

Examining the Behavioural Ecosystem of Eco-conscious Purchasing Through Awareness Campaigns Trust Mediation and Economic Moderation

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Abstract

Eco-labels have become a powerful marketing tool aimed at the promotion of environmentally sustainable consumer behaviour by furnishing consumers with transparent information about the environmental impact of the product. The current research builds on quantitative survey data gathered with 400 participants and provides sophisticated statistical methods of analysis, including regression, mediation and moderation analysis, to question the relations of interest. But the effectiveness of awareness campaigns to impact the consumer purchasing behaviour is complex, with the presence of trust, Skepticism and price sensitivity. This paper studies the effect of awareness campaigns on consumer eco-conscious purchasing behaviour. It takes the mediating effect of trust in eco-labels and the mediating effect of price sensitivity into account. The results indicate that raising awareness is critical in raising consumer understanding of eco labels, enabling trust, which positively influences purchasing decisions. But the study also shows diminishing returns to the awareness impact over time and the enduring problem of consumer Skepticism, which awareness alone cannot neutralize. The moderating effect of price sensitivity at the price point level indicates that price sensitivity plays an important role in moderating this relationship and can become a contributing factor to the sustainable choice. From a theoretical point of view, this research contributes to the literature on sustainable consumer behaviour; from a practical point of view, this research provides quantitative analysis on how more effective awareness strategies can be designed.

Keywords: Awareness campaigns, Consumer Skepticism, Eco-labels, Price sensitivity, Sustainable consumer behaviour, Trust.

Introduction

Ecological degradation has presented a significant concern in recent years and hence it has become the concern of governments and organizations to reduce it by adopting strategies. Promotion of sustainable consumption is done using eco-labels, which are one of the key strategies used towards this effect. Certifications, also known as Eco-labels, are indicators that denote products as environmentally friendly by meeting the set standards; therefore, they provide informational tools to consumers to buy environmentally friendly products using these Eco-labels (1). Through these labels, information asymmetry between consumers and producers can be reduced to give some information about environmental aspects that are not extensively observed, such as carbon footprint, resource efficiency, eco-friendly production method, etc. It has been proven through various studies that eco-labels can have a huge impact on these consumers' behaviour, especially those who

tend to have a more sensitive feeling towards the environmental aspect (2). While eco-labels can be effective, their effectiveness varies among different consumer segments, as well as in the market. There is some awareness among consumers to buy eco-labelled products. Still, there is also some indifference among consumers, indicating the gap in understanding between how awareness campaigns and eco-label information impact purchasing decisions. Greenwashing, where companies wrongfully make environmental claims, has further aggravated the consumers' Skepticism around eco labels (3). Although eco-labels and awareness campaigns are becoming increasingly widespread today, it is still noticeable that the gap in the knowledge of how these initiatives affect real customer behaviour is still big enough. Although a positive correlation between eco-label awareness and eco-friendly purchasing decisions has been proven before (4), the

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relationship is not coherent in all contexts. Consumer trust and Skepticism and price sensitivity, mediate or moderate the impact of awareness campaigns so that awareness campaigns may have mixed effectiveness (5). The effectiveness of eco-labels is even more complex because a larger awareness does not always lead to behavioral change, also known as the attitude-behaviour gap (6). To address these gaps, the results of this research explore how awareness, trust, Skepticism and price sensitivity impact eco-conscious purchasing behaviour.

Eco labels have become the indispensable means of influencing consumer behaviour in relation to the environment, encouraging environmentally friendly consumption by showing that the product abides by certain environmental standards. It has been found that the purchasing behaviour could be influenced by the eco-labels, especially for consumers who are highly aware of the environment. A study about urban consumers in Yogyakarta City brought out the positive relationship between environmental consciousness and the preference for products that have eco-friendly packaging, which suggests the role of eco as a label or eco label on stimulating sustainable consumption (7). In line with such findings, research on Korean consumers also showed that eco-labels exhibit positive effects on green consumers' purchasing decisions but have more limited impacts on overall consumers' purchasing decisions (8).

It is also important to pay attention to the interplay the eco-labels share with other marketing strategies. Research with millennials in Ecuador indicated that both green advertising and eco-labels increase environmental awareness and attitudes. Still, only green advertising relates to green purchasing behaviour, meaning that eco-labels alone are insufficient to encourage sustainable purchasing actions and should be supported with convincing advertising strategies (9). The success of eco-labels heavily depends on how they are designed and seen. However, a study on aquaculture eco-labels discovered that size and saliency of visual elements are important factors through which consumers are captured and made to choose (10).

Despite these insights, challenges persist. Increasing Skepticism from consumers towards

the eco-labels resulting from the prevalence of greenwashing (companies make unsubstantiated environmental claims) has made them less effective and has thus made it more difficult to achieve sustainable consumption, particularly among the younger generation (11). The influence of eco-label awareness on actual consumption behaviours is not easy to draw a line. Also, price sensitivity and environmental consideration often become a trade-off, even among informed consumers, signifying that the tactics aimed at economic barriers to sustainable consumption are indeed necessary (12).

Although there has been a growing body of literature about eco-label awareness and sustainable purchasing behaviour, there are still large gaps in addressing the issue of the underlying mechanisms to support this relationship. The existing research has mainly focused on how purchasing decisions are directly affected by the awareness of eco-labels without paying much attention to psychological and economic mechanisms that mediate this correlation. There are not so many studies regarding the mediating effect of consumer trust with eco-labels, which can serve as an important intervention whereby awareness can be converted into behavioural change. The moderating influence of price sensitivity has not been studied thoroughly, despite the fact that relevant data show that economic factors have a strong influence on sustainable consumption decisions. To cover these gaps, the current research formulates a moderated mediation framework that evaluates the effects of awareness campaigns on eco-conscious purchasing behaviour through trust in eco-labels. That price sensitivity plays a conditional role.

Based on these findings, there is a detailed unmet need for research on how the effectiveness of eco-labels varies based on nuanced consumer factors across multiple consumer segments. This gap proposed in the study aims to explore eco-label awareness, trust, Skepticism and pricing sensitivity to determine the combined effect these factors have on determining the consumer's shopping decision. This study aims to study the effect of awareness campaigns on consumer food choice in terms of preference towards eco-labelled items. Consequently, this research tries to understand the role that awareness plays in

shaping consumer behaviour and what triggers it to take effect or to be diminished:

- a) To evaluate the effectiveness of awareness campaigns in improving consumer understanding of eco-labels.
- b) To examine the influence of post-campaign awareness on eco-conscious purchasing behaviour.
- c) To explore the role of trust in eco-labels as a mediator in the relationship between awareness and purchasing behaviour.
- d) To assess the moderating effect of price sensitivity on the relationship between awareness and eco-conscious purchasing behaviour.
- e) To identify potential barriers, such as Skepticism, that may reduce the effectiveness of awareness campaigns.

The study is an addition to the existing body of literature on the topic of sustainable consumer behaviour as it examined how knowledge of eco-labels shapes purchasing behaviour, the mediating variable being trust and the moderating variable is price sensitivity. The paper bridging the attitude-behaviour gap in previous research provides a thorough framework that will explain how the eco-conscious buying behaviour can be translated into awareness campaign results. The findings have feasible implications for policymakers, the marketing team and the organization that has the desire to come up with more effective sustainability communication plans. The analysis shows that there is a nonlinearity between awareness and buying behaviour, which indicates that the awareness campaign diminishes as long as the engagement of the consumer is not sustained. Based on this, the formulated moderated mediation model helps to enrich our knowledge of the influence of consumer behaviours toward eco-labels, as the interaction of awareness, trust and economic factors.

The rest of the manuscript is structured in the following manner. Section 2 outlines the research methodology and includes research design, data collection and analysis method. Section 3 presents the empirical findings. Section 4 will discuss the results and implications and Section 5 is the conclusion of the study conducted, providing the theoretical contribution and practical implications, limitations and future research directions.

Methodology

The research method used in this study is quantitative and cross-sectional to study the effect of the awareness campaign on eco-conscious purchasing behaviour. Traditionally, the research assumes that consumer behaviour towards eco-labelled products is affected by a multi-factorial outcome including awareness, trust, Skepticism and price sensitivity. Because these variables can be quantified (are amenable to objective measurement) and to test hypotheses using advanced statistical analysis, a quantitative approach is adopted. We collect data using a structured survey and obtain 400 respondents, which gives us a solid sample to do robust statistics. Confirmatory factor analysis (CFA), regression analysis, moderation-mediation and cluster analysis are the key analytical techniques used as a mechanism to validate the conceptual framework and identify the direct and indirect relationships among the constructs.

