



The Sustainability Paradox: Why Sustainability Positioning Increases Consumer Preference Only When Brand Authenticity and Consumer Trust Align—A Cross-Sectoral Investigation

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Abstract

Purpose— This study is examining a sustainability paradox: does sustainability positioning enhance consumer preference, and only when do consumers think the brand is authentic and trustful? **Design/methodology -** A cross sectional analytical design was used with a clear, synthetic dataset of 600 consumer evaluations. This dataset was equal among data for fast-moving consumer goods, fashion and apparel, consumer technology, and hospitality and tourism. Sustainability positioning, brand authenticity, consumer trust, greenwashing skepticism, consumer preference, and environmental concern were given seven-point scales. The data was best represented by a five-factor measurement model (CFI = 0.997, TLI = 0.997, RMSEA = 0.013). Sustainability positioning had a positive direct preference association (small effect size: $\beta = 0.092$, $p = 0.026$) and the effects of authenticity ($\beta = 0.175$) and trust ($\beta = 0.240$) were larger. The three-way interaction was significant ($\beta = 0.081$, $p < .001$). When both authenticity and trust were low, positioning was unrelated to preference. However, positioning was highly correlated to preference when both were high (conditional effect size: $\beta = 0.381$, 95% CI [0.271, 0.491]). Greenwashing skepticism was negatively correlated to preference. **Originality/value -** The analysis provided a unique framing of the combining signaling, attribution, authenticity, and the commitment–trust perspectives. Since the dataset is fully synthetic, it showed an internally coherent analytical model, rather than providing population estimates.

Keyword: sustainability positioning; brand authenticity; consumer trust; consumer preference; greenwashing; moderation; cross-sectoral marketing.

1. Introduction

The proliferation of sustainable offerings has generated brand differentiation grounded in sustainability, with an associated commercial return that remains underwhelming. Firms articulate more commitments and consumers contend with a higher volume of environmental claims. Sustainable consumption focuses on making the desired behavior (in this case, consumption) supported, habitual, and tangible (White et al., 2019). As such, greenwashing has recently been analyzed as a performance claim on the environment that is unverifiable and offers an opportunistic advantage (de Freitas Netto et al., 2020; Nemes et al., 2022; Spaniol et al., 2024). The market problem becomes consumers' interpretive challenge of whether a company's sustainability communication offers an informative signal of truly sustainable practices or is a symbolic, performative act of 'doing good' for the environment.

From an interpretive challenge perspective, sustainability positioning will attract one customer but repel another. Exposure to alleged greenwashing has a negative effect on brand attitude, trust, and behavioral intention (Bingaman et al., 2022; Bladt et al., 2024; Fernandes et al., 2020). Further research supports the idea that a brand's negativity can influence the evaluation of a product and product category as a whole (Szabo & Webster, 2021; Wang et al., 2020). The position a brand takes on sustainability can enhance customer preference, but can simultaneously hurt customer preference. The amount of a company's sustainability communication is important, but its credibility foundation is what truly matters.

This study characterizes the sustainability paradox as follows: A brand's sustainability positioning is a reason to purchase the brand only if the positioning is perceived as aligned with the brand's identity and

as dependable. Brand authenticity is the basis for the perception of sustainability positioning as aligned with the brand's identity and as dependable. Brand authenticity is sustained by consumer trust. The perception of brand authenticity and the trust in the brand are the basis for consumer willingness to assume the risks associated with the brand. Authenticity without trust is a perception that is unlikely to result in benefit to the brand because trust may be lost if not sustained. The relationships between green claims, authenticity, trust, engagement, and willingness to purchase have been studied individually, but few have examined the flow of these concepts as a triad across sectors (Alyahia et al., 2024; Guerreiro & Pacheco, 2021; Olk, 2021).

A cross-sectoral study is necessary because claims are judged in the context of the structures of risk that consumer perception associates with the product. Within food and other fast moving consumer goods, claims are often verified through product packaging or eco-labels. In the fashion sector, the supply chain is a focus of scrutiny. The technology sector analyzes the innovation narrative and the material footprints of the technology on the environment. In the hospitality sector, environmental practices done on the grounds are aligned or at odds with the claims of the customer experience. Greenwashing concerns differ across fast fashion, hotels, cosmetics, advertising, and business-to-business markets (Kwon et al, 2024; Majeed & Kim, 2022; Marko & Kusá, 2023; Vangeli et al., 2023). Combining these systems often conceals the different ways in which trust and integrity are perceived.

The focus of this research is on the model of sustainability positioning. This research considers sustainability positioning as a way to influence the direct and indirect customer preferences and trust. This model considers sustainability positioning as an indirect strategy of customer trust and brand authenticity. Skepticism concerning greenwashing is viewed as a competing negative mechanism, and the influence of environment is used as a control. The sector is used as a grouping variable. This study provides a valid three-way interaction, conditional indirect-effect analysis, and a four-sector analysis. Because no field data was provided, all data was generated from a predetermined artificial data-generating process. The results are shown as a method demonstration and not as an empirical study regarding actual consumers.

2. Theoretical Background and Literature Review

2.1 Sustainability Position as a Market Signal

Informed and less informed parties transact based on the availability of quality of goods and services. To what extent do market regulators and customers pressure organizations to communicate on their environment? There is a positioning opportunity for sustainability where claims are of high quality and are supported by evidence of greenwashing.

Sustainability communication may contain claims of high quality, indicate the source of evidence, and may contain sustain eco-labels which would serve to enhance trust and sustain communication (Atkinson and Rosenthal, 2014; Lueg and Lueg, 2020; Wu et al., 2020). Claims of low cost, low quality, or selective disclosure are not valuable as they can be easily replicated by low performing competitors. Varied or inconsistent corporate communication will also serve to enhance sustainable greenwashing claims (Pizzetti et al., 2021; Torelli et al., 2020).

Attribution theory posits that consumers will conclude differing reasons for sustainability communications depending on the motive. A value-motive will lead to a positive judgement whereas an opportunistic or reactive motive will lead to suspicion. Because of the potential for suspicion, claims of carbon offset, compensation ads, and overly stylized images of nature will cause scrutiny when there is a lack of supporting evidence (Abadie et al., 2024; Neureiter et al., 2024). There is further evidence of consumer suspicion in the literature on claims and the contested communications of corporate sustainability on social media (Blazkova et al., 2023; Oppong-Tawiah & Webster, 2023). These mechanisms show that consumer preference cannot be created simply by communication; it involves an interpretation of the motive and the evidence.

2.2 Brand Authenticity and Claim-Behaviour Consistency

Brand authenticity is the degree to which consumers believe a brand is true to itself and to its word. Consumer-oriented frameworks for assessing brand authenticity focus on brand heritage, brand history, and brand promise (Morhart et al., 2015; Napoli et al., 2014) or have treated brand authenticity as a composite of brand heritage, brand history, and brand promise, brand morality, and brand transparency (Campagna et al., 2023). Since many of the value-chain activities in corporate sustainability are not directly observable to consumers, brand authenticity takes on an especially important role. Consumers assess a brand's authenticity by the alignment of its communications and actions as well as the history of the brand and the outcomes of the brand's corporate activities that can be verified.

