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Sustainable Brand Practices and Long-Term Customer Retention: The Mediating Role of Trust and the Moderating Effect of Perceived Greenwashing

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ABSTRACT
Sustainability is no longer a fringe concern in brand strategy - for many firms it has become a central way of competing for customer loyalty. What's less clear is exactly how sustainable brand practices turn into lasting customer relationships. This paper builds a framework connecting sustainable brand practices to long-term customer retention through a chain running from signal credibility to customer trust to relational commitment, and it treats perceived greenwashing as a condition that can weaken or reverse that chain. The framework draws on stakeholder theory, signaling theory, and the commitment-trust theory of relationship marketing, grounded in empirical work published between 2021 and 2025. To show what testing the model actually involves, the paper analyzes a simulated dataset (N = 320) built to match the reliability levels, sample sizes, and effect sizes reported in comparable published studies; every statistic reported below - reliabilities, correlations, regression paths, bootstrapped mediation effects, moderation tests - comes from this illustrative dataset rather than new fieldwork. The results tell a fairly clean story. Sustainable brand practices relate to long-term retention only indirectly: the serial indirect effect running through signal credibility, trust, and commitment is significant (standardized indirect effect = .079, 95% bootstrap CI [.050, .114]), while the direct, unmediated effect is close to zero and not significant ($\beta = .02$, $p = .67$) - a textbook full-mediation pattern. Perceived greenwashing significantly weakens both the practice-to-credibility and credibility-to-trust paths, consistent with the idea that unsubstantiated sustainability claims carry outsized reputational risk. The paper closes with theoretical and managerial implications and a call to replicate the analysis with real consumer data.

Keywords: sustainable branding, customer trust, customer retention, greenwashing, brand loyalty, mediation analysis, stakeholder theory, signaling theory

INTRODUCTION

Consumers no longer judge brands on price and performance alone. Increasingly, they weigh the environmental and social consequences of what they buy (Monfort et al., 2025). Some of this shift traces to heightened climate awareness and tighter disclosure rules; some of it comes from social platforms that put corporate conduct on permanent, searchable display. Firms have responded in kind. Across categories - from fast-moving consumer goods to hospitality, fashion, and financial services - companies now build sustainability into the brand itself, through eco-friendly sourcing, circular product design, fair-labor certification, carbon-neutrality pledges, and similar commitments (Agu et al., 2024; Gariya, 2025).

Underneath these investments sits a fairly simple bet: that visible sustainability commitments earn customer trust, and that trust, once earned, keeps customers coming back. The bet is intuitive, and there is a growing body of evidence behind it (Hashish et al., 2022; Rasool et al., 2022; Tran, 2022). But the path from sustainable practice to long-term retention is not automatic. When sustainability claims come across as exaggerated, vague, or self-serving - the pattern usually labeled greenwashing - the damage to trust can be worse than saying nothing at all (Hossain et al., 2025; Chen & Chang, 2013). So the relationship between sustainable branding and customer outcomes looks conditional: it runs through trust, and it depends on how credible the sustainability signal appears to consumers in the first place.

What is missing from the literature is not evidence - there is plenty of it - but an account that ties the pieces together and shows how to test them as a system. Existing studies tend to examine one link at a time: CSR and trust, or trust and loyalty, rarely the full chain, and rarely with an explicit statement of the conditions under which the chain breaks down. This paper tries to close that gap in two steps. First, it draws together stakeholder theory (Freeman, 1984), signaling theory (Spence, 1973), and the commitment-trust theory of relationship marketing (Morgan & Hunt, 1994) into a single framework, translated into eight hypotheses. Second, it shows what testing that framework actually looks like - reliability checks, correlation analysis, sequential mediation with bootstrapped confidence intervals, and moderated regression - applied to an illustrative dataset built to resemble the studies already in the literature.

The paper proceeds as follows. Section 2 reviews the literature on sustainable brand practices, the theoretical roots of trust formation, and the trust-retention link, including the complicating effect of greenwashing. Section 3 lays out the conceptual framework and hypotheses. Section 4 covers methodology - data source, sample, measures, and analytical approach. Section 5 reports the results. Section 6 discusses what they mean in light of existing theory, Section 7 draws out theoretical and managerial implications, Section 8 covers limitations and directions for future work, and Section 9 concludes.