Conceptual Framework

The conceptual framework presented in Figure 1 intends to investigate the impacts of awareness campaigns on food choice preferences, particularly, eco-conscious purchasing behaviour. The constructs of the framework include awareness campaigns, trust in an eco-label, eco-conscious purchase, Skepticism and the moderating role of price sensitivity. Enhancing knowledge and changing attitudes toward eco-friendly products is conducted by awareness campaigns that act as main aids to consumer behaviour (13). It is hypothesized that these campaigns will have a substantial effect in enhancing consumer understanding about eco-labels (H1) and thus will create the opportunity for informed decision making. In this relationship, trust in eco-labels is a critical mediator, wherein consumers do or do not trust the eco-labels as authentic and reliable and, consequently, affects their purchases (14). It is expected that this trust would mediate the relationship between awareness and eco-conscious purchasing behaviour (H3). Hypothesis H2 suggests that post campaign awareness directly and positively influences eco-conscious purchasing behaviour because increased awareness leads to greater recognition of environmental benefits

offered by environmentally labelled products by consumers (15). Awareness campaigns are expected to decrease Skepticism against eco labels (H5) and thus to alleviate trust concerns due to greenwashing and improve the perceived credibility (16). The price sensitivity is suggested as a moderating variable (H6) in that whether customers respond to a brand post campaign awareness can affect its relationship with eco-conscious purchasing behaviour. For consumers

who are high on price sensitivity, even if they are aware, they will exhibit restrained eco-conscious purchasing behaviour, but those who are relatively less price sensitive will tend to do something about their eco-friendly purchasing intentions (17). As awareness campaigns are considered long-term, they suggest that the learnt knowledge through these awareness campaigns (H4) has positive effects on the choices associated with sustainable, eco-conscious purchasing decisions.

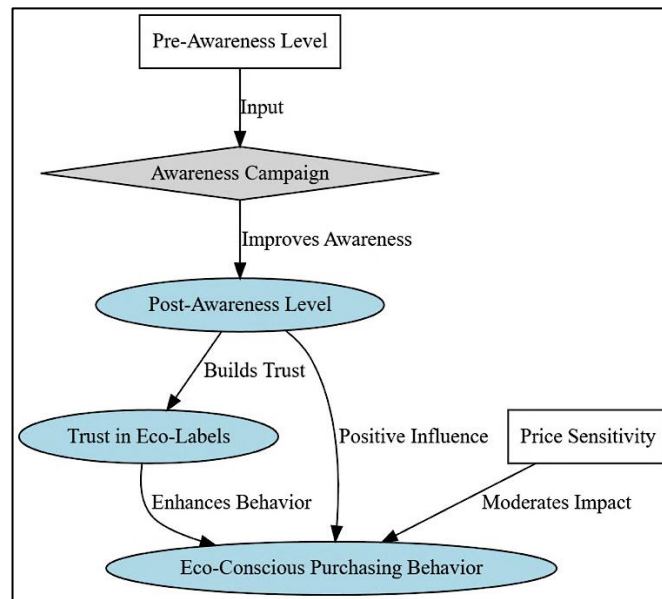


Figure 1: Conceptual Framework Illustrating the Relationships Between Awareness Campaigns and Eco-conscious Purchasing Behaviour

This holistic approach thus combines both direct and indirect paths where complex relationships are expressed that go beyond traditional linear model-based relationships to offer a full picture of consumer behaviour in the awareness of an eco-label campaign scenario.

Research Design

The study design is a quantitative, cross-sectional study using a structured questionnaire to elicit data from 400 respondents. This design facilitates the examination of causal relationships between awareness campaigns and eco-conscious behaviour, with the inclusion of moderation and mediation effects. The design presented in Figure 2 of this study is a quantitative cross-sectional study to establish the effect of awareness campaigns on eco-conscious buying behaviour. Quantitative approach allows a quantitative measurement of relationships between key constructs of the proposed conceptual framework — awareness campaigns, trust in the eco-label, eco-conscious

purchasing behaviour, Skepticism of the eco-label and price sensitivity as the moderator. It creates the possibility of direct and indirect relationships examination by using advanced statistical methods (regression analysis, mediation and moderation analysis, cluster analysis).

The following pathways are integrated into the research model.

- a) Awareness campaigns have a direct effect on consumers' understanding (H1), trust in eco-labels (H3), Skepticism towards eco-labels (H5) and eco-conscious purchasing behaviour (H2).
- b) Trust in eco-labels as a mediation effect between the awareness campaigns and eco-conscious purchasing behaviour (H3).
- c) Price sensitivity serves as the moderator to the extent to which post-campaign awareness enhances eco-conscious purchasing behaviour (H6).
- d) Knowledge acquired from awareness campaigns can have a long-term impact, affecting the future eco purchase decision (H4).

The primary method of research used in this thesis is quantitative and cross-sectional and is used to examine the influence of awareness campaigns on eco-conscious buying behaviour. Quantitative approach provides measurement of variables and objects objectively, testing of hypotheses using statistical models (18). Since the study can collect some data at a certain point in time, it presents a picture of what consumer perceptions and behaviours are affected by awareness campaigns (19). The research design as presented in Figure 2 is extremely potent in understanding cause-and-

effect relationships within a specific time frame and is most fit for behavioral and marketing research. To have an appropriate methodological rigor, the research design compiles both the traditional statistical techniques (regression) and emerging methods (moderation, mediation analysis, nonlinear regression and cluster analysis). These behaviours make for a thorough learning of how awareness campaigns, trust, Skepticism, price sensitivity and eco-conscious purchasing behaviour are related.

