

Perceived Green Logistics Practices, Consumer Trust, and Behavioural Outcomes in Chinese E-Commerce: A Moderated Mediation Analysis

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Abstract

This study examines how perceived green logistics practices (PGLP) are associated with consumer behavioural outcomes (CB) through consumer trust, and whether environmental consciousness (EC) and price sensitivity (PS) condition this process in Chinese e-commerce. A cross-sectional survey of 383 active online shoppers across five major Chinese cities was analysed using partial least squares structural equation modelling (PLS-SEM) in R. A moderated mediation model was estimated, and Johnson–Neyman floodlight analysis was used to identify the conditional boundaries of interaction effects. PGLP was positively associated with trust ($\beta = 0.531$) and directly with CB ($\beta = 0.176$). Trust was strongly associated with CB ($\beta = 0.686$), and the indirect pathway accounted for 67.4% of PGLP's total association with CB. EC strengthened the PGLP–trust association ($\beta = 0.127$), with significant amplification for 76.2% of respondents. PS weakened the trust-to-behaviour association ($\beta = -0.068$), but this attenuation was significant only among the most price-sensitive 21%. Conditional indirect effects ranged from $\beta = 0.462$ to $\beta = 0.210$ across the EC $\times$ PS matrix. The findings suggest that visible consumer-facing sustainability practices, especially eco-packaging and carbon transparency, may function as trust-related signals in Chinese e-commerce logistics. Green communication may therefore be relevant beyond eco-niche segments, while cost-neutral service options may reduce barriers among highly price-sensitive consumers. The study contributes an integrative moderated mediation framework linking PGLP, trust, EC, and PS in Chinese e-commerce delivery within a single empirical model, while integrating signalling theory, trust-commitment theory, and theory of planned behaviour.

Plain Language Summary

This study investigates whether and how consumers' perceptions of green delivery practices, such as eco-friendly packaging, low-emission vehicles, and carbon footprint disclosure, are associated with trust in logistics providers and favourable behavioural intentions on Chinese e-commerce platforms. Using survey data from 383 active online shoppers across five major Chinese cities and PLS-SEM analysis, the results show that perceived green logistics practices are positively associated with consumer trust, and trust is positively associated with satisfaction, loyalty, willingness to pay a premium, and positive word-of-mouth. Environmental consciousness strengthens this association: consumers who report stronger ecological concern respond more positively to green logistics signals, and this pattern is statistically significant for over three-quarters of the sample. Price sensitivity weakens the association between trust and behavioural outcomes, but this constraint becomes meaningful mainly among the most price-sensitive 21% of consumers. These findings suggest that visible green logistics practices, especially eco-packaging and carbon transparency, may be useful trust-related signals in Chinese e-commerce delivery, while cost-neutral or clearly communicated green delivery options may help reduce barriers among

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highly price-sensitive consumers. Because the study is cross-sectional and based on self-reported perceptions and intentions, the findings should be interpreted as associations rather than confirmed causal effects.

Keywords

green logistics, consumer trust, environmental consciousness, price sensitivity, moderated mediation, Chinese e-commerce

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1. Introduction

The exponential growth of e-commerce in China has generated unprecedented logistical demands, with an estimated 132 billion parcels delivered in 2023 alone (State Post Bureau, 2024). The environmental consequences of this substantial carbon emissions from last-mile fleet operations, escalating packaging waste, and urban congestion externalities, have drawn heightened regulatory, corporate, and consumer attention. As environmental awareness rises among Chinese consumers, questions regarding how sustainable last-mile delivery practices shape consumer attitudes and behaviours have acquired both scholarly and managerial urgency.

Green logistics, encompassing eco-efficient transportation, sustainable packaging, responsible warehousing, reverse logistics, and digital transparency, has increasingly been recognised as a strategic differentiator for delivery service providers (Jayarathna et al., 2024; Putz-Egger et al., 2025). As a result, major Chinese logistics providers, including SF Express, JD Logistics, and Cainiao, have invested heavily in electric delivery fleets, biodegradable packaging, solar-powered fulfilment centres, and real-time carbon footprint disclosure tools.