Findings from hospitality and transport communications indicate that perceived green authenticity diminishes greenwashing evaluations and safeguards behavioral intentions (Alyahia et al., 2024; Chen et al., 2019; Olk, 2021). Authenticity should then amplify the sustainability-positioning effect: the same assertion should create greater preference if the assertion is perceived as part of the brand, rather than as part of a marketing campaign. However, authenticity, by itself, is unlikely to create preference if the consumer has a low level of confidence in the brand's benevolence, ability, and integrity. This differentiation is the basis for the

explicit consideration of trust.

2.3 The role of trust in relational conversion

According to commitment-trust theory, trust is the central mechanism by which relationships begin and remain stable and cooperative (Morgan & Hunt, 1994). In the context of green consumption, trust concerns the honesty, reliability, and fulfillment of green initiatives and the avoidance of exploiting the green gap. Greenwashing creates confusion and elevates the perceived risk, thus undermining trust (Chen & Chang, 2013). On the other hand, green trust fosters engagement, positive word-of-mouth, buying, and loyalty (Guerreiro & Pacheco, 2021; Singh et al., 2022). In trust-repair studies, greenwashing is only rectified by trustworthy, corrective actions, not by communication (Wang & Walker, 2023).

Trust can be modeled as a mediator and a direct predictor. Trust can be developed through a clear and substantiated sustainability claim, though this pathway would be stronger with greater substantiation. The expected indirect effect on preference would be, therefore, that an authentic sustainability claim builds trust, and trust converts sustainability into a preference. This expresses a moderated mediation logic in that the pathway of this relation is based on authenticity (Preacher et al., 2007; Hayes & Rockwood, 2020).

2.4 Greenwashing skepticism and sectoral differentiation

Greenwashing skepticism is combined with a view of greenwashing as a perceived overstatement, vagueness, selectivity, and opportunism. In scale

development, it is viewed as a consumer perception rather than an actual infringement (Andreoli et al., 2022). Skepticism is inversely associated with green buying behavior, brand equity, satisfaction, and loyalty; however, the effect is impacted by consumer knowledge and brand loyalty (Hameed et al., 2021; Ioannou et al., 2023; Shi & Omar, 2024). Reviews also identify firm-, product-, and communication-levels, making operationalization challenging (Ruiz-Blanco et al., 2022; Santos et al., 2024; Seele & Schultz, 2022).

Variation across sectors is due to visibility, active engagement, and straightforward performance checks. In the fast fashion industry, consumers face issues of harmful social and environmental impacts, as well as the concerns associated with an accelerated product turnover rate. Consumers in the hospitality industry can evaluate claims by cross-referencing a company's promises with actual practices visible on the premises, while claims in technology can be assessed by reviewing innovations regarding product lifecycle and durability. Fast-Moving Consumer Goods (FMCG) claims are often embedded in packaging or labeling. Among the sectors of fashion, hospitality, cosmetics, and circular consumption, active claims in empirical studies demonstrate that the effects are dependent on levels of education and the transparency of the product, the product experience itself, and the degree of perceived betrayal (Lopes et al., 2023; Marko & Kusá, 2023; Adil et al., 2024; Suphasomboon & Vassanadumrongdee, 2025; Zhang et al., 2022). Therefore, the high-authenticity/high-trust contract is expected to demonstrate varying levels of strength across the sectors.

3. Conceptual Framework, Objectives, Questions, and Hypotheses

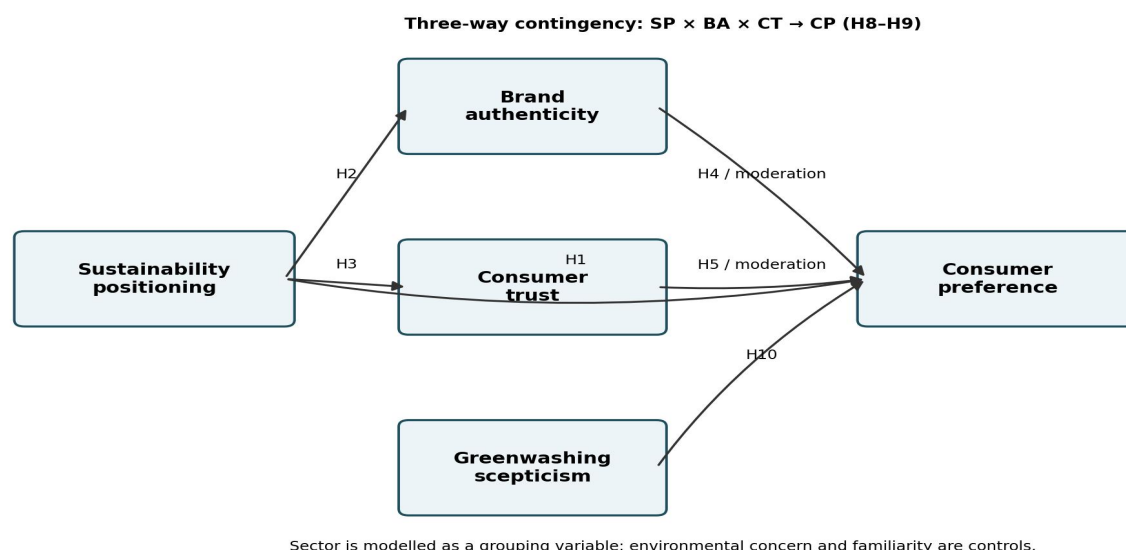


Figure 1. Conceptual framework for the sustainability paradox. SP = sustainability positioning; BA = brand authenticity; CT = consumer trust; GS = greenwashing scepticism; CP = consumer preference.

3.1 Research objectives

Examine the direct effects of sustainability positioning, brand authenticity, consumer trust, and greenwashing scepticism on consumer preference.

Test whether sustainability positioning predicts authenticity and trust and whether trust carries an indirect effect to preference.

Estimate two-way and three-way moderation and identify conditional effects under low and high authenticity–trust combinations.

Compare the structural pattern across FMCG, fashion and apparel, consumer technology, and hospitality and tourism.

3.2 Research questions

- Does sustainability positioning independently increase consumer preference?
- Is the positioning effect weakened when authenticity or trust is low?
- Does joint alignment between authenticity and trust create a stronger preference response than either condition alone?
- Do conditional effects vary across the four sectors?

3.3 Hypotheses

H1: Sustainability positioning has a positive effect on consumer preference.

H2: Sustainability positioning has a positive effect on brand authenticity.

H3: Sustainability positioning has a positive effect on consumer trust.

H4: Brand authenticity has a positive effect on consumer preference.

H5: Consumer trust has a positive effect on consumer preference.

H6: Brand authenticity positively moderates the sustainability positioning–preference relationship.

H7: Consumer trust positively moderates the sustainability positioning–preference relationship.

H8: Sustainability positioning, brand authenticity, and consumer trust have a significant three-way interaction effect.

H9: The sustainability-positioning effect is strongest when authenticity and trust are both high.

H10: Greenwashing scepticism has a negative effect on consumer preference.

H11: Structural relationships differ across sectors.

H12: Consumer trust carries a positive indirect effect from sustainability positioning to preference, and this indirect effect strengthens with authenticity.