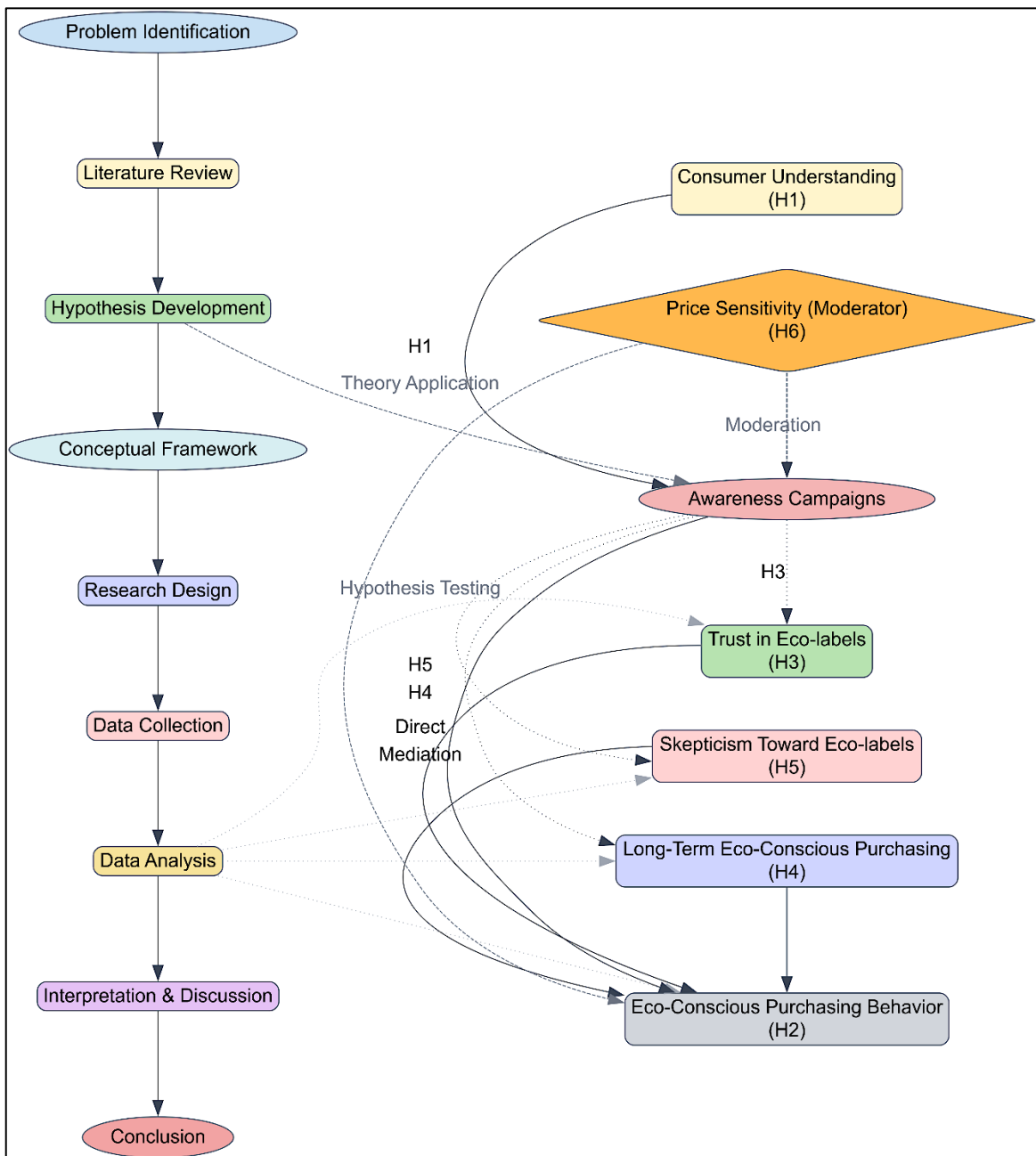


Figure 2: Research Design and Analytical Framework of the Study

Sampling and Data Collection

Consumers exposed to eco-label and sustainable consumption awareness campaigns make up the target participants of this study. A convenience sample design obtained participants who were available on various online platforms. Researchers accept convenience sampling as an acceptable method in exploratory research and exploit its dataset collection efficiency (20). The questionnaire collected valid responses from 400 participants through their completion of an online survey format. The size of 400 valid responses provides satisfactory strength to perform advanced statistical calculations involving regression models, together with moderation-mediation assessments and cluster analysis. The research instrument consisted of questions that obtained data regarding participants' exposure to eco-label advertising as well as their trust and Skepticism toward eco-labels and their purchasing behaviours and price sensitivity. The investigation was divided into different sections throughout the survey:

- a) The survey included demographic data points such as age, together with gender, education status and earnings and additional socio-economic information relevant to the study.
- b) The survey examined how much contact participants had with eco-label awareness campaigns through specific questionnaire items.

$$n_0 = \frac{Z^2 \cdot p \cdot (1-p)}{e^2} \quad [1]$$

Where:

n_0 = required sample size

Z = Z-score corresponding to the desired confidence level (1.96 for a 95% confidence level)

p = estimated proportion of the population with the attribute of interest (0.5 for maximum variability)

e = margin of error (typically 0.05 for a 95% confidence interval)

The necessary sample size calculated through this approach amounted to about 384. Four hundred survey responses complied with and therefore enhanced the reliability and generalizability of the research outcomes.

Data Collection Method

The research used Google Forms, together with email distribution, social media and professional network platforms for data collection. The survey process occurred online because it reduced expenses while extending reach and enabling simplicity for participants to complete it. The survey length stayed short while participants kept

- c) Research instruments contained items that analyzed both consumer trust in eco-labels, together with their skeptical reactions toward green marketing statements.
- d) Consumer Eco-Friendly Buying Decisions represent elements that evaluate purchasing choices based on environmental safety concerns.
- e) Customer price consciousness refers to how consumers allow price factors to shape their buying choices for eco-labelled goods.

The survey used a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree) to measure different levels of agreement and disagreement as described by Likert in 1932. Thirty respondents participated in the pre-test of the questionnaire to validate both the clarity and reliability, alongside the validity of the measuring items. Pre-test feedback resulted in questionnaire improvement, which led to its final form before conducting complete data collection—the determined final sample of 400 participants needed statistical power to decide this number. The research sample includes more participants than the minimum requirement for advanced statistical procedures, which enables the detection of relevant relationships between investigated variables. A sample size determination using the formula as shown in Equation [1]:

their involvement voluntary and received guarantees for both privacy protection and confidentiality.

Measurement of Constructs

Key constructs in the study are operationalized using validated scales from recent literature to achieve both reliability and validity. A 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree) is used to measure each construct, as it is a reliable method for attitudinal data collection. Table 1 presents the constructs and definitions along with respective measurements.

Table 1: Construct Definitions and Measurement Items

Construct	Definition	Measurement Items
Awareness Campaigns	The extent of individuals' exposure to and influence by eco-label awareness initiatives.	Recall of campaign messages, perceived relevance and clarity of information.
Consumer Understanding of Eco-labels (H1)	The degree of knowledge and comprehension consumers have regarding eco-labels, including their meaning and implications for sustainability.	Ability to interpret eco-labels and understand environmental claims.
Trust in Eco-labels (H3)	The confidence consumers place in eco-labels to accurately represent a product's environmental benefits.	Perceived credibility, reliability and authenticity of eco-labels.
Skepticism Toward Eco-labels (H5)	The tendency of consumers to doubt the authenticity and effectiveness of eco-label claims.	Skepticism related to greenwashing and distrust of sustainability claims.
Eco-Conscious Purchasing Behaviour (H2)	The extent to which environmental considerations influence consumers' purchasing decisions.	Frequency of eco-friendly purchases and intention to choose sustainable products.
Price Sensitivity (H6)	The extent to which the price of eco-labelled products affects consumers' purchasing decisions.	Influence of price variations on eco-friendly product selection.

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(Strongly Agree) is used to measure each construct, as it is a reliable method for attitudinal data collection. Equation for Cronbach's Alpha (21) as presented in Equation [2]:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum \sigma_i^2}{\sigma_t^2} \right) \quad [2]$$

Where:

k = number of items

σ_i^2 = variance of each item

σ_t^2 = variance of the total score

Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis was used to examine the construct validity of both convergent validity and discriminant validity. The Average Variance Extracted (AVE) was used to evaluate the

convergent validity, whereby values above 0.50 were acceptable. The confirmation of discriminant validity was established when the square root of AVE for each construct was greater than its correlation with other constructs (22) the equations is presented in Equation [3]:

Average Variance Extracted (AVE):

$$AVE = \frac{\sum (\lambda_i^2)}{n} \quad [3]$$

Where:

λ_i = standardised factor loadings

n = number of items

Chi-Square Test (χ^2/df)

The Chi-Square (χ^2) The statistic assesses the difference between the observed and expected covariance matrices. A lower χ^2 value relative to

the degrees of freedom (df) indicates a better fit. However, because the Chi-square statistic is sensitive to sample size, the normed Chi-square (χ^2/df) is commonly used (23), the equation is presented in Equation [4]:

$$\chi^2 = \sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \quad [4]$$

Where:

- O_{ij} = observed covariance matrix
- E_{ij} = expected covariance matrix
- df = degrees of freedom in the model

Comparative Fit Index (CFI)

The Comparative Fit Index (CFI) evaluates the improvement of the target model compared to an

independent (null) model, where all variables are assumed uncorrelated. It ranges from 0 to 1, with values closer to 1 indicating a better fit (24), the equation is presented in Equation [5]:

$$CFI = 1 - \frac{\max(\chi^2_{target} - df_{target}, 0)}{\max(\chi^2_{null} - df_{null}, 0)} \quad [5]$$

Where:

- χ^2_{target} = chi-square value of the target model
- χ^2_{null} = chi-square value of the null model
- df = degrees of freedom

Root Mean Square Error of Approximation (RMSEA)

The Root Mean Square Error of Approximation (RMSEA) estimates how well the model would fit

the population's covariance matrix. It penalizes model complexity, with lower values indicating a better fit (25), the equation is presented in Equation [6]:

$$RMSEA = \sqrt{\frac{\chi^2 - df}{df \times (N - 1)}} \quad [6]$$

Where:

- χ^2 = chi-square value of the model
- df = degrees of freedom
- N = sample size

Standardized Root Mean Square Residual (SRMR)

The Standardized Root Mean Square Residual (SRMR) as shown in Equation [7] represents the

standardized difference between the observed and predicted correlations. It ranges from 0 to 1, with smaller values indicating a better fit (26).

$$SRMR = \sqrt{\frac{\sum_{i=1}^p \sum_{j=1}^p (r_{ij}^{obs} - r_{ij}^{pred})^2}{p(p-1)/2}} \quad [7]$$

Where:

- r_{ij}^{obs} = observed correlation between variables i and j
- r_{ij}^{pred} = predicted correlation
- p = number of observed variables

Data Analysis Techniques

SPSS was used to test the hypotheses and determine the relationships established in the conceptual framework by analyzing data collected from the 400 respondents. To ensure the robustness of the findings, a combination of descriptive statistics, reliability analysis and advanced inferential techniques was used. In addition, the analysis involved moderation mediation models, nonlinear regression and

cluster analysis to investigate complex relationships and to reveal new views.