Despite the growing adoption of green logistics practices, an important question remains regarding whether and how these initiatives influence consumer attitudes and behaviours. The strategic value of sustainability investments ultimately depends not only on their operational effectiveness but also on the extent to which consumers recognise and respond to them. In digital commerce environments characterised by limited direct interaction between consumers and logistics providers, consumers often rely on observable signals to evaluate the credibility and values of service providers. Environmental initiatives may therefore function as important cues through which firms communicate their commitment to responsible practices (Prashar & Kalotra, 2024).

One mechanism through which such sustainability practice signals may influence consumer behaviour is trust (Jalil et al., 2024; Liu et al., 2025). As information asymmetry characterises online transactions, consumers rely on observable signals, such as green practices, to infer the competence, benevolence, and integrity of service providers (Damberg et al., 2024; Spence, 1973). Drawing insights from signalling theory (Spence, 1973), when consumers interpret these signals positively, they may develop stronger trust in logistics providers, which in turn can influence behavioural outcomes such as satisfaction, loyalty intentions, willingness to pay price premiums, and positive word-of-mouth. The importance of trust as a relational mechanism is also emphasised in trust-commitment theory (Morgan & Hunt, 1994) which positions trust as a central driver of long-term exchange relationships between firms and customers.

However, not all consumers respond uniformly to green signals. Environmental consciousness defined as the degree to which individuals are aware of, and motivated by, ecological concerns in their consumption decisions, may amplify consumers' attentiveness to sustainability cues and their inclination to reward firms demonstrating responsible practices (Charalampidis et al., 2023; Gazi et al., 2024). Conversely, price sensitivity, defined as the extent to which cost considerations govern consumer decisions, may constrain the translation of trust into behaviour, particularly where green services are perceived to carry a cost premium (Gazi et al., 2024). These individual differences suggest that the pathway from sustainability perceptions through trust to behavioural outcomes varies meaningfully across consumer segments.

Although prior research has explored sustainability signalling and logistics service quality separately, these streams have largely developed in parallel. Green marketing studies confirm that sustainability initiatives positively influence consumer trust and repurchase intentions (Chen & Chang (2012); Mawardi et al. (2024); Watanabe et al. (2020)), while logistics management research emphasises the primacy of delivery reliability and operational performance in shaping satisfaction (Nguyen et al., 2019; Zhang & Rogers, 2026). Nevertheless, three consequential gaps persist: how consumers interpret environmentally sustainable logistics practices in e-commerce delivery contexts (Jalil et al., 2024; Kavas, 2020); the psychological mechanisms through which such perceptions translate into behavioural outcomes (Chimezie et al., 2025; Liu et al., 2025); and the consumer-level characteristics that strengthen or weaken these relationships (Prashar & Kalotra, 2024).

To address these gaps, this study develops and empirically tests a moderated mediation model examining how perceived green logistics practices (PGLP) influence consumer behavioural outcomes through the formation of trust, drawing on signalling theory (Spence, 1973), trust-commitment theory (Morgan & Hunt, 1994), and the theory of planned behaviour

(Ajzen, 1991). Environmental consciousness is theorised as a first-stage moderator strengthening the PGLP–trust relationship, while price sensitivity operates as a second-stage moderator constraining the trust–behaviour link.

This research makes three contributions to the literature. First, it extends research on sustainable logistics by examining how environmentally responsible delivery practices influence consumer-level outcomes within the context of Chinese e-commerce. Second, it advances theoretical understanding by integrating sustainability perceptions, trust formation, and consumer behaviour within a moderated mediation framework. By examining environmental consciousness and price sensitivity as boundary conditions within a single integrative model, this study advances a moderated mediation framework that links green logistics practices to consumer behavioural outcomes through trust, identifying the consumer-level conditions that amplify or constrain this pathway. These contributions respond to recent calls for contextually grounded and theoretically integrated research examining the consumer implications of sustainable logistics practices (Chotisarn & Phuthong, 2025; Liu et al., 2024).

The remainder of the article proceeds as follows: Section 2 reviews the theoretical foundations and develops hypotheses; Section 3 describes the research methodology; Section 4 presents the results; Section 5 discusses findings, implications, limitations, and future directions; and Section 6 concludes.