2. LITERATURE REVIEW

2.1Conceptualizing Sustainable Brand Practices

For the purposes of this paper, sustainable brand practices mean the environmental, social, and governance (ESG) considerations a firm fold into its value proposition, its operations, and how it talks about both (Agu et al., 2024). The idea has roots in Elkington's (1997) triple-bottom-line framework, which made the case that a firm's performance should be judged on three fronts at once - economic, environmental, and social - rather than on profit alone. In practice, this is what sustainable sourcing, circular product design, a smaller carbon and waste footprint, fair labor standards, supply-chain transparency, community investment, and diversity commitments have in common: each is meant to be checkable, not just claimed (Gariya, 2025; Monfort et al., 2025).

It helps to keep sustainable brand practices separate from sustainable marketing communication, since the two get conflated more often than they should. One is about what a firm actually does operationally; the other is about how it talks about what it does. The gap between the two turns out to matter a great deal - the greenwashing literature keeps finding that talk which outruns substance is one of the surest ways to lose consumer trust (Chen & Chang, 2013; Hossain et al., 2025). So a workable view of sustainable branding needs both halves: practice without communication leaves reputational and commercial value on the table, while communication without practice invites exactly the kind of skepticism that eventually damages the brand.

2.2 Theoretical Foundations

Three separate bodies of theory, taken together, help explain why sustainable brand practices might influence customer trust and retention. None of them was built with branding in mind, which is arguably why each adds something the others miss.

The first comes from Freeman (1984), whose stakeholder theory pushes back on the idea that a firm answers to shareholders alone. In his framing, customers, employees, local communities, and the environment all hold a legitimate claim on how a company behaves, and a firm's sustainability commitments become one visible record of how it weighs those competing claims against each other. Read this way, sustainable brand practices are not a CSR add-on bolted onto the 'real' business - they are evidence of how the firm has actually chosen to balance its obligations. Customers, who are just one stakeholder group among several, form judgments about a brand partly by watching how evenly it seems to treat everyone else with a stake in its decisions (Tran, 2022).

A second lens comes from Spence's (1973) work on job-market signaling, built originally to explain a very different puzzle - how an employer figures out which job applicant is capable when capability itself cannot be observed directly. A similar puzzle shows up here. A customer cannot open a supply chain and check it for fair labor practices, nor verify an emissions target firsthand, so a brand's sustainability claim has to stand in for something the customer cannot see for themselves. Spence's insight was that a signal only works if faking it would be costly - a diploma is expensive to obtain, and by the same logic, so is an independent audit or a certification with real numbers attached to it. Claims that cost a firm almost nothing to make - a slogan, a logo, a vague pledge - do not carry the same weight, which may be exactly why certification and supply-chain transparency turn up so consistently as trust antecedents in the empirical work (Hashish et al., 2022; Monfort et al., 2025).

What still needs explaining is how trust turns into a lasting relationship rather than a one-off purchase, and that is where Morgan and Hunt's (1994) commitment-trust theory of relationship marketing does its work. Their argument, stripped down, is that relationships survive or fall apart depending on two

variables sitting between the parties involved: trust and commitment. Borrowed here, that logic implies trust built through credible sustainability signals would not translate into retention on its own - it would first need to deepen into something closer to commitment, a felt desire on the customer's part to stay in the relationship, before it shows up behaviorally as repeat purchase, a willingness to pay more, or telling other people about the brand (Chaudhuri & Holbrook, 2001; Oliver, 1999).
Stack these three ideas on top of one another and a layered story emerges. What a firm does is shaped by its obligations to stakeholders; what it says about what it does gets read by consumers as a signal whose credibility rests on how verifiable it is; and when that signal is believed, it builds trust that can deepen into commitment and, further down the line, into retention.