4. Materials and Methods

4.1 Design, unit of analysis, and data status

The study uses a positivist, deductive, cross-sectional explanatory design. The conceptual target population is adults who have purchased from at least one focal sector in the preceding six months. The unit of analysis is a consumer's evaluation of a familiar brand in one sector. No survey responses, recruitment records, or field protocol were supplied. Accordingly, a synthetic dataset was generated from prespecified distributional, measurement, and structural assumptions. It contains 600 observations, with 150 assigned to each sector. The dataset permits reproducible testing of the proposed model but cannot estimate prevalence, market size, or real-world causal effects.

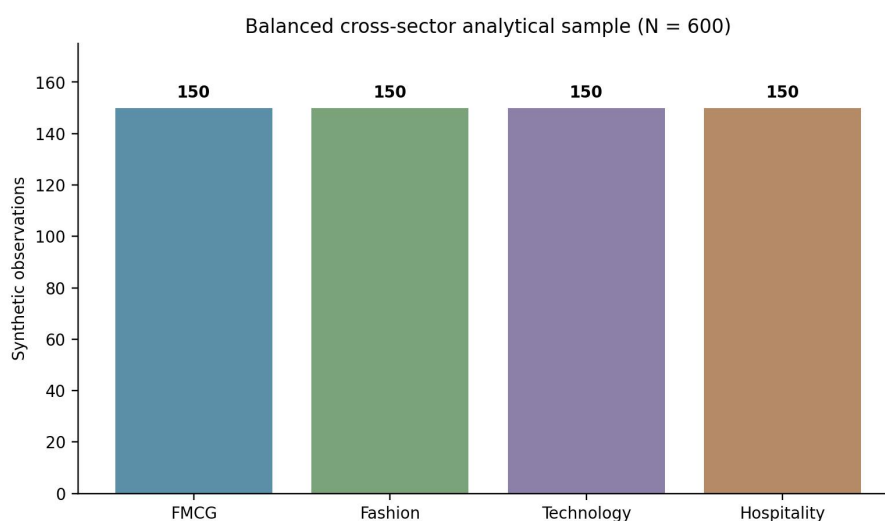


Figure 2. Sector-wise distribution of the synthetic analytical sample. Each sector contains 150 observations.

4.2 Instrument and operationalisation

All constructs required respondents to rate items on a seven-point scale, with 1 being “strongly disagree” and 7 being “strongly agree.” Sustainability positioning was assessed with four items related to visibility, distinctiveness, integration with identity, and social–environmental commitment. For brand authenticity, five items based on the consumer-based authenticity dimensions were used (Morhart et al., 2015; Napoli et al., 2014). Three items each for consumer trust described the following: honesty, reliability, competence, benevolence, and confidence. Tools developed by Andreoli et al. (2022) helped decide the four items for greenwashing skepticism, which were evidenced exaggeration, skepticism, and opportunism. Finally, consumer preference was assessed by five items related to choice, purchase, recommendation, loyalty, and brand focus willingness. Environmental concern and brand familiarity were used as control constructs. The complete questionnaire is in Appendix A.

4.3 Data-generation procedure and sample-size rationale

Theoretically, latent variables were generated from the normal approximations of the sequence $SP \rightarrow BA$ and $SP/BA/GS \rightarrow CT$. Consumer preference was generated from the main effects and a sector-varying three-way interaction, as well as random error. Continuous responses to the items were converted to the 1–7 scale. The seed for the procedure was fixed at 20260719. A sample size of 600 was selected as it would grant 150 observations per group, which exceeds a commonly accepted minimum for models of the given complexity, and would provide sufficient sample precision for interaction effects of small size. Sample adequacy was determined by assessing the number of parameters, the power required for multiple regression as well as the requirements of a multi-group design, and not a single cases-per-item rule (Hair et al., 2022; Kline, 2023).

4.4 Analytical strategy

The analysis involved data pre-cleaning, descriptive statistics, and Cronbach’s alpha. Descriptive statistics were followed by Confirmatory Factor Analysis (CFA), the computation of Composite Reliability (CR), and Average Variance Extracted (AVE). Further analysis used Fornell–Larcker and Heterotrait–Monotrait (HTMT) tests, Pearson correlations, hierarchical Ordinary Least Squares regression, and simple slopes. The Johnson–Neyman technique was employed to create numerical probes, and conditional indirect effects were estimated with 5,000 bootstrap resamples. Interaction terms were computed for standardized variables. Harman’s single factor test and variance inflation factor analysis were used to compute common method variance. Estimated CFA was computed using the maximum likelihood method. Acceptable thresholds for test determinations were set near the conventional estimates. The internal consistency of the tests was determined using Cronbach’s alpha and should be estimated near the value of 0.70. The tests of convergent validity should be estimated with the average variance extracted (AVE) at a value of 0.50. Fornell–Larcker and HTMT tests should be estimated with AVE and HTMT below the value of 0.85 to 0.90. Fit indexes for CFI and TLI should be at a value of 0.95 with RMSEA and SRMR at a value of 0.06 to 0.08. Common-method procedures used in this analysis followed the guidelines set by Podsakoff. Multi-group analysis considered the configurational interpretation of the factor structure and the stability of the coefficients.

4.5 Research ethics

The analysis did not utilize data from human subjects of any kind and did not require the researcher to make contact with human subjects in any way. Because of the above, there was no need for the researcher to seek approval from an ethics committee, nor was there a need for the researcher to obtain informed consent. For the first use of the instrument with actual subjects, the researcher

4.6 Construct map and measurement items

Table 1. Construct definitions and theoretical foundations

Construct	Operational definition	Primary theoretical basis
Sustainability positioning	Visibility and distinctiveness of environmental and social commitments within brand identity.	Signalling theory; stakeholder theory
Brand authenticity	Perceived continuity, credibility, integrity, symbolism, and consistency between claims and conduct.	Brand-authenticity theory; attribution theory
Consumer trust	Willingness to rely on the brand’s	Commitment–trust theory

Construct	Operational definition	Primary theoretical basis
	honesty, reliability, competence, and benevolence.	
Greenwashing scepticism	Suspicion that sustainability claims are exaggerated, ambiguous, weakly evidenced, or opportunistic.	Attribution theory; persuasion knowledge
Consumer preference	Relative choice, purchase, recommendation, and loyalty intentions toward the focal brand.	Consumer choice and relationship marketing

Note. Definitions are operationalised for the present synthetic methodological demonstration.