2. Theoretical Framework and Hypothesis Development

2.1. Theoretical Framework

This study integrates three complementary theoretical frameworks, each serving a distinct theoretical function. (1) Signalling theory (Spence, 1973) explains why observable green logistics practices function as credibility cues that reduce information asymmetry between logistics providers and consumers. (2) Trust-commitment theory (Morgan & Hunt, 1994) explains why consumer trust, once formed, converts favourable signal appraisals into durable commercial outcomes. (3) TPB (Ajzen, 1991) is applied not as a fully tested structural model but as a supporting behavioural logic for consumer heterogeneity, specifically, why environmental consciousness amplifies signal processing and why price sensitivity constrains behavioural follow-through; the full TPB structure (attitudes, subjective norms, perceived behavioural control) is not tested here. Signalling theory, originally formulated by Spence (1973) in the context of labour market information asymmetries, has gained significant application in marketing and consumer behaviour research. Its core proposition is that when information asymmetry exists between a sender and a receiver, the sender can transmit observable, costly signals that credibly communicate unobservable quality attributes (Damberg et al., 2024; Spence, 1973). In markets characterised by information asymmetry such as the e-commerce space, consumers cannot directly verify the competence or values of logistics providers. Observable environmental initiatives, such as electric delivery fleets, biodegradable packaging, and carbon footprint disclosure, thus function as costly signals of a provider's underlying capabilities and ethical commitments (Jalil et al., 2024; Spence, 1973). Signal credibility is a function of observability and non-triviality, because sustainable logistics investments require substantial operational and financial commitment, they are difficult to mimic without genuine capability, thereby conveying reliable quality information to evaluating consumers (Jayarathna et al., 2024; Prashar & Kalotra, 2024). Empirical studies that have applied signalling theory in green logistics context have argued that positive consumer appraisal of green logistics activities will reduce perceived risk and engender trust in the logistics provider (Damberg et al., 2024; González-Viralta et al., 2023; Liu et al., 2025).

Trust-commitment theory (Morgan & Hunt, 1994) extends this notion by positioning trust as a key relational mechanism through which favourable perceptions are converted into durable commercial outcomes. Morgan and Hunt (1994) conceptualised trust as a mediating construct within a broad nomological network that links perceived partner characteristics to long-term exchange commitment. Mayer et al. (1995) integrative model deepens this framework by decomposing trust into three conceptually distinct but empirically convergent dimensions: ability (the trustee's competence and skill to perform the trusted behaviour), benevolence (the trustee's genuine positive orientation towards the trustor), and integrity (the trustee's adherence to acceptable principles of honesty and non-deception). In the logistics context, ability trust reflects consumers' belief that the provider can deliver on its environmental and service commitments; benevolence trust reflects the belief that the provider considers consumers' interests; and integrity trust reflects the belief that the provider adheres to accepted ethical standards. When green logistics practices generate positive ability, benevolence, and integrity inferences, they are expected to be associated with higher consumer trust, which in turn is associated with satisfaction, loyalty, willingness to pay a premium, and positive word-of-mouth (Damberg et al., 2024; Liu et al., 2025). Empirical studies such as Jalil et al. (2024), Liu et al. (2025), Chimezie et al. (2025) and Chotisarn and Phuthong (2025) have established trust's mediating effect on green supply chain management and behavioural outcomes.

The theory of planned behaviour (TPB; Ajzen, 1991) complements these two frameworks by providing the individual-level cognitive architecture through which attitudes, subjective norms, and perceived behavioural control combine to shape

behavioural intentions. Within the present model, TPB suggests that consumers with higher EC will weight environmental information more heavily in forming evaluations. Prior research in green marketing confirms that EC amplifies the effect of green product attributes on consumer trust and attitude formation (Charalampidis et al., 2023; Gazi et al., 2024). Conversely, price sensitivity, as a form of perceived behavioural constraint, is expected to attenuate the translation of trust into commercial behaviour, particularly where green services are perceived to carry a cost premium. In China's e-commerce logistics market, despite rapidly growing environmental awareness, price sensitivity remains a dominant consumer characteristic, particularly among younger consumers, students, and those in lower income brackets (Jalil et al., 2024; Putz-Egger et al., 2025).

2.2. Perceived Green Logistics Practices and Consumer Behaviour

PGLP is conceptualised here as a five-dimensional construct comprising green transportation, green packaging, green warehousing, reverse logistics, and green information transparency. Each dimension captures a distinct observable signal that consumers may use to evaluate a logistics provider's environmental commitment (Jayarathna et al., 2024; Putz-Egger et al., 2025). Extant research on green supply chains and green logistics establishes that consumers who perceive firms as environmentally responsible report more positive attitudes and stronger behavioural intentions toward those firms (Charalampidis et al., 2023; Kavaz, 2020; Prashar & Kalotra, 2024). In the e-commerce delivery context, green packaging and carbon footprint transparency are particularly salient consumer-facing signals, as they are directly observable at the point of delivery and during the post-purchase experience (Jalil et al., 2024).