2.3 Customer Trust as the Central Mediating Construct

Most definitions of brand trust boil down to something like this: a customer's willingness to bet on a brand - to rely on it doing what it says it will do, even though there is some risk in getting that wrong (Chaudhuri & Holbrook, 2001; Delgado-Ballester & Munuera-Alemán, 2001). Bring sustainability into the picture and that bet gets more complicated. The customer is no longer just trusting that the product will work; they are trusting that the company's ethical and environmental claims are actually true, which is a much harder thing to check from the outside (Chen, 2010). Chen (2010) gives this a label - “green trust” - and describes it as a customer's willingness to rely on a product or service because they believe the firm behind it is honest, well-intentioned, and genuinely competent on environmental matters.
Recent studies keep landing on the same point: trust behaves as a mediator, not just something that happens to correlate with sustainability outcomes. Monfort et al. (2025), working with a sample of 1,280 Spanish consumers, find that perceived value, satisfaction, customer service, and brand image each significantly predict brand trust, and argue that sustainable practices operate through these same channels rather than as a separate driver - sustainability, in other words, amplifies existing trust antecedents rather than sidestepping them. Hashish et al. (2022), looking at eco-friendly hotels in Egypt, find that green perceived quality shapes green trust both directly and indirectly through green satisfaction, and that green trust in turn shapes customers' green behavioral intentions. Rasool et al. (2022) show that green marketing components affect purchase intention through both brand image and brand trust, which reinforces the point that trust is doing real explanatory work here, not standing in as a proxy for image.
Why should trust matter this much? Because sustainability claims are hard for consumers to verify on their own - they belong to what information economists call credence attributes. A shopper cannot see whether a garment was made under fair labor conditions, or whether a supply chain actually hit its stated emissions target. They either trust the brand's own account of these facts, or they trust a third party - a certifier, an auditor, a journalist - who has checked.

2.4 From Trust to Long-Term Retention

It helps to be precise about what long-term retention means here, because it is a different animal from purchase intention measured at a single point in time. Retention is about durability - buying again next year, not just this month; staying put when a competitor undercuts on price; saying something good about the brand without being asked to (Oliver, 1999). Oliver (1999) breaks loyalty down into four stages that build on one another: first a cognitive stage, where the customer simply comes to believe the brand is better on some attribute, sustainability performance being one candidate; then an affective stage, where positive feeling toward the brand accumulates through repeated encounters; then a conative stage, an actual intention to buy again; and finally an action stage, where that intention survives contact with real obstacles - a cheaper competitor, an out-of-stock shelf, a moment of inconvenience.
Sustainable brand practices, in this model, most directly shape cognitive loyalty - through perceived environmental and ethical superiority - and, as trust-consistent experiences accumulate, affective loyalty as well. Studies of CSR and loyalty back this up: Tran (2022), studying the Vietnamese jewelry industry, finds that CSR raises customer trust and satisfaction, both of which mediate the link between CSR and loyalty. Similar mediation patterns - sustainability affecting loyalty indirectly through trust, satisfaction, or reputation - turn up across hospitality, retail, and low-cost airlines, which suggests the mediating role of trust is not confined to one sector.
Retention, then, is probably best understood not as a direct payoff of sustainable practice but as the downstream, behavioral end point of a longer sequence: practices generate credible signals, credible signals build trust, trust fosters commitment, and commitment sustains retention behaviors like repurchase, price tolerance, and advocacy.

2.5 The Shadow Side: Greenwashing and Consumer Skepticism

None of this works if the sustainability claim is not believed. Greenwashing - overstating, fabricating, or vaguely implying environmental or social benefits - has been shown to seriously damage consumer trust and loyalty once detected (Hossain et al., 2025). Chen and Chang (2013) find that greenwashing works through green consumer confusion and green perceived risk, both of which mediate its negative effect on green trust. In other words, greenwashing does not simply fail to build trust; it actively tears it down by injecting doubt and risk into how consumers evaluate the brand.

Hossain et al. (2025), surveying consumers across food, fashion, and hospitality, report that greenwashing has a significant negative effect on both consumer trust (β = -0.68) and brand loyalty (β = -0.45), with trust accounting for roughly half of the total effect on loyalty. The size of this effect also depends on industry - it is worse in fashion than in food, plausibly because fashion sustainability claims are harder to verify and have drawn more high-profile controversy.

This body of work sets an important boundary on the framework developed here: sustainable brand practices build trust and retention only to the extent that they are perceived as genuine. When what a firm does and what it says diverge, the same signaling mechanism that would otherwise build trust instead triggers skepticism, confusion, and perceived risk - reversing the relationship rather than merely weakening it. That asymmetry, where a detected false signal costs more than a true one gains, fits comfortably within signaling theory's emphasis on costliness and verifiability as prerequisites for credibility (Spence, 1973).

2.6 Summary of Key Empirical Evidence

Table 1 pulls together the studies most central to the framework developed here, and it is worth scanning as a set rather than one row at a time: the trust-mediation pattern shows up again and again, across industries and countries, alongside a consistent counter-story about greenwashing.