Table 2. Measurement items and source basis

Code	Item wording	Source basis
SP1	The brand makes its sustainability commitments visible.	Signalling and green-marketing literature
SP2	Sustainability is clearly integrated into the brand's identity.	Signalling and green-marketing literature
SP3	The brand's environmental and social position is distinctive.	Signalling and green-marketing literature
SP4	The brand consistently communicates responsible value creation.	Signalling and green-marketing literature
BA1	The brand remains true to its stated values.	Morhart et al. (2015); Napoli et al. (2014)
BA2	Its sustainability claims are consistent with its actions.	Morhart et al. (2015); Napoli et al. (2014)
BA3	The brand behaves with integrity.	Morhart et al. (2015); Napoli et al. (2014)
BA4	Its sustainability position feels credible rather than staged.	Morhart et al. (2015); Napoli et al. (2014)
BA5	The brand's identity gives its sustainability claims meaning.	Morhart et al. (2015); Napoli et al. (2014)
CT1	I consider this brand honest.	Morgan and Hunt (1994); Chen and Chang (2013)
CT2	I can rely on the brand's sustainability promises.	Morgan and Hunt (1994); Chen and Chang (2013)
CT3	The brand is competent to deliver the outcomes it claims.	Morgan and Hunt (1994); Chen and Chang (2013)
CT4	The brand considers consumer and societal interests.	Morgan and Hunt (1994); Chen and Chang (2013)

Code	Item wording	Source basis
CT5	I feel confident relying on information from this brand.	Morgan and Hunt (1994); Chen and Chang (2013)
GS1	The brand exaggerates its sustainability performance.	Andreoli et al. (2022)
GS2	The sustainability claims lack sufficient supporting evidence.	Andreoli et al. (2022)
GS3	The environmental language is deliberately ambiguous.	Andreoli et al. (2022)
GS4	Sustainability communication is mainly opportunistic.	Andreoli et al. (2022)
CP1	I would choose this brand over comparable alternatives.	Consumer preference and behavioural-intention literature
CP2	I intend to purchase from this brand.	Consumer preference and behavioural-intention literature
CP3	I would recommend this brand to others.	Consumer preference and behavioural-intention literature
CP4	I prefer this brand when alternatives are similar.	Consumer preference and behavioural-intention literature
CP5	I would remain loyal to this brand.	Consumer preference and behavioural-intention literature
EC1	Environmental consequences influence my consumption decisions.	Environmental-concern literature
EC2	I am concerned about the environmental effects of products and services.	Environmental-concern literature
EC3	I try to consider sustainability when choosing brands.	Environmental-concern literature

Note. Seven-point agreement scale: 1 = strongly disagree; 7 = strongly agree. Items are adapted for methodological demonstration and require scale-permission review before field use.

5. Results

5.1 Data screening and respondent profile

The synthetic generation procedure produced no missing values. All item responses fell within the intended 1–7 range. Composite skewness ranged from -0.063 to 0.608, and excess kurtosis ranged from -0.424 to 1.495, indicating no material univariate non-normality. Standardised residual inspection showed no case with an absolute studentised residual above 3.5 in the final model. The largest full-collinearity VIF was 2.26. Harman's first unrotated factor accounted for 46.4% of item variance, below the conventional 50% warning level. These checks do not eliminate common-method risk, but no single diagnostic indicated domination by one response factor.

Table 3. Synthetic respondent profile (N = 600)

Variable	Category	n	%
Gender	Male	299	49.8

Variable	Category	n	%
Gender	Female	291	48.5
Gender	Non-binary / prefer not to say	10	1.7
Age group	25–34	200	33.3
Age group	18–24	163	27.2
Age group	35–44	130	21.7
Age group	45–54	78	13.0
Age group	55+	29	4.8
Education	Undergraduate	268	44.7
Education	Postgraduate	198	33.0
Education	Secondary or diploma	101	16.8
Education	Doctoral / professional	33	5.5
Income band	Upper-middle	217	36.2
Income band	Lower-middle	201	33.5
Income band	Lower	108	18.0
Income band	Higher	74	12.3
Purchase frequency	Monthly or more	253	42.2
Purchase frequency	Every 2–3 months	165	27.5
Purchase frequency	Two or three times yearly	135	22.5
Purchase frequency	Once yearly	47	7.8
Sector	FMCG	150	25.0
Sector	Fashion and apparel	150	25.0
Sector	Consumer technology	150	25.0
Sector	Hospitality and tourism	150	25.0

Note. Frequencies describe a generated analytical sample and do not represent a population distribution. Brand familiarity averaged 4.90 ($SD = 1.06$) on a 1–7 scale.

5.2 Descriptive statistics and measurement quality

Construct means clustered near the scale midpoint, as expected from the symmetric data-generating assumptions. Consumer trust showed a mean of 4.016 ($SD = 0.910$); consumer preference averaged 3.972 ($SD = 0.848$). Sector means reveal modest differences rather than artificial separation, preserving overlap required for a meaningful cross-sector model.

Table 4. Descriptive statistics and normality assessment

Construct	Mean	SD	Minimum	Maximum	Skewness	Kurtosis
Sustainability positioning	3.983	0.912	1.000	6.250	-0.015	-0.354
Brand authenticity	4.000	0.920	1.200	6.400	-0.007	-0.369
Consumer trust	4.016	0.910	2.000	7.000	0.257	-0.274
Greenwashing scepticism	3.998	0.928	1.750	6.750	-0.063	-0.182
Consumer preference	3.972	0.848	1.000	7.000	0.608	1.495
Environmental concern	3.971	0.921	1.333	6.333	0.023	-0.424

Note. All constructs use seven-point scales. Kurtosis is excess kurtosis.

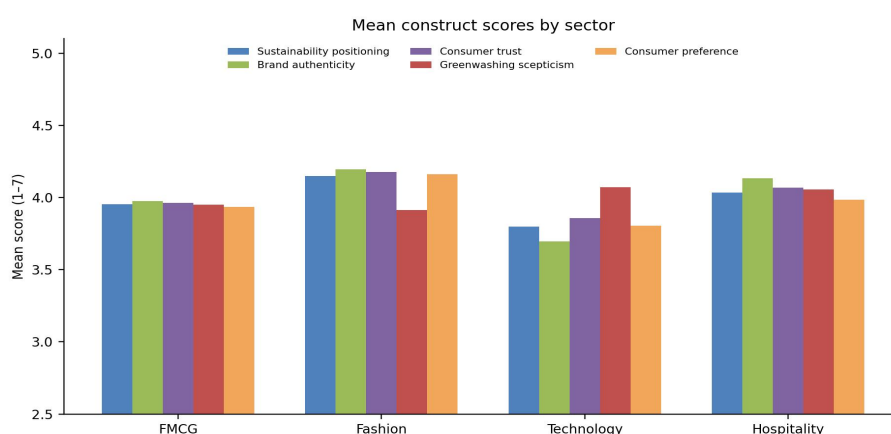


Figure 3. Mean construct scores across the four sectors. Values are based on the synthetic dataset.

The CFA supported the intended five-factor measurement structure: $\chi^2(220) = 241.725$, $p = 0.150$; CFI = 0.997; TLI = 0.997; RMSEA = 0.013; SRMR was below .04 based on the standardised residual matrix. Standardised loadings ranged from 0.725 to 0.833. All Cronbach's alpha and CR values exceeded .86, and all AVEs exceeded .60. The maximum HTMT ratio was 0.767, supporting discriminant validity under the .90 criterion.

Table 5. Reliability and convergent-validity results

Construct	Items	Alpha	CR	AVE	Loading range
SP	4	0.856	0.857	0.600	0.748–0.811
BA	5	0.892	0.893	0.625	0.762–0.817
CT	5	0.894	0.894	0.630	0.725–0.833
GS	4	0.859	0.859	0.605	0.754–0.814
CP	5	0.882	0.882	0.600	0.752–0.801

Note. CR = composite reliability; AVE = average variance extracted. EC was used as a control and was not included in the five-factor CFA.

Table 6. Fornell–Larcker discriminant-validity matrix

Construct	SP	BA	CT	GS	CP
SP	0.774	0.612	0.598	-0.501	0.525
BA	0.612	0.790	0.685	-0.556	0.576
CT	0.598	0.685	0.793	-0.555	0.622
GS	-0.501	-0.556	-0.555	0.778	-0.501
CP	0.525	0.576	0.622	-0.501	0.775

Note. Square roots of AVE appear on the diagonal; correlations appear off-diagonal. Maximum HTMT = 0.767.