While prior research consistently links green practices to purchase intentions in product contexts (Liu et al., 2025; Mawardi et al., 2024), evidence of a direct effect on downstream behavioural outcomes in logistics service contexts remains comparatively limited and varied. Some PGLP dimensions, notably information transparency and packaging, may generate immediate attitudinal responses that bypass the trust formation process, consistent with TPB predictions that attitudes can have both direct and indirect effects on behavioural intentions (Ajzen, 1991). This reasoning supports the following two hypotheses regarding the direct pathways from PGLP (See Figure 1):

- H1a:** *Perceived green logistics practices have a significant positive direct effect on consumer behavioural outcomes.*
H1b: *Perceived green logistics practices have a significant positive effect on consumer trust.*

2.3. Consumer Trust as Mediator

Drawing on trust-commitment theory (Morgan & Hunt, 1994) and signalling theory (Spence, 1973), consumer trust is theorised as the dominant mechanism through which PGLP perceptions are converted into commercial behavioural

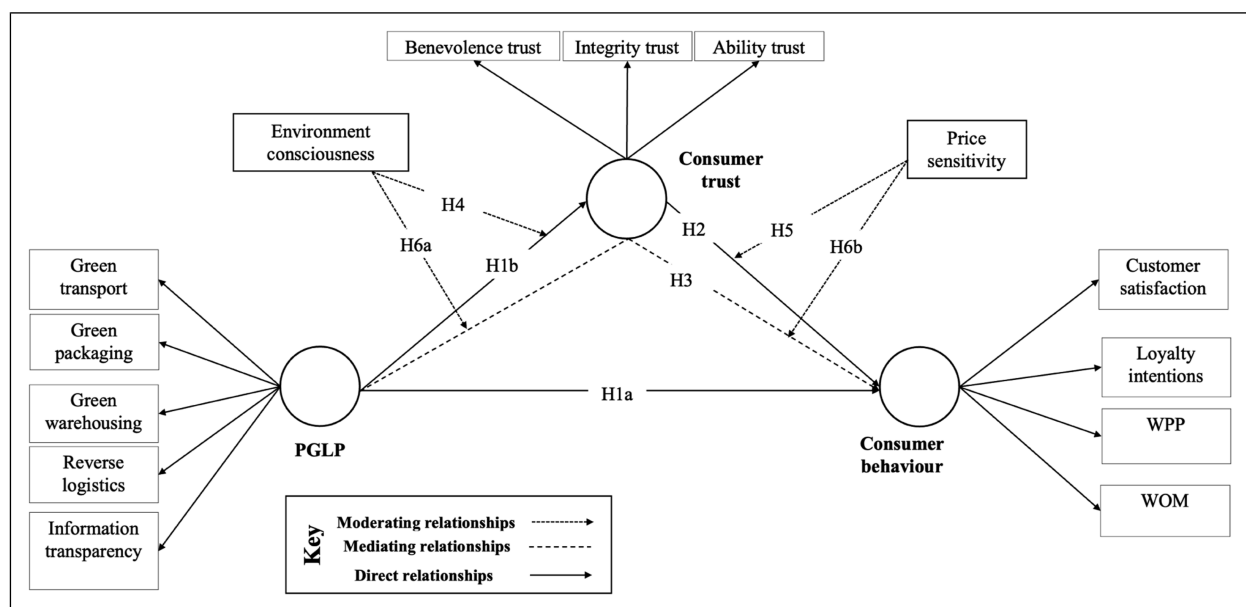


Figure 1. Conceptual model

outcomes. When consumers appraise green logistics signals positively, they update their beliefs about the ability, benevolence, and integrity of the logistics provider (Mayer et al., 1995). Trust, once formed, reduces perceived risk and uncertainty in the exchange relationship, enabling consumers to commit to the provider through satisfaction, loyalty, premium willingness, and positive advocacy (Damberg et al., 2024; Morgan & Hunt, 1994). Consistent with this framework, recent empirical studies confirm that green practices and trust jointly drive consumer satisfaction and repurchase behaviour in both product and service contexts (Chen & Chang, 2012; Jalil et al., 2024; Liu et al., 2024). González-Viralta et al. (2023) found that perceived green practices in retail contexts generated satisfaction, loyalty, and WOM through perceived quality and trust mechanisms. Jalil et al. (2024) demonstrated that trust fully mediated the effect of green supply chain management on online shopping satisfaction. Chimezie et al. (2025) showed that trust mediated product quality effects on multiple consumer behaviour outcomes in e-commerce. The expected mediation is partial rather than full, given the direct pathway established in H1a. Accordingly:

H2: *Consumer trust has a significant positive effect on consumer behavioural outcomes.*

H3: *Consumer trust mediates the positive effect of perceived green logistics practices on consumer behavioural outcomes.*

2.4. Environmental Consciousness as First-Stage Moderator

Environmental consciousness (EC) refers to the degree to which an individual is cognitively and motivationally oriented toward ecological concerns in consumption decisions (Gazi et al., 2024). Grounded in the TPB (Ajzen, 1991), consumers with higher EC are predicted to allocate greater attentional and evaluative weight to sustainability signals, interpret PGLP cues more favourably, and consequently develop stronger trust responses to equivalent levels of green practice disclosure. This amplification mechanism reflects the attitude-accessibility principle: when pro-environmental attitudes are chronically accessible, green signals are processed more elaborately and generate more extreme evaluative responses (Charalampidis et al., 2023; Kavas, 2020).

Empirical evidence supports this moderating role. For example, Charalampidis et al. (2023) reported that environmental concern significantly strengthened the relationship between green supply chain perceptions and purchasing preferences in the electronics market, while Gazi et al. (2024) found that EC amplified the effect of green practices on consumer trust and advocacy intentions. The moderating effect of EC on the PGLP–trust relationship is therefore expected to be positive and significant (See Figure 1):

H4: *Environmental consciousness positively moderates the relationship between perceived green logistics practices and consumer trust, such that the positive effect is stronger for consumers with higher environmental consciousness.*

2.5. Price Sensitivity as Second-Stage Moderator

Price sensitivity (PS) captures the extent to which cost considerations govern consumer purchase and loyalty decisions (Chen et al., 2023). While trust formed through green logistics perceptions is expected to generate positive behavioural outcomes on average, highly price-sensitive consumers may resist converting trust into commercial commitment when they perceive that sustainable logistics entails a price premium. This constraint is consistent with TPB's concept of perceived behavioural control: even when attitudes and trust are favourable, structural barriers, in this case, cost perceptions, can weaken the attitude–behaviour correspondence (Ajzen, 1991).

Extant literature supports this second-stage moderating role. For example, Gazi et al. (2024) found that price sensitivity attenuated the translation of green-driven trust into purchase intentions, while research on willingness to pay for sustainable services consistently identifies price orientation as a significant negative boundary condition on green trust–behaviour relationships (Chotisarn & Phuthong, 2025; Liu et al., 2025; Watanabe et al., 2020). Jalil et al. (2024) also noted that price-related barriers were among the most commonly cited obstacles to green service adoption in e-commerce contexts. Thus, the direction of this moderation is expected to be negative: as PS increases, the conversion of consumer trust into satisfaction, loyalty, willingness to pay a premium, and positive word-of-mouth will be attenuated:

H5: *Price sensitivity negatively moderates the relationship between consumer trust and consumer behavioural outcomes, such that the positive effect of trust on behaviour is weaker for consumers with higher price sensitivity.*

2.6. The Moderated Mediation Framework

The hypotheses above specify a moderated mediation model in which PGLP signals generate consumer trust (H1b, mediation pathway), trust drives behavioural outcomes (H2), and the indirect effect of PGLP on consumer behaviour via trust is jointly moderated by environmental consciousness at the first stage (H4) and price sensitivity at the second stage (H5) (See Figure 1). This moderated mediation structure captures the heterogeneity of consumer responses to green logistics initiatives and addresses recent calls for research that identifies both the psychological mechanisms and the individual-level boundary conditions governing the consumer implications of sustainable logistics practices (Chotisarn & Phuthong, 2025; Liu et al., 2024). High environmental consciousness is predicted to amplify the indirect effect by strengthening the PGLP–trust link, while high price sensitivity is predicted to attenuate it by weakening trust-to-behaviour conversion. The joint moderating roles are expressed in the following final hypotheses:

H6a: *Environmental consciousness positively moderates the indirect effect of perceived green logistics practices on consumer behavioural outcomes via consumer trust (first-stage moderated mediation).*

H6b: *Price sensitivity negatively moderates the indirect effect of perceived green logistics practices on consumer behavioural outcomes via consumer trust (second-stage moderated mediation).*

3. Research Methodology

3.1. Research Design and Sample

This study employed a cross-sectional quantitative design based on a structured self-administered questionnaire. The target population comprised active online shoppers in China who had used an e-commerce delivery service in the preceding six months. Convenience sampling, augmented by snowball recruitment through WeChat social networks and university alumni groups, was employed to access a geographically dispersed sample spanning Beijing: 21.4%, Shanghai: 24.3%, Guangzhou: 19.6%, Chengdu: 18.3%, Wuhan: 16.4%. Data were collected in February 2026 from respondents who had made at least one e-commerce delivery purchase in the preceding six months.

An a priori power analysis conducted in R using the pwr package (Champely, 2020) confirmed that a minimum sample of 175 respondents was required to detect a medium effect size ($f^2 = 0.15$) with 80% power at $\alpha = .05$ for a model with five predictors; the achieved sample of $N = 383$ substantially exceeds this threshold. The sample comprised predominantly female respondents (54.8%), aged 25–34 years (37.3%), with a bachelor's degree or higher. Monthly income was most commonly RMB 3,000–6,999 (37.0%). Respondents reported frequent online shopping, particularly several times per week (38.6%). Delivery services most frequently used included JD Logistics, Cainiao, and SF Express. The sample characteristics are presented in Table 1. Respondents were asked to evaluate the delivery service most recently used in association with their most frequent e-commerce platform. All survey items use the referent “this delivery service” consistently.

3.2. Measures

All multi-item scales were adapted from validated measures published in prior research and modified to reflect the Chinese e-commerce delivery context. All items were originally in English and were translated into Simplified Chinese by one bilingual researcher, then back-translated by a second independent bilingual researcher; discrepancies were resolved by consensus with a third bilingual colleague. The translated instrument was pilot-tested with 30 active online shoppers not included in the main sample; items generating confusion or floor/ceiling effects were revised. All scale items were adapted to reference delivery service contexts using the referent “this delivery service.” A 7-point Likert scale (1 = Strongly Disagree; 7 = Strongly Agree) was used throughout, consistent with recommendations for PLS-SEM applications (Hair & Alamer, 2022). PGLP was measured using 26 items across five dimensions: green transportation (6 items; e.g., ‘This delivery service uses low-emission vehicles for deliveries’), green packaging (6 items), green warehousing (4 items), reverse logistics (5 items), and green information systems (5 items). These dimensions were adapted from González-Viralta et al. (2023), Jayarathna et al. (2024), and Putz-Egger et al. (2025).

Consumer trust (CT) was operationalised as a second-order composite comprising three first-order reflective dimensions: ability trust (4 items; e.g., ‘I believe this delivery service has the ability to implement green logistics effectively’), benevolence trust (5 items), and integrity trust (5 items), adapted from Mayer et al. (1995) and Damberg et al. (2024). Composite scores for CT were computed as the mean of the three dimension scores, following established practice for reflective higher-order constructs (Hair & Alamer, 2022). Higher-order construct specification: PGLP is specified as a reflective-formative second-order construct, where the five first-order dimensions are reflective within each dimension but

Table 1. Sample Characteristics (N = 383)

Category	Data	Frequency	Percent
Gender	Male	156	40.7
	Female	210	54.8
	Other/NR	17	4.5
Age	18–24	98	25.6
	25–34	143	37.3
	35–44	89	23.2
	45–54	38	9.9
	55+	15	3.9
Education	High school or below	52	13.5
	Bachelor's degree	218	56.8
	Master's or above	113	29.5
Monthly Income (RMB)	< 3,000	71	18.5
	3,000–6,999	142	37.0
	7,000–11,999	98	25.5
	≥ 12,000	72	18.8
Online Shopping Frequency	Daily	67	17.4
	Several times/week	148	38.6
	Several times/month	118	30.7
	Rarely	50	13.0
Delivery Service Used	JD Logistics	112	29.2
	SF Express	89	23.2
	Cainiao/Taobao	104	27.1
	Others	78	20.3

formative at the second-order level, representing distinct complementary facets of green logistics. Consumer Trust is specified as a reflective-reflective second-order construct following [Mayer et al. \(1995\)](#): ability, benevolence, and integrity trust are theoretically related manifestations of an underlying trust disposition. Consumer Behaviour is similarly reflective-reflective.