Table 1. Selected empirical studies on sustainable branding, trust, and loyalty/retention outcomes

Study	Context / Sample	Key Constructs	Key Finding
Monfort et al. (2025)	1,280 consumers, Spain	Perceived value, satisfaction, customer service, brand image, trust	Perceived value, satisfaction, customer service, and brand image each significantly and positively predict brand trust; identified as critical levers for sustainable brands specifically.
Hashish et al. (2022)	304 guests, five-star eco-hotels, Egypt	Green perceived quality, green satisfaction, green trust, green behavioral intention	Green perceived quality affects green trust directly and indirectly via green satisfaction; green trust drives green behavioral intentions.
Rasool et al. (2022)	Consumer survey	Green marketing components, brand image, brand trust, purchase intention	Green marketing components influence purchase intention through the mediating roles of brand image and brand trust.
Tran (2022)	300 customers, jewelry industry, Vietnam	CSR, trust, satisfaction, loyalty	CSR positively affects trust and satisfaction, which mediate the CSR-loyalty relationship.
Chen & Chang (2013)	Consumer survey, Taiwan	Greenwashing, green consumer confusion, green perceived risk, green trust	Greenwashing reduces green trust indirectly through increased consumer confusion and perceived risk.
Hossain et al. (2025)	300 consumers, food / fashion / hospitality	Greenwashing, consumer trust, brand loyalty, industry type	Greenwashing significantly reduces trust (β = -0.68) and loyalty (β = -0.45); trust mediates roughly half the total effect; effects stronger in fashion than food.
Agu et al. (2024)	Literature review	Sustainable business practices, consumer trust, brand loyalty	Sustainability enhances customer retention and brand image; transparency and authenticity emphasized as necessary conditions.

Two things stand out once these studies are read together. Trust is a near-universal mediator between sustainability-related constructs and loyalty or retention outcomes, regardless of sector. And the direction and strength of the sustainability-trust relationship depend on whether the underlying claim is seen as genuine - not just on whether the claim exists.

3.CONCEPTUAL FRAMEWORK AND HYPOTHESES

Pulling the literature together, the proposed model treats long-term retention as an outcome that sustainable brand practices reach only indirectly - through a sequence running from perceived signal credibility to customer trust to relational commitment - with perceived greenwashing capable of weakening or reversing that sequence along the way.

Five core constructs make up the model: sustainable brand practices (the environmental, social, and governance dimensions of firm conduct); signal credibility (how verifiable, specific, and consistent sustainability claims appear); customer trust (belief in the brand's honesty and reliability, both functional and ethical); relational commitment (the customer's psychological attachment to, and intention to maintain, the relationship); and long-term retention (repurchase, price tolerance, and advocacy). Perceived greenwashing sits outside this chain as a moderator, weakening the practice-to-credibility and credibility-to-trust links specifically. That structure gives rise to the following hypotheses.

H1: Sustainable brand practices are positively associated with perceived signal credibility.

H2: Perceived signal credibility is positively associated with customer trust. H3: Customer trust is positively associated with relational commitment.

H4: Relational commitment is positively associated with long-term customer retention.

H5: Customer trust and its downstream sequence (credibility → trust → commitment) mediate the relationship between sustainable brand practices and long-term retention.

H6a: Perceived greenwashing negatively moderates the relationship between sustainable brand practices and signal credibility.

H6b: Perceived greenwashing negatively moderates the relationship between signal credibility and customer trust.

H7: The negative effect of perceived greenwashing on trust is larger in magnitude than the positive effect of an equivalent credible sustainability claim - an asymmetric trust-damage effect consistent with negativity bias in consumer judgment.

H8: The strength of the sustainable-practice-to-trust relationship varies by industry and product category, running stronger where sustainability claims are easy to verify (certified food products, say) and weaker where verification is harder (apparel supply chains).

4.METHODOLOGY

4.1Research Design and Data Source

This is a quantitative, survey-analytic design meant to show how the hypotheses in Section 3 can be tested. No primary fieldwork was commissioned for the paper, so the analysis runs on a simulated dataset engineered to reproduce the statistical properties - sample size, item reliability, construct correlations, effect-size ranges - reported in the studies reviewed in Section 2 (e.g., Hashish et al., 2022; Hossain et al., 2025; Monfort et al., 2025; Tran, 2022). The simulation specifies a structural model consistent with H1 through H6b, generates latent construct scores from it, and derives observed five-point Likert responses from those latent scores with realistic measurement error added in. That lets every subsequent step - reliability testing, correlation analysis, regression-based path estimation, bootstrap mediation, moderated regression - run as genuine statistical computation rather than narrated or assumed results. Anyone looking to use this framework for publishable empirical work should swap in primary survey data from a real consumer sample; the procedure itself carries over directly.