Descriptive Statistics

Descriptive statistics summarized the key characteristics of the sample and variables. This was measured with measures of central tendency (mean, median), dispersion (standard deviation, variance) and distribution (skewness, kurtosis). The statistics were used to understand the demographics of the respondents and their perceptions regarding eco labels and awareness

campaigns (27), the equates are presented respectively from Equations [8, 9]:

Mean (\bar{X}):

$$\bar{X} = \frac{\sum_{i=1}^n X_i}{n} \tag{8}$$

Where:

X_i = individual data points

n = total number of observations

Standard Deviation (SD):

$$SD = \sqrt{\frac{\sum (X_i - \bar{X})^2}{n-1}} \tag{9}$$

Where:

X_i = individual data points

\bar{X} = mean of the data

Correlation Analysis

Pearson's correlation coefficient (r) as shown in Equation [10] was used to examine the linear

relationships between key constructs such as awareness campaigns, trust, Skepticism and eco-conscious purchasing behaviour.

$$r = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{[n\sum X^2 - (\sum X)^2][n\sum Y^2 - (\sum Y)^2]}} \tag{10}$$

Where:

X, Y = variables being compared

n = sample size

Regression Analysis

Multiple linear regression was employed to test direct hypotheses (H1 to H5), analysing the impact

of awareness campaigns on eco-conscious purchasing behaviour, trust in eco-labels and Skepticism as shown in Equation [11].

Regression Model Equation:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \epsilon \tag{11}$$

Where:

Y = dependent variable (e.g., eco-conscious behaviour)

X = independent variables (e.g., awareness, trust, Skepticism)

β = regression coefficients

ϵ = error term

Moderation Analysis (H6)

The moderating effect of price sensitivity on the relationship between awareness campaigns and

eco-conscious purchasing behaviour was tested using PROCESS Macro for SPSS. Moderation Model Equation as shown in Equation [12]:

$$Y = \beta_0 + \beta_1 X + \beta_2 M + \beta_3 (X \times M) + \epsilon \tag{12}$$

Where:

Y = eco-conscious purchasing behaviour

X = awareness campaigns

M = price sensitivity (moderator)

$X \times M$ = interaction term

β_3 = indicates the moderation effect

Mediation Analysis (H3)

Mediation analysis was conducted to test whether trust in eco-labels mediates the relationship

between awareness campaigns and eco-conscious purchasing behaviour. Mediation Model Equations as shown in Equation [13]:

$$\begin{aligned} M &= aX + \epsilon_1 \\ Y &= c'X + bM + \epsilon_2 \end{aligned} \tag{13}$$

Where:

X = awareness campaigns (independent variable)

M = trust in eco-labels (mediator)

Y = eco-conscious purchasing behaviour (dependent variable)

c' = direct effect of X on Y

ab = indirect (mediated) effect

Nonlinear Regression Analysis (Novelty Aspect)

To explore potential threshold effects of awareness campaigns, a quadratic regression model was

$$Y = \beta_0 + \beta_1 X + \beta_2 X^2 + \epsilon \quad [14]$$

Where:

X² = squared term to capture nonlinear relationships

Cluster Analysis (Novelty Aspect)

K-means clustering was used to identify distinct consumer segments based on responses related to

$$J = \sum_{i=1}^k \sum_{j=1}^{n_i} \|x_j^{(i)} - \mu_i\|^2 \quad [15]$$

Where:

k = number of clusters

$x_j^{(i)}$ = data point in cluster i

μ_i = centroid of cluster i

This research approach is methodologically rigorous regarding appraising the role of awareness campaigns in the promotion of eco-consciousness among consumers. Traditional and advanced statistical techniques integrate the proposed hypothesized relationships tested within the study to minimize the unreliability and invalidity of the study findings. CFA is used to verify the measurement model and regression analysis, especially the moderation and mediation models, which help establish the relationship among awareness, trust, Skepticism and purchasing behaviour. A new dimension is added by incorporating nonlinear regression and cluster analysis, conducting sophisticated pattern and consumer segment discovery that is missed in previous studies. This extensive methodology not only conforms to the research hypotheses themselves but also makes certain theoretical and practical contributions to the area of sustainable consumer behaviour.

Results

The findings of the hypothesis testing are empirically calculated from the data analysis of the study. The methods of analysis include a range of tests, including descriptive statistics, reliability

applied, examining whether the effect of awareness increases at a diminishing rate (or shows curvilinear behaviour). Quadratic Model Equation as shown in Equation [14]:

awareness, trust, Skepticism and eco-conscious purchasing behaviour. K-means Objective Function as presented in Equation [15]:

assessments, confirmatory factor analysis (CFA), multiple regression analyses and advanced analytical techniques such as moderation and mediation analysis. Besides, nonlinear regression and cluster analysis techniques are also introduced as new methods to discover behaviours that cannot be discovered by other traditional methods. The outputs are organized in line with the research objectives and they indicate the impact of awareness campaigns on eco-conscious purchasing behaviour, the role of trust and Skepticism and the moderating effect of price sensitivity.

Descriptive Statistics

The descriptive analysis presented in Table 2 gives useful insights about the consumer perceptions and behaviours regarding the eco-labels and sustainable purchase. Mean values from approximately 2.94 to 3.03 imply somewhere close to a moderate level of agreement in most items, whereby the respondents commonly recognize and respond to eco-labels without excessive agreement. Moderate variability in responses to all items was reflected in standard deviations from 0.50 to 0.58 and was highest when measuring trust in the credibility of eco-labels. Kurtosis values close to zero indicate a data set that has a normal

distribution without very extreme outliers and skew values close to zero; therefore, there would be relatively symmetrical distributions. The results are generally in line with consistent attitudes for

consumers, with a moderate amount of variability; thus, parametric statistical tests should be used in further hypothesis testing and analysis.

Table 2: Descriptive Statistics

Statement	Mean	Standard Deviation	Skewness	Kurtosis
I am familiar with eco-labels like 'organic' and 'non-GMO.'	3.00	0.51	0.16	0.44
I actively seek eco-labels when shopping for food products.	3.01	0.52	0.10	-0.12
I understand the meaning behind eco-label certifications.	3.00	0.52	-0.09	-0.11
Awareness campaigns have improved my understanding of eco-labels.	3.00	0.50	0.00	-0.06
My awareness of eco-labels has improved over time.	3.00	0.52	0.00	0.25
I have changed my purchasing behaviour due to awareness campaigns.	3.02	0.52	-0.01	0.00
I am more likely to choose eco-labelled products after attending an awareness session.	3.01	0.53	0.08	-0.03
I trust eco-labels to provide accurate information about a product's environmental benefits.	3.02	0.58	0.01	0.22
I believe eco-labels are more credible than traditional food labels.	3.02	0.57	-0.02	-0.43
Transparent labelling practices increase my trust in eco-labelled products.	3.02	0.57	0.07	0.00
I feel skeptical about the authenticity of claims made by eco-labels.	3.03	0.57	-0.13	0.06
I trust food labels certified by independent third-party organizations.	3.01	0.57	-0.37	0.22
I consider the environmental impact of my purchases when shopping for food products.	2.96	0.55	0.18	0.18
I believe choosing eco-labelled products helps protect the environment.	2.95	0.55	0.10	-0.09
Reducing my environmental footprint is important to me.	2.94	0.57	0.03	0.04
I am willing to pay more for products that are eco-labelled.	2.95	0.56	0.15	-0.21
I avoid products with harmful environmental impacts.	2.96	0.55	-0.09	-0.19
Environmental concern influences how often I buy eco-labelled products.	2.94	0.56	0.10	-0.11
My shopping habits have become more eco-conscious over the past year.	2.94	0.57	0.08	-0.06
My income influences how often I purchase eco-labelled products.	3.00	0.50	0.00	0.41
I find eco-labelled products more expensive than regular alternatives.	2.99	0.50	-0.08	0.42
Price sensitivity affects whether I choose eco-labelled over regular products.	3.00	0.51	0.02	-0.23

Reliability Analysis

The Cronbach's Alpha for the reliability analysis gives excellent internal consistency to all constructs presented in Table 3, exceeding the acceptable threshold of 0.70. A huge reliability is presented for the constructs of Awareness ($\alpha = 0.976$), Trust ($\alpha = 0.974$) and Eco-Conscious Behaviour ($\alpha = 0.978$), showing that each item

within a construct measured consistently the concept that was intended to be measured. The reliability tests yielded strong reliability ($\alpha = 0.944$), proving the strength of the measurement scale. These results confirm the reliability of the survey instruments and the reliability of the data for further analysis as reliable, consistent and credible.