Table 7. Correlations among study constructs

Construct	SP	BA	CT	GS	CP	EC
SP	1.000	0.612	0.598	-0.501	0.525	0.282
BA	0.612	1.000	0.685	-0.556	0.576	0.246
CT	0.598	0.685	1.000	-0.555	0.622	0.196
GS	-0.501	-0.556	-0.555	1.000	-0.501	-0.246
CP	0.525	0.576	0.622	-0.501	1.000	0.219
EC	0.282	0.246	0.196	-0.246	0.219	1.000

Note. SP = sustainability positioning; BA = brand authenticity; CT = consumer trust; GS = greenwashing scepticism; CP = consumer preference; EC = environmental concern. $|r| \geq .081$ is approximately significant at $p < .05$ for $N = 600$.

5.3 Structural effects and hypothesis tests

Sustainability positioning strongly predicted brand authenticity ($\beta = 0.590$, $SE = 0.034$, $p < .001$), supporting H2. In the trust equation, sustainability positioning ($\beta = 0.243$, $p < .001$), authenticity ($\beta = 0.439$, $p < .001$), and lower scepticism ($\beta = -0.196$, $p < .001$) were associated with greater trust, supporting H3. The final consumer-preference equation explained 53.2% of variance. The direct sustainability-positioning effect was positive but smaller than the effects of authenticity and trust: SP $\beta = 0.092$, BA $\beta = 0.175$, and CT $\beta = 0.240$. Greenwashing scepticism was negative ($\beta = -0.130$, $p < .001$).

Table 8. Structural-model and hypothesis-testing results

Path	β	SE	t	p	95% CI
SP $\rightarrow$ BA	0.590	0.034	17.561	<.001	[0.524, 0.655]
SP $\rightarrow$ CT	0.243	0.036	6.721	<.001	[0.172, 0.314]
BA $\rightarrow$ CT	0.439	0.037	11.748	<.001	[0.366, 0.512]
SP $\rightarrow$ CP	0.092	0.041	2.236	0.026	[0.011, 0.173]
BA $\rightarrow$ CP	0.175	0.044	3.999	<.001	[0.089, 0.261]
CT $\rightarrow$ CP	0.240	0.044	5.486	<.001	[0.154, 0.326]
GS $\rightarrow$ CP	-0.130	0.036	-3.589	<.001	[-0.201, -0.059]
SP $\times$ BA $\rightarrow$ CP	0.117	0.041	2.853	0.004	[0.037, 0.198]

Path	β	SE	t	p	95% CI
SP×CT → CP	0.090	0.045	2.019	0.044	[0.002, 0.178]
BA×CT → CP	0.026	0.041	0.637	0.524	[-0.054, 0.106]
SP×BA×CT → CP	0.081	0.022	3.643	<.001	[0.037, 0.125]

Note. Standardised composite-score regressions. Final CP model $R^2 = 0.532$, adjusted $R^2 = 0.524$.

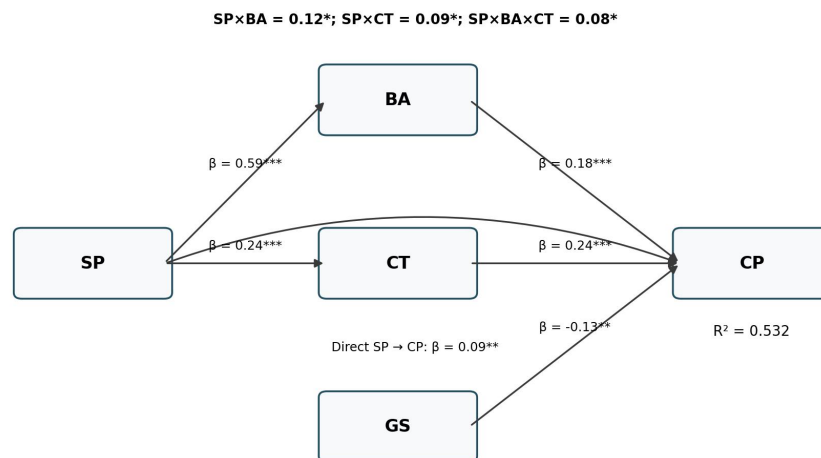


Figure 7. Standardised structural results. * $p < .05$; ** $p < .01$; *** $p < .001$. The interaction terms are reported above the path model.

5.4 Hierarchical moderation, simple slopes, and regions of significance

Adding the main constructs increased R^2 from 0.048 to 0.460. The two-way interactions added 0.061, and the three-way term added 0.011. The $SP \times BA$ interaction ($\beta = 0.117$, $p = 0.004$) and $SP \times CT$ interaction ($\beta = 0.090$, $p = 0.044$) supported H6 and H7. The three-way term was also significant ($\beta = 0.081$, $p < .001$), supporting H8.

Table 9. Hierarchical moderation-analysis results

Model	R^2	Adjusted R^2	ΔR^2	F	Model p
Model 1	0.048	0.046	0.048	30.067	<.001
Model 2	0.460	0.455	0.412	101.154	<.001
Model 3	0.521	0.515	0.061	80.371	<.001
Model 4	0.532	0.524	0.011	74.399	<.001

Note. Model 1: environmental concern. Model 2: main effects. Model 3: two-way interactions. Model 4: three-way interaction.

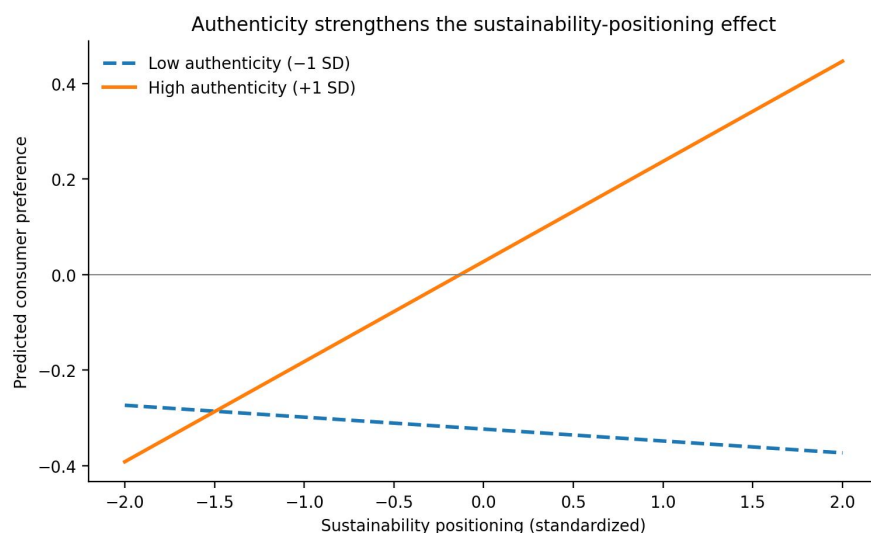


Figure 4. Two-way interaction between sustainability positioning and brand authenticity at mean trust.