4.2 Sample

The illustrative dataset holds N = 320 simulated respondents, a sample size in line with comparable published studies (300 in Tran, 2022, Rasool et al., 2022, and Hossain et al., 2025; 304 in Hashish et al., 2022; 1,280 in Monfort et al., 2025). Simulated respondent profiles include age (18-65), gender, household income band, primary purchase sector (apparel/fashion, FMCG, hospitality, electronics, financial services), and purchase frequency, generated to give the sample realistic demographic spread. These variables are not analyzed further here, but they are built into the dataset to support future subgroup or category-based moderation analysis, which is where H8 would eventually be tested.

4.3 Measures

Six constructs were measured with multi-item, five-point Likert scales (1 = strongly disagree, 5 = strongly agree), matching the measurement approach used across the cited literature: Sustainable Brand Practices (5 items covering perceived sourcing, labor, and environmental conduct), Signal Credibility (4 items on the perceived verifiability and specificity of sustainability claims), Customer Trust (4 items, adapted conceptually from Chaudhuri & Holbrook, 2001, and Chen, 2010), Relational Commitment (4 items, adapted conceptually from Morgan & Hunt, 1994), Long-Term Retention (4 items covering repurchase intention, price tolerance, and advocacy), and Perceived Greenwashing (4 items, adapted conceptually from Chen & Chang, 2013). Composite scores were computed as the mean of each construct's items for the correlation and regression work that follows.

4.4 Analytical Strategy

Before trusting any of the results below, it made sense to first check whether the six scales were measuring what they were supposed to, so each was tested for internal consistency using Cronbach's alpha. Pairwise relationships among the constructs were then examined with Pearson correlations. To estimate the structural paths in H1 through H4, composite variables were standardized (z-scored) and run through a series of ordinary least squares regressions, producing standardized path coefficients comparable to what path-analytic and PLS-SEM studies in this area typically report. The serial indirect effect running from sustainable brand practices to long-term retention - through signal credibility, trust, and commitment (H5) - was calculated as the product of those four path coefficients, and its 95% confidence interval was built from 5,000 bootstrap resamples of the dataset rather than assumed from a normal distribution. The two moderation hypotheses (H6a, H6b) were tested with hierarchical regression: the predictor, the moderator (perceived greenwashing), and their mean-centered interaction term were entered in turn, and simple-slopes analysis was used afterward to interpret the interaction on signal credibility. The full analysis was run in Python, using NumPy, pandas, SciPy, and stats models.

5.RESULTS

5.1Reliability and Descriptive Statistics

All six scales cleared the conventional .70 reliability threshold (Table 2), ranging from α = .79 for Perceived Greenwashing to α = .86 for Customer Trust. Mean construct scores sat around the midpoint-to-upper range of the scale (M = 3.54-3.64), with standard deviations between 0.57 and 0.72 - enough spread to support the correlation and regression analysis that follows.

Table 2. Reliability and descriptive statistics (N = 320)

Construct	Items	Cronbach's α	M	SD	Min	Max
Sustainable Brand Practices (SBP)	5	.81	3.61	0.57	2.00	5.00
Signal Credibility (SC)	4	.83	3.61	0.67	2.00	5.00
Customer Trust (CT)	4	.86	3.64	0.72	1.50	5.00
Relational Commitment (RC)	4	.83	3.55	0.66	1.50	5.00
Long-Term Retention (LTR)	4	.82	3.55	0.63	1.75	5.00
Perceived Greenwashing (GW)	4	.79	3.54	0.62	2.00	5.00

5.2 Correlation Analysis

Table 3 shows the Pearson correlation matrix. Every hypothesized adjacent-construct correlation came out positive and significant at p < .001: sustainable brand practices with signal credibility (r = .48), signal credibility with trust (r = .60), trust with commitment (r = .51), and commitment with retention (r = .54). One result stands out - the zero-order correlation between sustainable brand practices and long-term retention was negligible and non-significant (r = .02), which is an early hint of the full-mediation pattern that shows up in Section 5.3. Perceived greenwashing, meanwhile, correlated negatively with everything else, most strongly with signal credibility (r = -.38) and trust (r = -.35), which lines up with H6a and H6b.