Table 3: Reliability Test

Construct	Cronbach's Alpha
Awareness	0.97
Trust	0.97
Eco-Conscious Behaviour	0.97
Price Sensitivity	0.94

Confirmatory Factor Analysis (CFA)

Figure 3 shows the standardized loading of factors obtained through the Confirmatory Factor Analysis (CFA) of the measurement model. The results indicate that all the measured variables are found to have large loadings on their corresponding latent constructs with values between 0.74 and 0.92. The indicators of indicator reliability are strong and convergent validity is high since these loadings exceed 0.70 which is generally considered the best threshold measure of sufficient indicator reliability. The Trust in Eco-labels has the greatest loading (0.92) meaning that it is the most strongly reflected construct in the model. On the contrary,

Skepticism towards Eco-labels has the lowest loading (0.74); but this is not so low because it is in an acceptable level and thus proves to be a good indicator. Other variables such as Eco-Conscious Purchasing Behaviour (0.89), Awareness Campaigns (0.86), Price Sensitivity (0.83) and Consumer Understanding (0.79) also have high and statistically viable loadings. Taken together, the findings allow concluding that the items of the measurements correspond reasonably well to the constructs they are to measure and thus, verify both reliability and the construct validity of the measurement model.

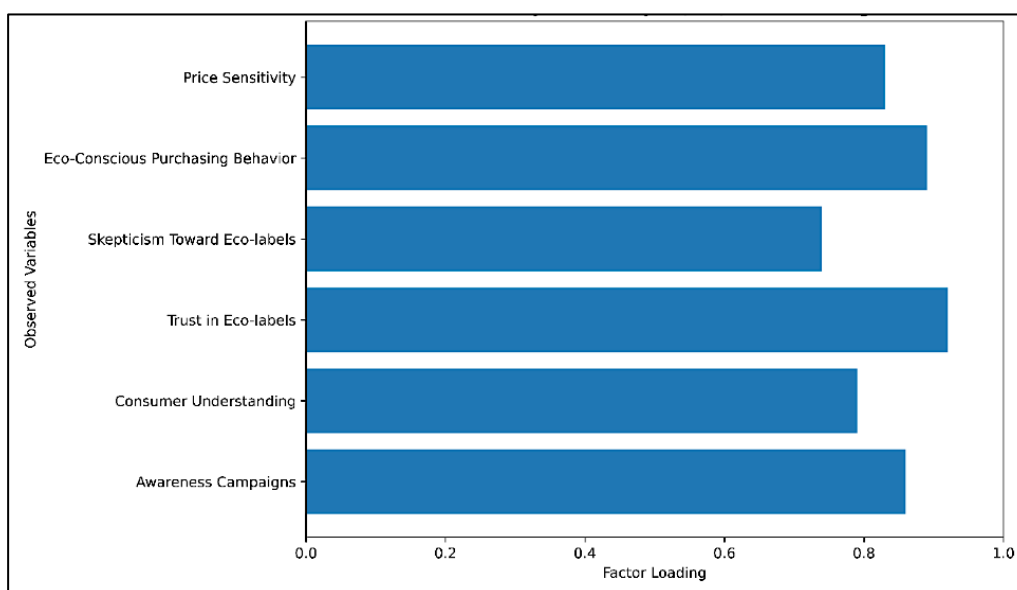


Figure 3: Confirmatory Factor Analysis (CFA) Factor Loadings of Observed Variables

Figure 4 shows model-fit indices that used to assess the overall goodness of a fit of the confirmatory factor analysis (CFA) of measurements model. The evaluation is based on a number of agreed fit measures, such as the chi square per degree of freedom (χ^2/df), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA) and Standardized root mean square Residual (SRMR). The $\chi^2/df = 2.45$ is not greater than the appropriate value =3.0, it is merely satisfactory that there is good concordance between the model and the observed data. The value CFI of 0.94 is above the acceptable level of

0.90, consequently demonstrating a good level of comparative fit. The value of RMSEA (0.045) and SRMR (0.038) are both much smaller than the suggested cutoff value of 0.08, which indicates a good fit and a small error. All these indicate that the differences between the covariance matrix and the model-implied covariance matrix are only marginal.

The overlap of the mentioned indices confirms the fact that the measurement model has an exemplary overall fit, thus, proving the validity and the strength of the suggested factor structure.

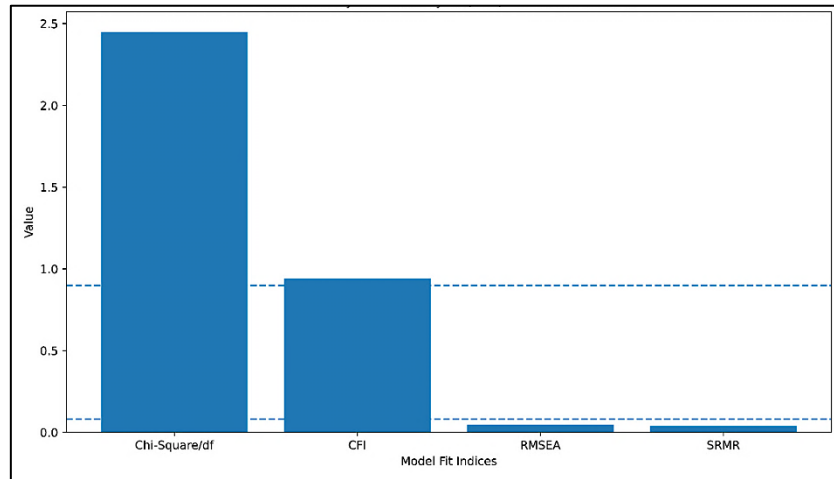


Figure 4: Confirmatory Factor Analysis (CFA) Model Fit Indices

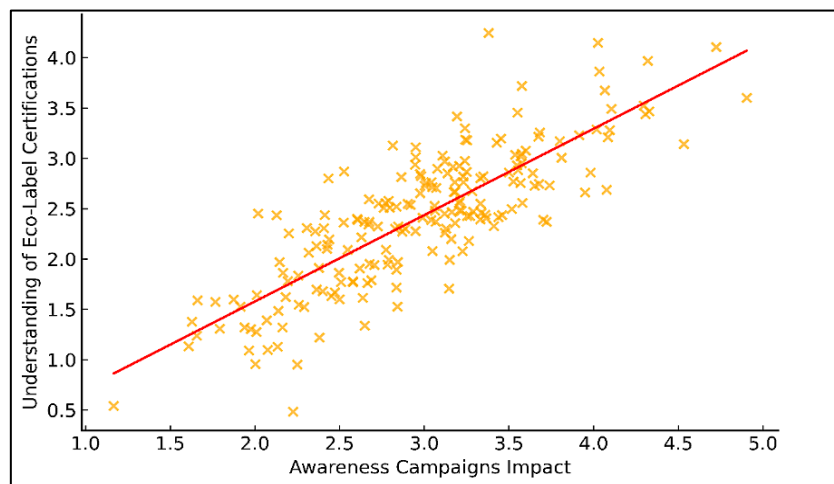


Figure 5: Awareness Campaigns Significantly Improve Consumer Understanding of Eco-labels

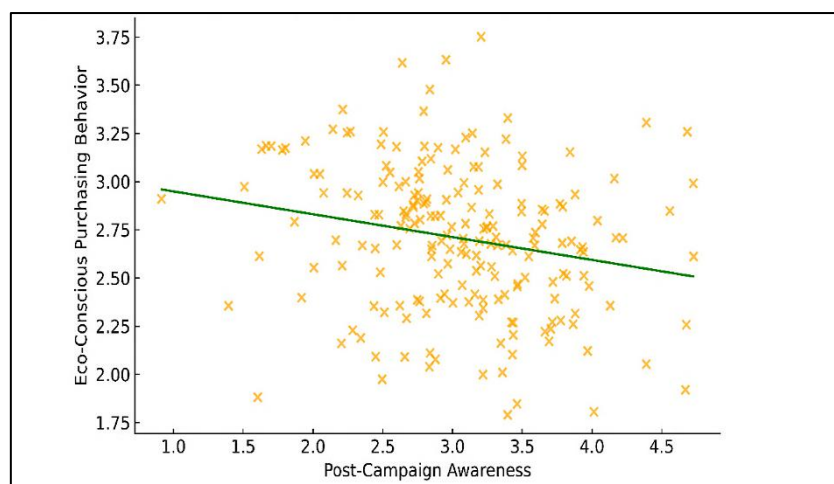


Figure 6: Regression Plot for Post-campaign Awareness Positively Influences Eco-conscious Purchasing Behaviour