Consumer behaviour was operationalised as a composite of four reflective first-order constructs: Customer satisfaction (CS; 5 items), Loyalty intentions (LI; 5 items), Willingness to Pay a Premium (WPP; 5 items), and Word-of-Mouth intentions (WOM; 5 items), adapted from [González-Viralta et al. \(2023\)](#) and [Chotisarn and Phuthong \(2025\)](#).

Although these four behavioural dimensions are conceptually distinct, they were modelled as a second-order Consumer Behaviour construct because they represent related manifestations of favourable consumer response to logistics service evaluation. Customer satisfaction captures evaluative response, loyalty intentions capture repeat-patronage tendency, willingness to pay a premium captures value-based behavioural commitment, and word-of-mouth captures advocacy intention. Treating them as a higher-order construct allows the model to estimate the overall behavioural consequence of perceived green logistics practices while preserving the multidimensional nature of consumer response. To ensure that this aggregation did not conceal substantively different patterns, we also estimated robustness models for the four sub-dimensions separately; these results are reported in [Appendix A4](#).

Environmental Consciousness (EC) was assessed using five items adapted from [Gazi et al. \(2024\)](#) and [Çam et al. \(2025\)](#), capturing general pro-environmental orientation and awareness of ecological problems. Price Sensitivity (PS) was measured using five items adapted from [Chen et al. \(2023\)](#), assessing the extent to which cost considerations dominate purchase and loyalty decisions (See [Appendix A1](#)).

3.3. Common Method Bias

To mitigate common method bias, procedural remedies were employed: the questionnaire separated predictor and outcome items with an unrelated filler section, and respondents were assured of anonymity and the absence of correct answers. Post-hoc, Harman's single-factor test was conducted in R by extracting an unrotated single factor from all items; the single factor explained 29.7% of total variance, well below the threshold of 50%, indicating that common method bias was unlikely to substantially distort the findings. Full collinearity VIF values for all lower-order constructs are explicitly reported in [Table 2](#); the range (1.38–3.14) is well below the 3.3 threshold recommended by [Hair and Alamer \(2022\)](#). It should be noted that Harman's single-factor test has recognised limitations as a sole indicator of common method bias; the combination of

Table 2. Measurement Model: Reliability, Validity, and Outer Loadings

Construct/Dimension	Items	Loading range	α	CR	AVE	Mean (SD)	VIF
Panel A – PGLP First-Order Dimensions							
Green Transportation (GT)	6	0.731–0.882	0.826	0.867	0.521	4.92 (1.02)	2.41
Green Packaging (GP)	6	0.786–0.921	0.908	0.926	0.611	5.14 (0.98)	2.87
Green Warehousing (GW)	4	0.812–0.891	0.882	0.907	0.582	4.88 (1.06)	2.56
Reverse Logistics (RL)	5	0.802–0.901	0.871	0.895	0.564	4.96 (1.04)	2.63
Green Info Transparency (GI)	5	0.818–0.912	0.895	0.914	0.598	4.79 (1.09)	2.74
Panel B – Consumer Trust Sub-Dimensions							
Ability Trust (AT)	4	0.876–0.931	0.903	0.921	0.622	5.06 (0.94)	2.18
Benevolence Trust (BT)	5	0.889–0.950	0.928	0.942	0.651	4.97 (0.97)	2.31
Integrity Trust (IT)	5	0.906–0.959	0.938	0.950	0.673	4.89 (1.01)	2.44
Panel C – Consumer Behaviour Sub-Dimensions							
Customer Satisfaction (CS)	5	0.778–0.879	0.862	0.888	0.574	5.12 (0.91)	2.09
Loyalty Intentions (LI)	5	0.804–0.911	0.882	0.906	0.611	5.08 (0.93)	2.21
Willingness to Pay Premium (WPP)	5	0.741–0.862	0.832	0.867	0.537	4.71 (1.18)	1.89
Word-of-Mouth (WOM)	5	0.792–0.902	0.874	0.898	0.573	5.03 (0.97)	2.13
Panel D – Moderators							
Environmental Consciousness (EC)	5	0.771–0.891	0.861	0.888	0.561	5.21 (0.88)	1.72
Price Sensitivity (PS)	5	0.758–0.871	0.845	0.872	0.542	4.83 (1.14)	1.81
Panel E – Higher-Order Composite Constructs							
PGLP	—		0.908	0.931	0.732	4.94 (0.96)	—
Consumer Trust (CT)	—		0.924	0.941	0.843	4.97 (0.94)	—
Consumer Behaviour (CB)	—		0.918	0.935	0.812	4.99 (0.98)	—