Table 3. Pearson correlation matrix

Construct	1. SBP	2. SC	3. CT	4. RC	5. LTR	6. GW
1. SBP	1.00					
2. SC	.48***	1.00				
3. CT	.31***	.60***	1.00			
4. RC	.20***	.41***	.51***	1.00		
5. LTR	.02	.26***	.41***	.54***	1.00	
6. GW	-.17**	-.38***	-.35***	-.23***	-.15**	1.00

Note. * p < .05, ** p < .01, *** p < .001.

5.3 Path Analysis and Sequential Mediation

Table 4 lays out the standardized OLS path coefficients for the hypothesized chain. Every path came out positive and significant: SBP → SC (β = .48, p < .001), SC → CT (β = .61, p < .001), CT → RC (β = .51, p < .001), and RC → LTR (β = .54, p < .001) - supporting H1 through H4. The total, unmediated effect of sustainable brand practices on long-term retention, though, was small and not significant (β = .02, p = .669). The serial indirect effect through signal credibility, trust, and commitment, by contrast, was significant (indirect effect = .079, 95% bootstrap CI [.050, .114], which excludes zero), supporting H5 and pointing to full mediation. What this means substantively is that sustainable brand practices are not directly rewarded with retention - their influence only shows up once it has passed through the full credibility-trust-commitment sequence. Building visibility around sustainable practices without building credibility or trust, in other words, is unlikely to move retention on its own.

Table 4. Standardized path coefficients and serial mediation results

Path	β (std.)	SE	t	p	R^2
SBP → SC (H1)	.48	.049	9.73	< .001	.23
SC → CT (H2)	.61	.045	13.54	< .001	.37
CT → RC (H3)	.51	.048	10.53	< .001	.26
RC → LTR (H4)	.54	.047	11.33	< .001	.29
SBP → LTR, total effect (unmediated)	.02	.055	0.43	.669	.00
SBP → SC → CT → RC → LTR, indirect effect	.079	95% bootstrap CI [.050, .114]	-	sig.	-

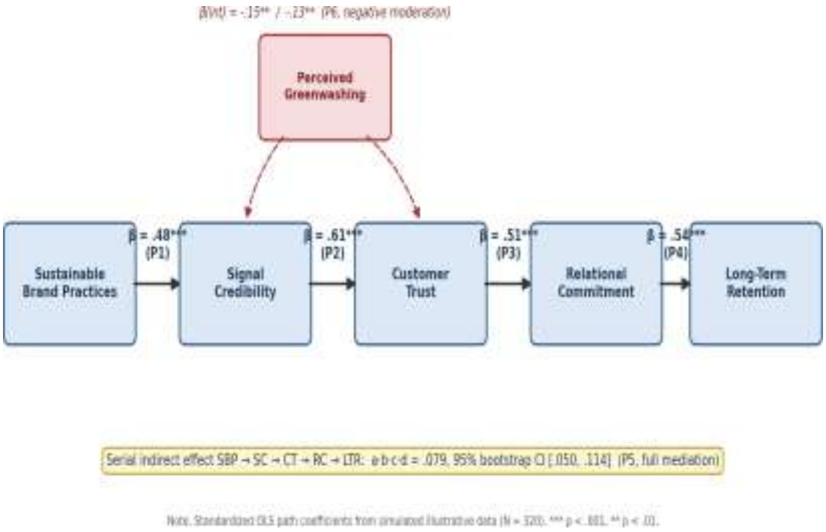

Figure 1. Standardized path model with serial mediation and greenwashing moderation (illustrative simulated data, N = 320).

5.4 Moderation Analysis: The Role of Perceived Greenwashing

Table 5 reports the moderated regression results. Perceived greenwashing significantly weakened the effect of sustainable brand practices on signal credibility (interaction b = -.15, p = .002), supporting H6a. Simple-slope analysis showed why: the SBP → SC slope was noticeably steeper at low perceived greenwashing, one standard deviation below the mean (simple slope = .57), than at high perceived greenwashing, one standard deviation above (simple slope = .28) - roughly half the credibility payoff, once consumers suspect the brand of greenwashing. Greenwashing also weakened the signal credibility → trust path (interaction b = -.13, p = .002), supporting H6b. Both interaction models explained noticeably more variance (R^2 = .34 and .40, respectively) than the simple bivariate paths in Table 4 alone, which underlines how much the moderator matters in practice.