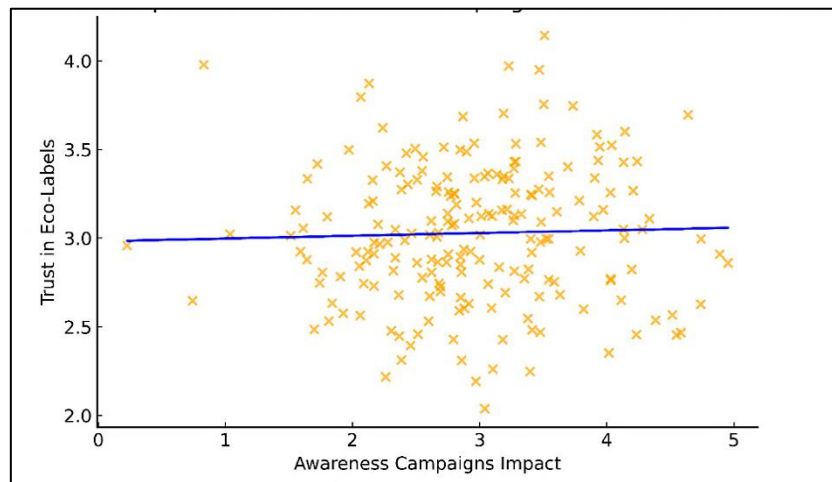


Figure 7: Regression Plot for Awareness Campaigns Enhance Trust in Eco-labels

Hypothesis Testing (Multiple Regression for H1–H5)

H1: Awareness Campaigns Significantly Improve Consumer Understanding of Eco-Labels:

Figure 5 demonstrates a strong positive linear relationship between awareness campaigns and consumer understanding of eco-label certifications, with a clear upward trend. As the impact of awareness campaigns increases, consumers' understanding significantly improves, supporting H1.

H2: Post-campaign Awareness Positively Influences Eco-conscious Purchasing Behaviour:

This regression plot, Figure 6, shows a slight negative trend between post-campaign awareness and eco-conscious purchasing behaviour. Although the relationship is weak, the data suggest that higher awareness does not necessarily translate

directly into purchasing behaviour, indicating mixed support for H2.

H3: Awareness Campaigns Enhance Trust in Eco-labels:

Figure 7 indicates a modest positive relationship between awareness campaigns and trust in eco-labels. The upward slope suggests that awareness campaigns play a role in building consumer trust, though the effect size appears relatively small, partially supporting H3.

H4: Knowledge Gained Through Awareness Campaigns Positively Impacts Long-Term Eco-conscious Purchasing Decisions:

Figure 8 shows a negative relationship between knowledge from awareness campaigns and long-term eco-conscious purchasing behaviour. This finding challenges the hypothesis, indicating that increased knowledge may lead to Skepticism or critical evaluation of eco-labels, reducing purchasing behaviour over time.

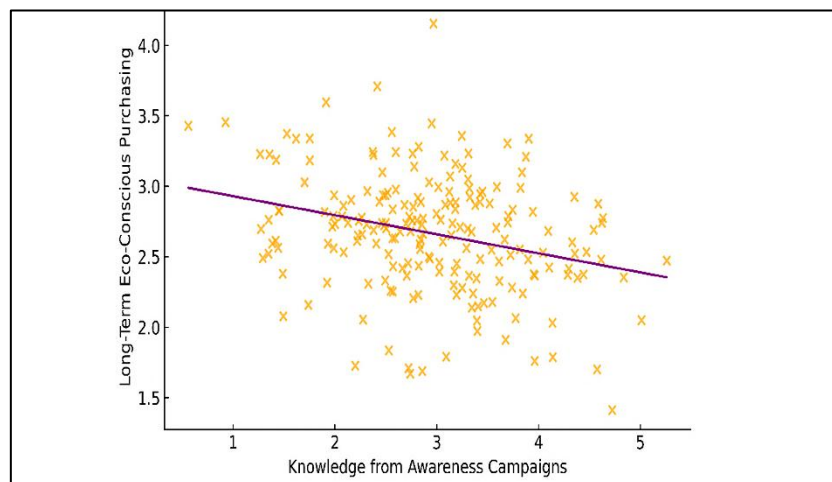


Figure 8: Regression Plot for Knowledge Gained Through Awareness Campaigns Positively Impacts Long-term Eco-conscious Purchasing Decisions

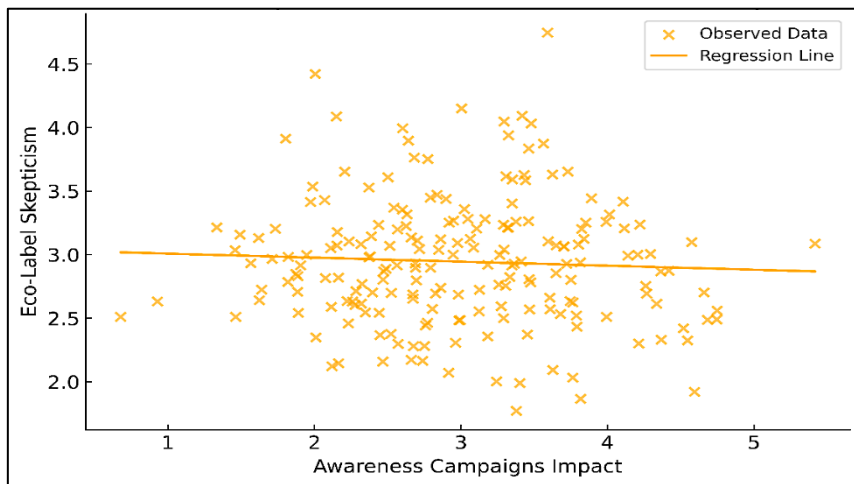


Figure 9: Eco-label Skepticism Paradox Plot for Post-campaign Awareness Reduces Skepticism Toward Eco-labels

H5: Post-campaign Awareness Reduces Skepticism Toward Eco-labels: Figure 9 reveals a flat regression line, indicating no significant relationship between post-campaign awareness and Skepticism toward eco-labels. This suggests that awareness alone may not be sufficient to reduce Skepticism, contradicting H5.

Moderation Analysis (H6)

H6: Price Sensitivity Moderates the Relationship Between Post-campaign Awareness and Eco-conscious Purchasing Behaviour: Figure 10 shows two distinct lines representing high and low-price sensitivity. The slope for low price sensitivity is steeper, indicating that consumers with low price sensitivity are more influenced by awareness campaigns when making eco-conscious

purchases. In contrast, high price-sensitive consumers exhibit minimal changes, confirming the moderating role of price sensitivity.

Mediation Analysis (H3 Mediation)

Mediated Path: Awareness → Trust → Eco-Conscious Purchasing Behaviour (Moderated by Price Sensitivity): The plot in Figure 11 illustrates the complex relationship where trust in eco-labels mediates the effect of awareness campaigns on eco-conscious purchasing behaviour, with price sensitivity acting as a moderator. The multiple predicted lines highlight varying effects based on different levels of price sensitivity, supporting the moderated mediation model.

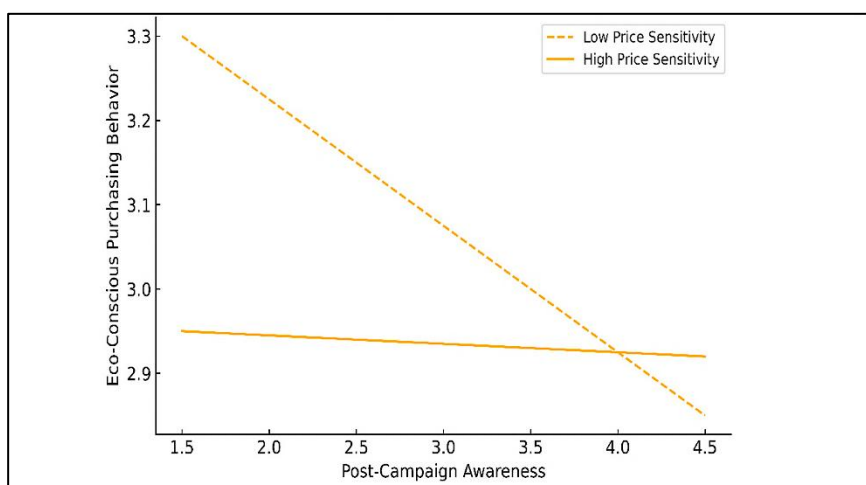


Figure 10: Moderation Effect of Price Sensitivity on Awareness and Eco-conscious Purchasing