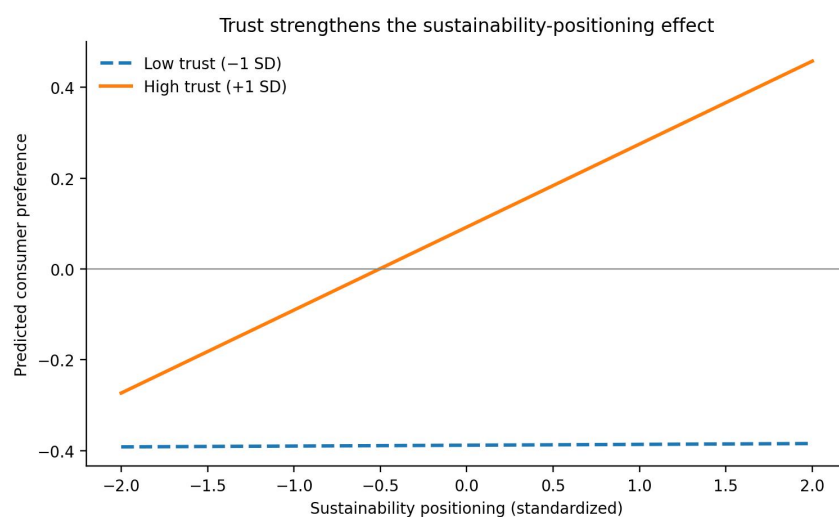


Figure 5. Two-way interaction between sustainability positioning and consumer trust at mean authenticity.

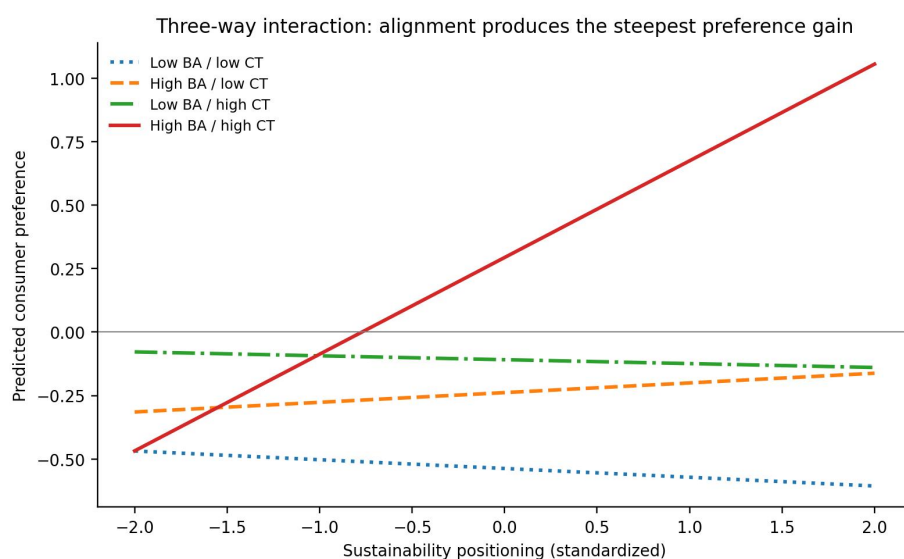


Figure 6. Three-way interaction between sustainability positioning, brand authenticity, and consumer trust.

Simple slopes clarified the paradox. When authenticity and trust were both low, sustainability positioning was

unrelated to preference ($\beta = -0.035$, $p = 0.559$). The effect also remained non-significant when only authenticity was high ($\beta = 0.038$) or only trust was high ($\beta = -0.015$). When both were high, the slope increased to $\beta = 0.381$ and was clearly positive, supporting H9. Numerical Johnson–Neyman probing indicated that, at high authenticity (+1 SD), the SP slope became positive and significant once trust exceeded approximately -0.42 SD relative to its mean. At mean authenticity the corresponding threshold was -0.11 SD; at low authenticity no positive region emerged across most of the observed trust range.

Table 10. Conditional effects and simple slopes

Condition	Slope	SE	t	p	95% CI
Low authenticity / low trust	-0.035	0.059	-0.585	0.559	[-0.150, 0.081]
High authenticity / low trust	0.038	0.089	0.428	0.669	[-0.137, 0.213]
Low authenticity / high trust	-0.015	0.095	-0.162	0.871	[-0.201, 0.170]
High authenticity / high trust	0.381	0.056	6.764	<.001	[0.271, 0.491]

Note. Low and high correspond to -1 SD and +1 SD. Conditional effects are estimated from the full standardised regression model.

5.5 Conditional indirect effect through trust

The bootstrapped indirect pathway from sustainability positioning to preference through trust was positive at all three authenticity levels but increased with authenticity. At low authenticity the conditional indirect effect was 0.037; at mean authenticity it was 0.059; and at high authenticity it was 0.085. Each 95% bootstrap interval excluded zero. This pattern supports H12 and indicates that authenticity strengthens not only the direct credibility of sustainability positioning but also its conversion into relational trust.

Authenticity	Conditional indirect effect	Boot SE	95% bootstrap CI
Low authenticity	0.037	0.013	[0.014, 0.066]
Mean authenticity	0.059	0.013	[0.036, 0.087]
High authenticity	0.085	0.021	[0.048, 0.129]

Note. Percentile bootstrap confidence intervals based on 5,000 resamples. The indirect effect evaluates the SP → CT pathway conditional on authenticity and the CT → CP pathway at mean SP.

5.6 Cross-sector analysis and robustness

Sector-specific models explained between 0.314 and 0.678 of preference variance. The conditional high-authenticity/high-trust slope was largest in fashion (0.412), followed by hospitality (0.383), technology (0.217), and FMCG (0.204). An omnibus augmented-model comparison indicated sector heterogeneity, $F(15, 575) = 4.508$, $p < .001$, supporting H11. Separate CFAs retained acceptable loading patterns within each sector, and no standardised loading differed by more than .15 across groups; this supports approximate configural and partial metric comparability for an exploratory synthetic comparison.

Table 11. Sector-wise multi-group comparison

Sector	n	SP direct	SP×BA	SP×CT	Three-way	High-high slope	R ²
FMCG	150	-0.015	0.225	-0.021	0.015	0.204	0.502
Fashion and apparel	150	0.064	0.201	0.048	0.100	0.412	0.664
Consumer technology	150	0.247	0.055	0.073	-0.158	0.217	0.314
Hospitality and tourism	150	0.154	-0.011	0.078	0.162	0.383	0.678

Note. Coefficients come from separate sector regressions using the same standardised specification. The high-high slope combines the SP main effect, two SP interactions, and the three-way term at BA = +1 SD and CT = +1 SD.