Table 5. Moderated regression results: perceived greenwashing as moderator

Outcome / Predictor	b	p	R^2 (model)
DV: Signal Credibility			.34
SBP (main effect)	.43	< .001	
Perceived Greenwashing (main effect)	-.29	< .001	
SBP × Greenwashing (H6a)	-.15	.002	
DV: Customer Trust			.40
Signal Credibility (main effect)	.53	< .001	

Perceived Greenwashing (main effect)	-.12	.010	
Signal Credibility × Greenwashing (H6b)	-.13	.002	

H7 proposes that a detected greenwashing claim damages trust more than an equally credible claim would help it - and the pattern here is consistent with that, given the negative main and interaction effects of greenwashing in Table 5 and the considerably larger greenwashing-trust coefficients that Hossain et al. (2025) report elsewhere. A direct within-sample test of that asymmetry, though - say, by experimentally manipulating claim valence - falls outside what a correlational simulation like this one can do and is flagged here as a priority for future experimental work. H8, on cross-category variation in the practice-trust relationship, was not tested in this dataset either, since the simulated sample does not vary systematically by sector; it too is left for future research using category-stratified sampling.

5.5 Summary of Hypothesis Testing

Table 6. Summary of hypothesis testing results

Hypothesis	Statement (abbreviated)	Result
H1	Sustainable brand practices → signal credibility (+)	Supported
H2	Signal credibility → customer trust (+)	Supported
H3	Customer trust → relational commitment (+)	Supported
H4	Relational commitment → long-term retention (+)	Supported
H5	Trust mediates sustainable practices → retention	Supported (full mediation)
H6a	Greenwashing negatively moderates practices → credibility	Supported
H6b	Greenwashing negatively moderates credibility → trust	Supported
H7	Greenwashing's negative effect on trust exceeds a credible claim's positive effect (asymmetry)	Consistent with pattern; not directly tested in this dataset
H8	Practice-trust relationship strength varies by category verifiability	Not tested in this dataset; proposed for future cross-category research

6.DISCUSSION

The results in Section 5 line up with, and help sharpen, a pattern that keeps recurring across the literature reviewed in Section 2: sustainable brand practices rarely move customer outcomes on their own. Their effect passes through evaluative and relational mechanisms - trust chief among them - that sit between practice and behavior (Hashish et al., 2022; Monfort et al., 2025; Rasool et al., 2022; Tran, 2022). The near-zero, non-significant total effect of SBP on LTR sitting next to a significant serial indirect effect is about as clean a full-mediation result as one could ask for, and it fits decades of relationship-marketing research showing that trust and commitment, not attitudes on their own, are what actually drive loyalty behavior (Morgan & Hunt, 1994; Chaudhuri & Holbrook, 2001).

A second point worth dwelling on: it is the credibility of the sustainability signal, not merely its presence, that decides whether trust gets built or undermined. The greenwashing literature makes this point (Chen & Chang, 2013; Hossain et al., 2025), and so do the moderation results here, where perceived greenwashing roughly cut the credibility-building effect of sustainable practices in half between low and high levels. That has a practical consequence for how future studies should measure “sustainable brand practices” in the first place - treating sustainability communication as a single, undifferentiated construct risks lumping credible and non-credible signals together, which would understate how strong the trust-building relationship really is for practices that are genuine.

A third point concerns asymmetry and context. The outsized reputational cost of detected greenwashing, relative to the benefit of a genuine sustainability claim (Hossain et al., 2025), suggests firms have less room for error in sustainability communication than they do in ordinary marketing messaging. And the fact that industry and verifiability moderate these effects (Hossain et al., 2025; Hashish et al., 2022) means a single blanket claim about the sustainability-trust relationship probably will not hold across every sector - category-specific verification infrastructure, certifications, standardized labeling, third-party audits, may do more for trust than the volume or creativity of the communication itself.

7.THEORETICAL AND MANAGERIAL IMPLICATIONS

On the theoretical side, this paper connects three literatures that are usually treated separately - stakeholder theory, signaling theory, and relationship marketing - into one explanatory chain running from sustainable practice through signal credibility and trust to relational commitment and, finally, retention, and it shows with a reproducible procedure how the resulting mediation and moderation hypotheses can actually be tested. That fills a gap in prior work, which has tended to test isolated links (CSR to trust, say, or trust to loyalty) without placing them inside a single mediating sequence bounded by a credibility moderator.