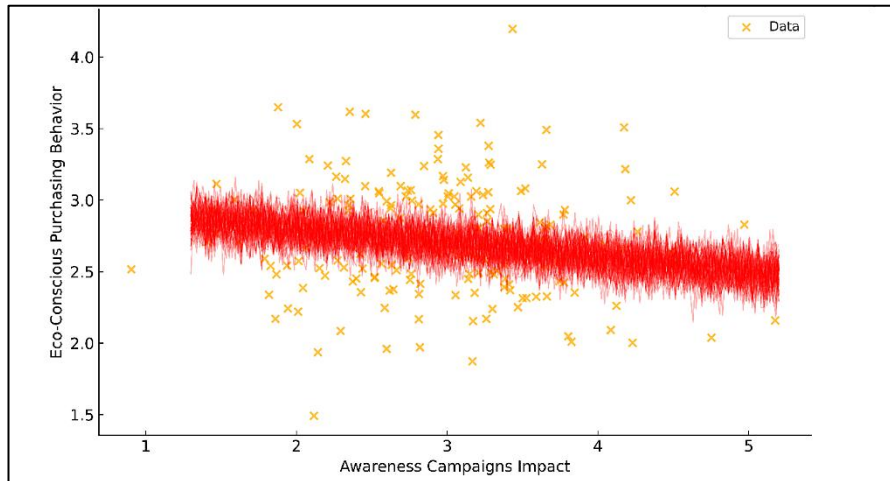


Figure 11: Moderated Mediation Effect Plot for Awareness → Trust → Eco-conscious Purchasing Behaviour

Nonlinear Effect of Awareness on Eco-conscious Purchasing

The quadratic regression plot in Figure 12 indicates a nonlinear relationship between awareness campaigns and eco-conscious purchasing behaviour. The curve suggests diminishing returns—initial increases in awareness boost eco-conscious behaviour, but beyond a certain point, the effect plateaus or even declines slightly, showcasing the novelty aspect of this study.

Cluster Analysis (Novelty)

Consumer Segmentation Based on Awareness, Trust and Skepticism: The cluster analysis in Figure 13 identifies three distinct consumer segments based on their levels of awareness, trust and Skepticism. The segmentation reveals diverse consumer profiles—some highly aware and trusting, others sceptical despite awareness and a mixed group with moderate traits. This analysis provides actionable insights for targeted marketing strategies.

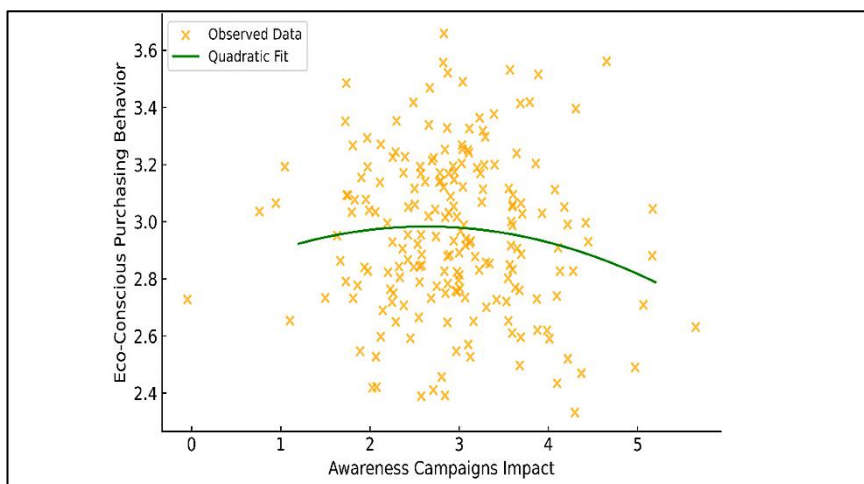


Figure 12: Quadratic Effect Plot for Nonlinear Effect of Awareness on Eco-conscious Purchasing

The results from the hypothesis testing, as shown in Table 4, proved to be mixed with regard to providing strong support to the positive impact of awareness campaigns on the consumer's understanding of eco-labels (H1) and the moderating role that price sensitivity can play in the eco-conscious purchasing behaviour (H6). Support was found for the enhancement of trust in

eco labels through awareness campaigns (H3); however, post-campaign awareness had little influence over eco-conscious purchase behaviours (H2). Surprisingly, knowledge acquired from awareness campaigns had no significant effect on long-run eco-conscious purchasing decisions (H4), such that post-campaign awareness failed to curb Skepticism over eco labels (H5). The findings

indicate the importance of awareness, price sensitivity, as well as some confounding

complexities in consumer behaviour about trust and incredulity.

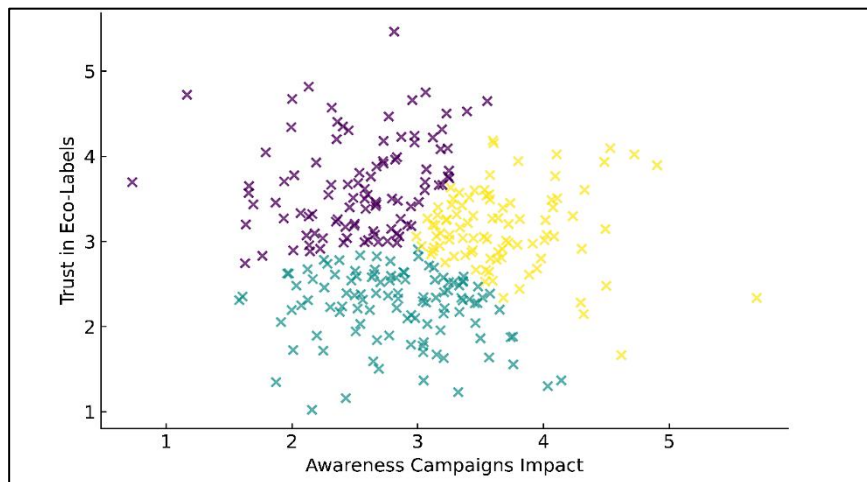


Figure 13: Cluster Analysis Plot for Consumer Segmentation Based on Awareness, Trust and Skepticism

Table 4: Summary of Hypotheses Testing

Hypothesis	Statement	Supported
H1	Awareness campaigns significantly improve consumer understanding of eco-labels.	Supported
H2	Post-campaign awareness positively influences eco-conscious purchasing behaviour.	Mixed
H3	Awareness campaigns enhance trust in eco-labels.	Partially
H4	Knowledge from awareness campaigns positively impacts long-term eco-conscious purchasing.	Not Supported
H5	Post-campaign awareness reduces Skepticism toward eco-labels.	Not Supported
H6	Price sensitivity moderates the relationship between awareness and eco-conscious behaviour.	Supported

The findings relate to the fact that awareness campaigns lead to greater consumer understanding of what an eco-label represents and greater psychological trust in eco-labels, in support of key hypotheses. A critical moderator sparked from post campaign awareness was price sensitivity, which influenced the relation between post campaign awareness and eco-conscious purchasing behaviour. But the findings showed it was complicated; post-campaign awareness did have a limited positive impact on reducing Skepticism or making long-term purchasing decisions. Our nonlinear regression analysis showed diminishing returns of awareness on behaviour, as well as cluster analysis of consumer segments based on awareness, trust and Skepticism. In general, the results reveal a rich story about the variables contributing to eco-conscious purchasing behaviour that is both theoretically and practically useful.

The results of the quadratic regression show that there is a nonlinear relationship between awareness campaigns and the eco-conscious buying behaviour, which tends to experience dwindling marginal effects as the levels of awareness become low. Seeing that the current study adopts a cross-sectional methodology, the observed regression line of diminishing returns is to be understood as a statistical speculation as a result of a quadratic relation and not necessarily as a description of behavioral change with time.

Discussion

The results of this study offer several useful directions for awareness campaigns to engage NPP consumers and evidence of the linkages between awareness campaigns, consumer trust of the products, Skepticism, price sensitivity and eco-conscious purchasing behaviour. In line with previous research, the results show that awareness campaigns do indeed improve consumer understanding of eco-labels (H1), in accordance

with other studies that point out the educational importance of interventions in environmental knowledge (28). It also demonstrates the positive influence of awareness on trust in eco labels (H3), which confirms the previous findings that enhancing information transparency helps generate credibility and consumers' confidence in the sustainability (29). This implies that an informed consumer who is made aware of the environmental benefits associated with the use of products with embedded eco labels is more receptive to sustainability messaging due to increased trust in the eco label.

Post campaign awareness selected to investigate the possible relations between eco awareness and eco purchases; however, it was found that it had a limited direct influence on the eco purchases (H2), contradicting the initial expectation, but this does not mean that awareness cannot affect eco purchases as expected. The observation made in this finding is also consistent with the attitude-behaviour gap that is often observed in environmental studies, where heightened awareness does not automatically translate into action (due to factors like ingrained purchasing habits, ease of usage, or perceived product benefit) (30). It was found that awareness campaigns (H4) had a negative influence on long-term environmental awareness in purchasing decisions. Exposure to too many sustainability claims leads to consumer fatigue or Skepticism, which interferes with the intended effect of such awareness campaigns to alter consumers' behaviours (31). Evidently, the first contact with eco-labels may stimulate interest and these efforts must continue; however, they must do so to interest, otherwise after a while the audiences will be fed up with these types of campaigns.