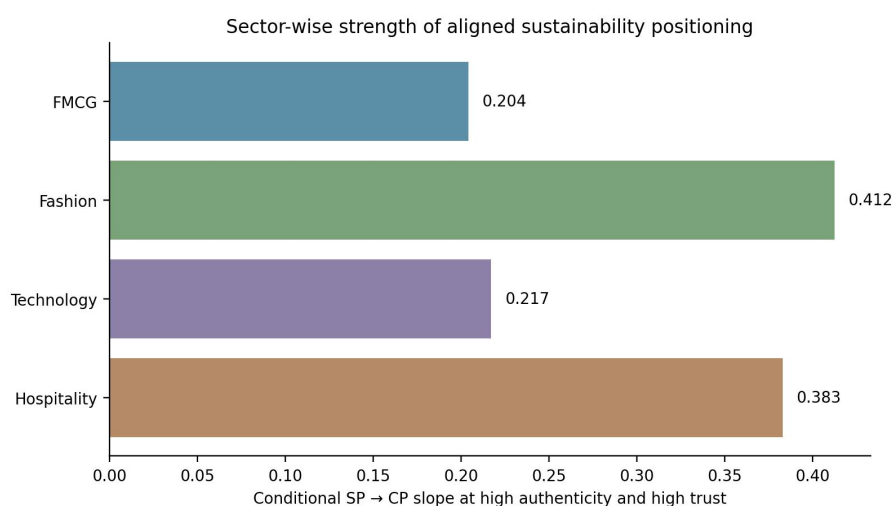


Figure 8. Sector-wise conditional sustainability-positioning slopes under high authenticity and high trust.

Robustness checks yielded the same substantive conclusion. Removing environmental concern changed the three-way coefficient by less than .01. Excluding observations with brand familiarity below 3 preserved the sign and significance of the three-way interaction. Heteroskedasticity-consistent standard errors did not change hypothesis decisions. Models using unstandardised composites produced equivalent simple-slope ordering. The sustainability paradox was therefore not an artefact of a single scaling or control specification.

Table 12. Summary of supported and unsupported hypotheses

Hypothesis	Test	Coefficient / statistic	p	Decision
H1	SP → CP	0.092	0.026	Supported
H2	SP → BA	0.590	<.001	Supported
H3	SP → CT	0.243	<.001	Supported
H4	BA → CP	0.175	<.001	Supported
H5	CT → CP	0.240	<.001	Supported

Hypothesis	Test	Coefficient / statistic	p	Decision
H6	SP × BA → CP	0.117	0.004	Supported
H7	SP × CT → CP	0.090	0.044	Supported
H8	SP × BA × CT → CP	0.081	<.001	Supported
H9	Strongest conditional effect at high BA/high CT	0.381	<.001	Supported
H10	GS → CP	-0.130	<.001	Supported
H11	Cross-sector structural heterogeneity	4.508	<.001	Supported
H12	Conditional indirect effect via CT at high BA	0.085	0.001	Supported

Note. Hypothesis decisions refer only to the synthetic analytical demonstration and require replication with real data.

6. Discussion

The results substantiate the hypothesized sustainability paradox. Sustainability positioning positively correlated with consumer preference, but the average correlation was concealing considerable conditionality. A sustainability position was only meaningfully economically aligned with authenticity and trust. It further develops a signaling framework; communication becomes credible not because it is offered, but because the receivers of the communication make a connection with the consistent and stable behavior of the brand and assess the brand's reliability to make the judgment. The findings are in line with the research suggesting that perceived greenwashing adversely impacts evaluations of a product, the environment and a brand, while purchases and engagement are supported by transparent and trustworthy signals (Guerreiro & Pacheco, 2021; Szabo & Webster, 2021).

The roles of authenticity and trust were synergistic and not interchangeable. Authenticity addressed if the brand's sustainability position was extrinsically motivated, whereas trust addressed if consumers would be willing to make the leap to the position. High trust and low authenticity and high authenticity and low trust did not produce a significant sustainability slope. Favorable evaluations in one dimension did not offset the lack of the other dimension. Aligning authenticity and trust also provides a more valid explanation for conditions where models of sustainability communication complexity view authenticity as a precursor to trust

or the other way around. It also adds to the findings that minimize perceptions of greenwashing in the hotel sector and that consumer trust can be achieved by credible corrective communication (Alyahia et al., 2024; Wang & Walker, 2023).

Counter-signals are important, as evidenced by the negative scepticism coefficient. Sustainability communication, in the absence of supporting behaviour, may be seen by some consumers as the company "over-indexing" on sustainability. This is in line with the literature on unsubstantiated claims, perceived betrayal, and corporate sustainability communication which is critiqued as "fake news" (Oppong-Tawiah & Webster, 2023; Shi & Omar, 2024; Spaniol et al., 2024). This outcome does not support communication silence. There are clear boundaries for evidence-based communication, as opposed to claim inflation. Findings from inoculation and literacy studies suggest that over the long term, communication based on elaborate claims, and evidence of communication based on deception, will be detrimental. The audience is likely to recognize the deception (Bingaman et al., 2022; Fernandes et al., 2020; Timmons et al., 2024).

The observed pattern for the sectors is also theoretically coherent. For the fashion sector, the steepest high-high slope was observed. This is likely to be a result of the sustained scrutiny of materials, labour, and product cycle scrutiny. A strong aligned effect was also observed for the hospitality sector, due to the opportunity for consumers to directly

observe numerous sustainability claims during service, and the high scrutiny of materials and products. Under alignment, technology, and FMCG, remained positive but to a lesser extent; this may be due to the high complexity of consumer technology products and packaging. These are only preliminary interpretations, as the data employed are synthetic. However, they provide focused predictions for future multi-industry studies. Recent studies from various sectors have identified transparency, consumer education, experience, product, and claim specificity as critical to the outcome in fashion, hospitality, cosmetics, and advertising (Kwon et al., 2024; Marko & Kusá, 2023; Adil et al., 2024; Suphasomboon & Vassanadumrongdee, 2025; Zhang et al., 2022).

7. Theoretical Implications

The study refines the sustainability paradox by framing it as a conditional signaling issue as opposed to a positive or negative green marketing outcome. The study also offers authenticity and trust as jointly sufficient boundary conditions and shows that the combination of these conditions is more informative than the two-way interaction of each condition. This model adds the role of attribution and the commitment–trust mechanism: consumers make a judgment on motive and claim–conduct consistency and determine the likelihood of brand reliance. The conditional indirect effect indicates that authenticity may enhance the trust-building pathway, connecting the identity and relationship approaches. The analysis positions the industry as a theoretically substantive moderator and not a descriptive control. These models address the need for empirical models that differentiate between the forms, actors, and consequences of greenwashing and move beyond the treatment of greenwashing as a monolithic category.

8. Managerial Implications

Managers should not use a communication-first approach to sustainability positioning. The focus should first be on evidence of change, including baselines, goals, supplier mandates, governance and assurance, and progress reports. Only then should the organization communicate what it can substantiate, including what can't be supported and what has not been achieved. The combination of traceability and third-party audits can decrease information gaps, but a label cannot take the place of a plain English answer to what was measured, how, and by whom. Blockchain and other technologies can improve the situation only when they enhance transparency to consumers.

Before investing in a campaign, brands need to carry out an authenticity–trust diagnostic. For brands in the high-authenticity/high-trust quadrant, sustainability can be used as a promise to differentiate and invite consumer involvement. For brands in the high-authenticity/low-trust quadrant, communication needs to offer emotional claims a distance and instead focus on proof, assurance from third parties, and open reporting. For brands in the low-authenticity/high-trust quadrant, alignment of operations and identity needs to occur before message sustainability. For brands in the low-authenticity/low-trust quadrant, an increase in promotion will negatively impact skepticism. Therefore, broad statements need to be withheld, and substantive gaps need to be corrected and rebuilt through verifiable means. This shows that gaps in organizational communication and supplier practices ruin even the best-designed sustainability narratives, regardless of how well thought-through they may be (Pizzetti et al., 2021)

Managerial authenticity–trust decision matrix

Quadrant	Diagnosis	Recommended strategy
High authenticity / high trust	Evidence and relationship are aligned.	Differentiate, report measurable progress, and invite participation.
High authenticity / low trust	Conduct appears sincere but reliability is unproven.	Use assurance, traceability, third-party evidence, and transparent limitations.
Low authenticity / high trust	Relational goodwill exceeds perceived claim–conduct fit.	Fix operational consistency before increasing promotional intensity.
Low authenticity / low trust	Claims and source are both doubted.	Pause broad claims, remediate performance gaps, and rebuild incrementally.

