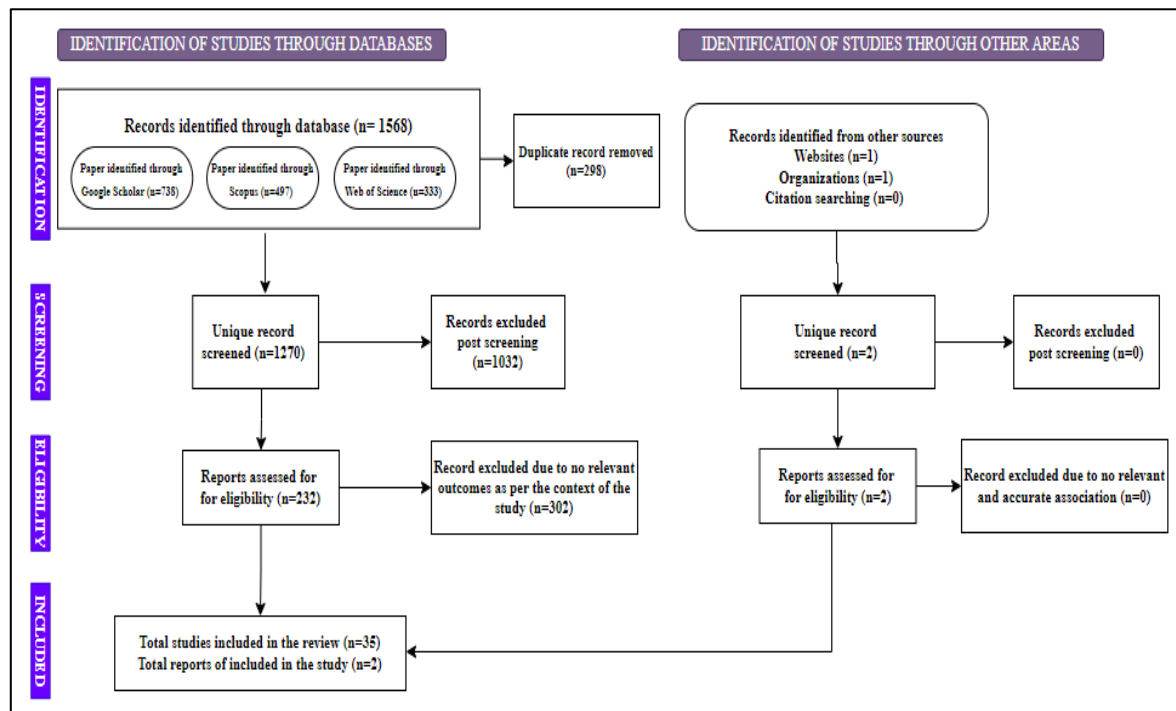
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List of Abbreviations

ACON:	Adverse Consequences
AV:	Altruistic Value
ARES:	Ascribed Responsibility
AVE:	Average Variance Extracted
BI:	Behavioural Intention
BV:	Biospheric Value
CR:	Composite Reliability
CV:	Convergent Validity
CB-SEM:	Covariance-based Structural Equation Modeling
α :	Cronbach Alpha
EFPs:	Eco-Friendly Products
EW:	Ecological Worldviews
EV:	Egocentric Values
NAM:	Norm Activation Model
PLS-SEM:	Partial Least Squares Structural Equation Modeling
PEB:	Pro-Environmental Behaviour
SO:	Sense of Obligation
SEM:	Structural Equation Modeling
SC:	Sustainable Consumption
TPB:	Theory of Planned Behavior
VBN:	Value-Belief-Norm
VAF:	Variance Accounted For
WTPM:	Willingness to Pay More
WOM:	Word-Of-Mouth

Appendix 1. Literature search and identification using the PRISMA approach.



Appendix 2. Survey items.

Construct and item

Biospheric value

- BV1 Respecting the Earth.
- BV2 Unity with nature
- BV3 Protecting the environment.
- BV4 Preventing pollution

Altruistic value

- AV1 Equality
- AV2 A world at peace
- AV3 Social justice

Egoistic value

- EV1 Social power
- EV2 Wealth
- EV3 Authority

Ecological worldview

- EW1 The balance of nature is very delicate and can easily get upset.
- EW2 Humans are severely abusing the environment.
- EW3 The Earth is like a spaceship with limited room and resources.

Adverse consequences for valued objects

- ACON1 Plastic products can cause water pollution.
- ACON2 Plastic products can potentially aggravate global warming.
- ACON3 Plastic products can lead to soil pollution.