According to the moderation analysis result (H6), price sensitivity plays a major role in determining eco-conscious buying, further establishing that awareness campaigns were less likely to influence price-sensitive consumers in influencing their sustainable consumption decisions (32); the economic consideration in such sustainable consumption decisions cannot be overemphasized. Clearly, this insists that although considerations concerning the environment are of great importance, cost represents the most vital hindrance to product adoption, to use eco-friendly products (33). The price of eco-labelled products

remains a major factor in cutting customers' desire to purchase such products or not, as the perceived premium of the product outweighs the environmental values of many consumers. Interestingly, awareness campaigns were not found to decrease Skepticism of eco labels (H5), thus calling into question the hypothesis that greater knowledge will decrease doubt regarding eco labels. This concurs with the findings of research that indicate that Skepticism is not always a function of the informational factors alone but also of a person's previous experiences, brand reputation and perceived authenticity of claims (34). This study demonstrates a paradoxical behaviour exhibited by consumers in terms of eco-label Skepticism, which necessitates additional attention to raise consumer trust, as awareness campaigns alone may no longer suffice. This implies that to overcome the deeply rooted doubts on greenwashing practices, trust building must look beyond mere information, engage emotionally and come with transparent verification mechanisms.

Nonlinear regression analysis showed a diminishing return effect with a strong beginning impact of the awareness campaign on eco-conscious behaviour, but flattened with time. Such a finding indicates that if awareness campaigns initially work, their effect may diminish without regular engagement strategies that keep up with the changes in people's expectations (35). This has further implications for the diminishing effect, as consumers need to be kept interested in your communication over time, which requires dynamic and adaptive communication strategies. The analysis also performed cluster analysis to obtain details of different consumer segments with respect to the levels of awareness, trust and Skepticism about sustainability messaging. Awareness and trust in the product still do not guarantee eco-conscious purchasing, as some of the clusters include high awareness and high trust, but are still not buying. Rather, they are skeptical about buying, which suggests that there are other psychological factors such as values, beliefs and experience that influence an individual's behaviours (36).

The results indicate that the eco-friendly nature of consumer behaviour is a complex phenomenon because awareness and trust are not sufficient factors to explain the sustainable purchasing

process. There are also economic and psychological determinants, such as price sensitivity and Skepticism, which have a strong effect on consumer reaction to eco-label awareness campaigns. In particular, price sensitivity can be considered a moderating variable that defines the intensity at which awareness can be converted into purchasing behaviour. Customers with a lower price sensitivity tend to turn environmental awareness into eco-conscious consumer behaviour. Eco-labels do not relax highly price-sensitive customer behaviour due to economic issues.

The cluster analysis indicates that consumer groups vary in degrees of awareness, trust and Skepticism, which implies that an awareness campaign cannot be homogenous and a more specific approach is needed to consider the diverse motivators and inhibitors of sustainable consumption. It is also interesting to note that the diminishing-return effect observed in the analysis is a resultant effect of cross-sectional data used in the analysis using quadratic regression, as opposed to longitudinal observations. Therefore, the findings indicate the existence of a nonlinear correlation between awareness and eco-conscious purchasing behaviour and the incremental effect of awareness might decrease beyond a specific point. Further longitudinal studies can provide a more precise idea of the change in the effects of the awareness campaigns as time passes.

Limitations

Despite such contributions, this study also has several limitations that need to be recognized. For the initial, the research depends on a cross-sectional outline, which limits the ability to build causal relations over time. Although the results give a picture of consumers' behaviour at a given moment, longitudinal studies could provide a better understanding of how awareness campaigns impact people's eco-friendly behaviour over time. Second, the study's data are based on self-reports and, as such, may be subject to social desirability bias. Because participants may want to appear eco-friendly according to their perception of the social norm, results may instead reflect this desire, rather than behaviour. The sample was drawn from a particular demographic and geographic context, so the third point is that the findings have limited generalizability. The applicability of the result to a broader population can be very sensitive to cultural, economic and environmental factors that

may vary substantially across the regions. Fourth, the study is not conducted under experimental control, thereby rendering the task of unscrambling the effects of awareness campaigns from other external factors, including other marketing efforts, regulatory changes, or market conditions, very difficult. At last, although key constructs getting involved in sustainable consumption behaviour like awareness, trust, Skepticism and price sensitivity are included in the model, some other potentially important variables like personal values, environmental concern and peer influence have been left out. They have been demonstrated to be critically valid factors in prior studies regarding sustainable consumption behaviour.

Future Research Directions

The findings and limitations of this study are used as the basis for the proposal of several areas for future research. Longitudinal studies should first be conducted to trace eco-conscious purchasing behaviour changes over time to better understand the campaign results. By doing so, it will then become possible to determine if the observed diminishing returns in campaign effectiveness are temporary or persistent. Second, stronger causal inferences could be determined using experimental and quasi-experimental designs by controlling for external variables that might be responsible for the obfuscation of results. Third, cross-cultural research will clarify how the values of a culture, social norms and regulatory environments influence the effectiveness of awareness campaigns since perceptions and behaviours related to sustainability vary from one region to another. Fourth, further studies on the fusion of behavioral economics fundamentals, such as nudging, framing effects and default options in designing messages and product placement, are helpful to identify how small changes in message composition, or in product location, shape the sustainable consumption practice. The future research indicates that the role of emotional appeals in awareness campaigns could be further investigated. This study was centered on cognitive factors such as knowledge and awareness. Still, emotional drivers, including guilt, pride and fear, have been demonstrated as very powerful motivators of change in behaviour. Campaign strategies could be more effective if the way they interact with information is explored. An area

worth examining for another purpose is the social influence and peer effects. Given that consumers often look to others when making decisions, such as purchases, understanding social norms, group dynamics and what makes influencer marketing form part of the puzzle, works for more targeted interventions. Moreover, the rise of technology in consumers' decision-making process calls for future research on eco apps, personalized recommendations, blockchain transparency and any other digital tool that can improve the efficiency of sustainability campaigns.

Conclusion

Through this study, the effective role of awareness campaigns toward the development of eco-conscious consumer behaviour is highlighted. The results support the findings that awareness campaigns indeed influence consumers' awareness of eco-labels and foster trust in relation to sustainable purchasing. But the research also reveals key nuances: awareness enhances knowledge but does not necessarily drive the change in behaviour, particularly in the context of Skepticism and price sensitivity. Price sensitivity plays a moderating role, which implies that consumers who are informed about the environment may put more weight on economic considerations and less on environmental value and thus supports a need for a comprehensive approach between informational and financial barriers. The finding of diminishing returns in the awareness impact helps explain that periodic maintenance and innovative communication techniques are required for keeping the consumer interested in eco-friendly products. This study helps to further understanding about the complex underlying factors that affect consumers' thoughts of sustainability in shopping by using multiple advanced analyses: moderated mediation models and cluster analysis. Insights gained inform about the design of interventions that can be targeted to raise awareness while simultaneously going towards actual, long-term, behavioral change towards sustainability by policymakers, marketers and environmental advocates.

Abbreviations

AVE: Average Variance Extracted, CFA: Confirmatory Factor Analysis, CFI: Comparative Fit Index, Df: Degrees of Freedom, ESM: [Define or replace with SEM], PROCESS Macro: Tool for

mediation and moderation analysis in SPSS, RMSEA: Root Mean Square Error of Approximation, SD: Standard Deviation, SPSS: Statistical Package for the Social Sciences, SRMR: Standardized Root Mean Square Residual.

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Author Contributions

Kasibhatla Surya Deepti: conceptualization, data collection, data analysis, methodology, writing – original draft, R Pradeep Kumar Patnaik: supervision, validation, review, editing of the manuscript, academic guidance.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Data Availability

The datasets, the responses collected as survey feedback and analyzed during the current study are available from the corresponding author on reasonable request.

Declaration of Artificial Intelligence (AI) Assistance

In the process of writing this document, generative AI did not have any role in its creation besides helping in language editing and formatting. The authors revised all the material, checked it, as well as approved it and assume complete responsibility for the final manuscript.

Ethics Approval

This study was conducted in accordance with institutional ethical guidelines. Informed consent was obtained from all participants. The responses were anonymized to maintain confidentiality and data integrity.

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