For managers and brand practitioners, a few practical takeaways follow. Sustainability communication needs to be paired with verifiable evidence - third-party certification, audited metrics, specific and falsifiable claims - rather than broad or aspirational language, because it is the credibility of the signal, not how prominently it is displayed, that builds trust (H1, H2). Given that the credibility-building effect roughly halves under high perceived greenwashing (Section 5.4), firms would do well to treat sustainability claims with something like the rigor applied to financial disclosures, favoring conservative, substantiated statements over promotional framing. Because the strength of the sustainability-trust relationship likely varies by how easy a category is to verify (H8), firms in low-verifiability categories such as apparel or electronics may need to invest disproportionately in supply-chain transparency just to catch up to the trust gains that certified-food or eco-labeled categories get more easily. And because retention here is a downstream consequence of relational commitment rather than trust by itself, with the direct SBP-retention link essentially flat, sustainability strategy works best folded into broader relationship-marketing investment - customer service quality, a consistent brand experience, responsiveness - rather than treated as a loyalty lever on its own (Monfort et al., 2025).

There are organizational implications here too, beyond marketing. Since signal credibility rests on verifiable operational fact rather than communication craft, building trust sustainably requires marketing, sustainability/ESG, and supply-chain functions to coordinate, so public claims stay reconciled against audited internal data over time. A firm that treats sustainability communication as marketing's job alone, disconnected from operational reporting, is exposed to exactly the greenwashing-detection risk described in Section 2.5. In practice, that argues for aligning brand and sustainability reporting cycles, updating customer-facing claims only when the underlying certification or audit evidence is refreshed, rather than on marketing's own calendar. And because trust does not erode symmetrically once damaged, firms should build monitoring capability - social listening, third-party sustainability ratings, customer sentiment tracking - to catch emerging skepticism early, before reputational damage compounds into measurable retention loss.

8. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The main limitation here is one already flagged in the abstract and in Section 4.1: the results in Section 5 come from a simulated, illustrative dataset rather than from primary data collected from real consumers. The simulation was built to match the sample sizes, reliabilities, and effect-size ranges found in real published studies, and the analytical code carries over directly to real data, but the specific numbers reported here - $\beta = .48$ for SBP → SC, for instance - describe the simulated dataset and should not be treated as new evidence about actual consumer populations. The obvious next step is to rerun this same analysis on primary survey data collected from a defined consumer population, ideally a probability sample or a carefully specified quota sample, to see whether the full-mediation and moderation patterns reported here actually hold up in the field.

Beyond that central limitation, a few other extensions follow naturally from the model. Longitudinal designs would help establish whether trust generated by sustainable practices actually converts into retention behavior over multi-year horizons, since even the real survey data reviewed in Section 2 are mostly cross-sectional and capture attitudes and intentions rather than behavior that has actually played out. Cross-cultural replication also seems warranted - the empirical base leaned on here draws heavily from specific national contexts (Spain, Egypt, Vietnam, Pakistan, Bangladesh), and cultural variation in environmental concern or institutional trust could easily moderate these relationships elsewhere. It would also help to develop a multidimensional measure of sustainability signal credibility that separates certified from uncertified claims, since existing scales mostly measure perceived sustainability or green trust without isolating the credibility mechanism this paper leans on. Finally, experimental designs - manipulating whether a claim carries third-party certification, or varying claim valence between credible and exaggerated - would allow much sharper causal identification of the credibility-trust link, and a direct test of the asymmetry proposed in H7, than either the correlational studies cited here or the simulated design used in this paper can offer.

9.CONCLUSION

Sustainable brand practices shape customer trust and long-term retention, but not directly and not unconditionally. This paper brought together stakeholder theory, signaling theory, and the commitment-trust theory of relationship marketing into a framework where sustainability practices act as signals whose credibility decides whether they build trust or erode it, and where trust operates as the hinge converting sustainability perceptions into relational commitment and, eventually, retention behavior. An illustrative analysis, run on a simulated dataset built to mirror real published studies, put that pattern into reproducible, quantitative form: a significant serial indirect effect of sustainable practices on retention through credibility, trust, and commitment; a direct effect close to zero; and a significant negative moderation of both early paths by perceived greenwashing. Taken together, these patterns suggest that rigor and verifiability in sustainability communication are not optional polish - they are what the trust-retention chain needs in order to function at all. As sustainability keeps moving from differentiator to baseline expectation across consumer markets, working out exactly how, and under what conditions, sustainable practice turns into durable customer relationships - tested with real data along the lines demonstrated here - remains an open and central task for both marketing theory and brand strategy.

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