Ascribed responsibility

-
- ARES1* I believe that consumers are partly responsible for environmental problems potentially caused by plastic products.
- ARES2* I feel that the consumers are jointly responsible for the environmental deterioration potentially caused by current plastic products.
- ARES3* I believe that every consumer must take responsibility for the environmental problems caused by current plastic products.

Sense of obligation to take pro-environmental actions

- SO1* I feel an obligation to choose an eco-friendly home product.
- SO2* I feel that I should behave in an environmentally friendly manner when buying home products.
- SO3* I feel it is essential that consumers behave sustainably when using home products.

Willingness to pay more

- WTPM1* I am likely to pay more for eco-friendly home products.
- WTPM2* Buying eco-friendly home products is the right thing to do, even if they cost more.
- WTPM3* I am willing to buy eco-friendly home products despite my limited choices.

Word-of-Mouth

- WOM1* I will likely say positive things about eco-friendly home products to others.
- WOM2* I am likely to recommend eco-friendly home products to others.
- WOM3* I am likely to encourage others to use eco-friendly home products.

Behavioral intention

- BI1* I want to use eco-friendly home products.
- BI2* I will surely buy eco-friendly home products in the future.
- BI3* I will use eco-friendly home products more frequently.
- BI4* I believe others would be influenced by my decision to adopt eco-friendly home products.
-

Note: All the items use Likert scales (1 = strongly disagree, 7 = strongly agree).

Appendix 3. Interview details.

Interviewee	Duration (Mins)	Gender	Age	Marital status	Children	Family Type	Occupations	Education	Monthly Income (INR)
INT-1	35	Male	44	Married	Yes	Nuclear	Business	Graduate	Above 50,000
INT-2	37	Male	55	Married	Yes	Nuclear	Business	Graduate	Above 50,000
INT-3	34	Female	49	Married	Yes	Nuclear	Others	Undergraduate	40,001-50,000
INT-4	27	Male	56	Married	Yes	Nuclear	Services	Graduate	Above 50,000
INT-5	29	Female	53	Married	Yes	Joint	Services	Post-graduate	Above 50,000
INT-6	33	Male	48	Married	Yes	Nuclear	Services	Graduate	Above 50,000
INT-7	39	Male	41	Married	Yes	Joint	Others	Graduate	40,001-50,000
INT-8	38	Female	39	Married	Yes	Nuclear	Services	Others	40,001-50,000
INT-9	37	Male	34	Married	Yes	Joint	Services	Graduate	Less than 30,000
INT-10	32	Female	37	Married	Yes	Nuclear	Others	Post-graduate	Above 50,000

INT-11	37	Male	42	Married	Yes	Joint	Services	Graduate	40,001-50,000
INT-12	45	Male	33	Married	Yes	Nuclear	Others	Graduate	Less than 30,000
INT-13	33	Male	37	Married	Yes	Joint	Business	Others	Above 50,000
INT-14	31	Female	39	Married	Yes	Nuclear	Services	Post-graduate	Above 50,000
INT-15	32	Male	34	Married	Yes	Joint	Others	Graduate	Less than 30,000
INT-16	29	Male	38	Married	Yes	Nuclear	Services	Post-graduate	40,001-50,000
INT-17	41	Male	32	Married	Yes	Joint	Services	Graduate	40,001-50,000
INT-18	42	Female	35	Married	Yes	Joint	Business	Post-graduate	Above 50,000
INT-19	33	Female	37	Married	Yes	Nuclear	Services	Others	40,001-50,000
INT-20	32	Female	41	Married	Yes	Nuclear	Business	Post-graduate	Above 50,000

Appendix 4. Exemplary quotes and findings from the interviews ($n=20$).

Constructs	Measure	Interviewee	Sample quotes
Value	Biospheric value	(INT-18)	I believe that we are responsible for caring for and preserving the environment for future generations; our choices positively impact the environment. Using EFPs and reducing waste can reduce our carbon footprint and environmental impact. So, we must do our part to create a sustainable future for everyone.
	Altruistic value	(INT-11)	I believe it is essential to think beyond ourselves and consider the well-being of others. I try to use eco-friendly products at home as much as possible. We use reusable shopping bags to reduce our plastic waste, eco-friendly cleaning products, and purchase products with minimal packaging. In addition, we recycle things, including paper, plastic, and glass.
	Egostic value	(INT-8)	We prioritize our comfort and convenience over environmental concerns and do not want inconvenience or spend extra money on EFPs unless we benefit directly. It is not that we do not care about the environment, but we do not put it ahead of our needs. We care about the environment to the extent that it affects us personally. For instance, we turn off lights