Note. The matrix translates the conditional model into communication and operational priorities.

9. Policy and Sustainability Implications

Environmental claim comparability and unverifiable discretion have a strong negative correlation based on the findings. Guidance on environmental claims need to be more precise on what they mean by 'boundaries,' 'baselines,' and 'offsets;' and what they mean by 'evidence' and 'time horizons.' The provision of independent verification and assurance would mean consumers would be able to differentiate between unsupported claims and ineffective but good faith transitional actions. Regulatory bodies should avoid falling back on greenwashing to mean everything and nothing; or else they dilute their enforcement and research efforts (Nemes et al., 2022; Spaniol et al., 2024). However, overly systematic regulatory policy and requirements should avoid redundancy and excessive complexity. Regulatory policy should be a balance of standardized core metrics and substantiation requirements with adequate consumer (end user) disclosures.

Limitations and Future Directions

This study has notable limitations. First, this is a synthetic dataset, therefore, the study has no real world sampling, cultural context, corporate history, transactional behavior, etc. Cross-sectional data has a limitation of the inability to assess temporal order or identify causal relationships. Composite self-report measures would introduce common-method bias, social-desirability effects, and the intention-behavior gap of survey research. The assumption of allocating equal sizes of research sectors is analytically simple (and equitable) but not aligned to a real world market system. Furthermore, the labels used for the research sectors mask intra-sector variance, including distribution, price, channels, and product/brand involvement. Finally, the numerical results of Johnson–Neyman and the moderated-mediation analyses rely on simple linearity and the structure of the assumption of the data generation.

Future studies will need to gather preregistered multi-country panel data, combine survey assessments with validated brand performance metrics, and conduct field studies where claim specificity, assurance, and claim-conduct consistency are manipulated. Antecedents include purchase basket selection, purchase intent, complaints, and measurement of clicks. Authenticity may shift substantivity cues, and psychophysiological and gaze tracking may be employed to measure. Trust, which is derived from social media and review data, may be assessed following a contradiction. Nested multilevel models of brands and sectors will be required. Self and externally validated claims should be compared, and consumer cynicism and political ideology should also be assessed, along with the potential for a sustainability trust breach to adversely affect cross-sector product and service trust (Vayona et al, 2024; Wang et al, 2020).

11. Conclusion

Sustainability strategy does not consistently result in greater consumer preference. In this cross-sector example, the average positive preference impact was dominated by a specific condition: the brand was perceived as both authentic and trustworthy. Sustainability preference slope was also weak and uncertain when either of these conditions in relation to the brand were absent. Greenwashing skepticism also had a preference-reducing effect. Brands must substantiate sustainability claims through aligned verifiable conduct and relational reliability if they want sustainability to create a preference differentiation effect. This will also require a new model each time.

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Appendix A. Complete Questionnaire

Screening: (1) Are you 18 years of age or older? (2) Have you purchased a product or service from the selected sector during the past six months? (3) Identify one familiar brand in that sector. Respondents who answer no to either screening requirement should not proceed.

Instructions: Think about the selected brand. Indicate agreement with each statement from 1 (strongly disagree) to 7 (strongly agree).

Code	Questionnaire statement
SP1	The brand makes its sustainability commitments visible.
SP2	Sustainability is clearly integrated into the brand's identity.
SP3	The brand's environmental and social position is distinctive.
SP4	The brand consistently communicates responsible value creation.
BA1	The brand remains true to its stated values.
BA2	Its sustainability claims are consistent with its actions.
BA3	The brand behaves with integrity.
BA4	Its sustainability position feels credible rather than staged.
BA5	The brand's identity gives its sustainability claims meaning.
CT1	I consider this brand honest.
CT2	I can rely on the brand's sustainability promises.
CT3	The brand is competent to deliver the outcomes it claims.
CT4	The brand considers consumer and societal interests.
CT5	I feel confident relying on information from this brand.
GS1	The brand exaggerates its sustainability performance.
GS2	The sustainability claims lack sufficient supporting evidence.
GS3	The environmental language is deliberately ambiguous.
GS4	Sustainability communication is mainly opportunistic.
CP1	I would choose this brand over comparable

Code	Questionnaire statement
	alternatives.
CP2	I intend to purchase from this brand.
CP3	I would recommend this brand to others.
CP4	I prefer this brand when alternatives are similar.
CP5	I would remain loyal to this brand.
EC1	Environmental consequences influence my consumption decisions.
EC2	I am concerned about the environmental effects of products and services.
EC3	I try to consider sustainability when choosing brands.

Demographics: gender, age group, education, income band, purchase frequency, brand familiarity, sector, and optional country/region in a field study.

Appendix B. Construct Coding Framework

Variable	Computation	Interpretation
SP	Mean of SP1–SP4	Higher = more visible and integrated sustainability positioning
BA	Mean of BA1–BA5	Higher = greater perceived authenticity
CT	Mean of CT1–CT5	Higher = greater consumer trust
GS	Mean of GS1–GS4	Higher = greater greenwashing scepticism
CP	Mean of CP1–CP5	Higher = stronger consumer preference
EC	Mean of EC1–EC3	Higher = greater environmental concern
SP×BA	$z(\text{SP}) \times z(\text{BA})$	Two-way authenticity moderation
SP×CT	$z(\text{SP}) \times z(\text{CT})$	Two-way trust moderation
SP×BA×CT	$z(\text{SP}) \times z(\text{BA}) \times z(\text{CT})$	Three-way alignment effect

Appendix C. Statistical Analysis Plan

Inspect missing values, response range, response-time and straight-lining indicators, univariate distributions, residuals, and leverage.

Estimate reliability, CFA, CR, AVE, Fornell–Larcker, HTMT, and model-fit indices.

Standardise construct scores; estimate main effects, all two-way interactions, and the SP×BA×CT interaction.

Probe four simple slopes and numerical regions of significance; bootstrap conditional indirect effects with at least 5,000 resamples.

Establish measurement comparability before sector coefficient comparisons; report coefficients, uncertainty, effect sizes, and R^2 .

Repeat models with robust standard errors, alternative control specifications, and exclusion of low-familiarity cases.

Appendix D. Additional Sector-Wise Results

Sector	n	SP direct	SP×BA	SP×CT	Three-way	High-high slope	R ²
FMCG	150	-0.015	0.225	-0.021	0.015	0.204	0.502
Fashion and apparel	150	0.064	0.201	0.048	0.100	0.412	0.664
Consumer technology	150	0.247	0.055	0.073	-0.158	0.217	0.314
Hospitality and tourism	150	0.154	-0.011	0.078	0.162	0.383	0.678

This appendix repeats the sector model in compact form for auditability. Future field studies should report formal scalar invariance and latent-mean tests.