			and unplug electronics when not in use to save on utility bills. We also try to use less water to cut our water bills.
Belief	Ecological worldview	(INT-4)	We are part of nature and must protect and pass on our environment to future generations. The eco-friendly worldview includes several things in our everyday life. For example, people use reusable bags when shopping.
	Adverse consequences for valued objects	(INT-17)	Our consumption habits can potentially damage the environment, water, and soil. These adverse effects are minimized by lessening the waste generated and consuming less energy. We also select sustainable products with a small environmental impact.
	Ascribed responsibility	(INT-5)	I have a great sense of responsibility for the environment and think we should protect and cherish it forever. This is a lifestyle choice we make daily as we try to reduce environmental damage and realize sustainability by making eco-friendly choices and reducing our carbon footprint.
	Sense of obligation to take pro-environmental actions	(INT-6)	We feel a strong sense of responsibility to do something for the environment, and we must protect the environment. Toward this end, we purchase well-made products of long-lasting quality that are not disposable or made cheaply that contribute to waste, and we hope the examples we set will be emulated in people's homes.
Behavior	Willingness to pay more	(INT-14)	Using a coir cleaning kit makes me feel as if I am doing something to protect the environment, and this is a small step that can have a significant impact. It is the cleanest way of reducing my carbon footprint. I am willing to pay extra for charcoal cleaning kits because they are better for my family's health and the environment.
		(INT-13)	I appreciate it when stores offer discounts for bringing our own shopping bags because it incentivizes many like me to remember to bring my own bag. I have noticed that more and more stores are offering eco-friendly bags, which makes it easier to make the switch.

			Moreover, despite fewer choices and high prices, I am willing to buy eco-friendly home products.
	Word-of-mouth advocacy	(INT-16)	Shopping clothes bags are sturdier and can hold more weight than plastic bags, so it is a win-win. I have started to gift my friends and family these reusable bags to encourage them to reduce plastic waste. Also, I try to keep a few extra bags in my car so I am always prepared to use them.
		(INT-3)	I prefer to use jute or cotton shopping bags because they are biodegradable and compostable. One of my friends recommended the same to me, and I think it is essential to set a good example for my children by using eco-friendly shopping bags and teaching them about the importance of sustainability.
		(INT-2)	I have noticed that coir cleaning kits are becoming more widely available in stores, making it easier for me to switch. I have found that coir cleaning kits are just as effective as traditional cleaning products and without harming the environment. I even recommended coir cleaning kits to my other friends because I think supporting EFPs is essential.
		(INT-9)	On the recommendation of a colleague, we started using a kitchen composter bin at home and found that its use has made us more aware of the amount of food waste we produce, which has encouraged us to waste less overall. Also, it is an easy way to reduce the environmental impact and save money on fertilizers.
		(INT-7)	I feel good about using water-saving taps because it is a small step I can take to contribute to a more sustainable future, and that too, without changing my daily routine. So, I recommend these taps to my friends and family because they are a simple way to save water. Also, I like that water-saving taps come in different styles and designs, which makes it easy to find one that fits my bathroom or kitchen décor.

	Behavioral intention	(INT-19)	I have started using reusable shopping cloth bags instead of plastic bags when I go grocery shopping because I want to reduce my plastic waste. I always keep a foldable bag in my purse or backpack, so I am never caught without a reusable option, and it makes me feel better when I know I am doing my part to protect the environment.
		(INT-1)	I appreciate that kitchen composter bins come in different sizes, which makes it easy to find one that fits my needs. They are odor-free and do not attract pests; keeping them in my house is easy. So, I began composting my kitchen waste to cut down on the garbage. It also benefits my garden.
		(INT-20)	A kitchen composter bin would help me produce less waste. Since keeping a kitchen composter bin, the waste I produce has significantly reduced. It makes me feel even better about the environment. By using a kitchen composter bin, I feel I am doing something to lessen my carbon footprint, a small step that can have a big impact.
		(INT-10)	What I like about the water-saving taps is that they save me money on my water bill and help me reduce water wastage. Moreover, they are easy to install and do not require extra effort. Now that water-saving taps have become much more affordable and easily available, I find switching easier.
		(INT-12)	I can confidently clean using coir cleaning kits, knowing that my family will not be exposed to harmful chemicals. I am happy coir-cleaning kits are biodegradable and compostable; I am not adding to landfills.
		(INT-15)	Coir cleaning kits are eco-friendly and effective in their cleaning abilities. One of the things I like about coir cleaning kits is that they have different attachments, which makes it much easier to clean hard-to-reach

			places. Sustainable raw materials are a good alternative to conventional cleaning products.
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