Note. α = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted; VIF = full collinearity variance inflation factor (lower-order constructs only; n/a for higher-order composites). Higher-order loadings = first-order component loadings onto the second-order composite. HTMT ratios across all construct pairs: 0.312–0.741, all below the 0.85 threshold (Henseler et al., 2015). N = 383.

procedural remedies (temporal separation of predictor and outcome blocks, anonymity assurance), Harman's test results (29.7%), and acceptable VIF values collectively provides reasonable assurance that common method bias is unlikely to materially distort findings, while acknowledging that it cannot be ruled out entirely in cross-sectional single-source designs (Podsakoff et al., 2003).

3.4. Analytical Strategy

Structural equation modelling was conducted using a PLS-SEM approach executed in R (version 4.3.1) with the *semr* package (Ray et al., 2021). PLS-SEM was selected because the study model involves composite second-order constructs and because the aim is prediction and explanation rather than confirmatory theory testing (Hair & Alamer, 2022). We carried out the analysis in two stages: (1) evaluation of the measurement model (outer model), including separate assessment of lower-order constructs and higher-order composites, and (2) evaluation of the structural model (inner model). Higher-order composite scores for CT and CB were computed as the mean of their respective first-order dimension scores, following established practice for reflective higher-order constructs (Hair & Alamer, 2022).

Higher-order constructs were estimated using a two-stage approach. In the first stage, the lower-order constructs were estimated reflectively, and latent variable scores were extracted for each first-order dimension. In the second stage, these latent scores were used as manifest indicators of the corresponding higher-order constructs. PGLP was specified as a Type II reflective-formative higher-order construct because green transportation, green packaging, green warehousing, reverse logistics, and green information transparency represent distinct but complementary components of perceived green logistics rather than interchangeable manifestations of a single latent attribute. Accordingly, PGLP was assessed using formative diagnostics at the second-order level, including outer weights, bootstrapped confidence intervals, variance inflation factors, and the relative contribution of each dimension. Consumer Trust and Consumer Behaviour were specified as reflective-reflective higher-order constructs because their first-order dimensions represent theoretically related manifestations of broader relational trust and favourable consumer response, respectively. For these reflective higher-order constructs, internal consistency, convergent validity, and discriminant validity were assessed using Cronbach's alpha, composite reliability, AVE, HTMT, and Fornell–Larcker checks.

Moderated mediation was then tested following Hayes' (2018) PROCESS logic, adapted for PLS-SEM. Interaction terms were constructed as orthogonalised products of mean-centred composite scores for the moderators and the relevant endogenous predictors, thereby minimising multicollinearity between main effects and interaction terms. Bootstrapped confidence intervals (10,000 resamples) were used to evaluate indirect and conditional indirect effects (Preacher & Hayes, 2008), with J-N floodlight analysis (Hayes, 2018; Spiller et al., 2013). The index of moderated mediation was computed for both EC (first-stage moderation) and PS (second-stage moderation). Subsequently we assessed the predictive relevance using PLSpredict with ten-fold cross-validation (Shmueli et al., 2019).

All structural path coefficients and indirect effects are reported as standardised estimates. The moderated mediation model was specified as follows: Consumer Trust = $iM + a1(PGLP) + a2(EC) + a3(PGLP \times EC) + eM$, and Consumer Behaviour = $iY + c'(PGLP) + b1(Consumer\ Trust) + b2(PS) + b3(Consumer\ Trust \times PS) + eY$. The conditional indirect effect of PGLP on Consumer Behaviour through Consumer Trust was therefore computed as $(a1 + a3EC)(b1 + b3PS)$. The index of first-stage moderated mediation for EC was calculated as $a3(b1 + b3PS)$, while the index of second-stage moderated mediation for PS was calculated as $b3(a1 + a3EC)$. Because higher PS indicates stronger price sensitivity and the Consumer Trust $\times$ PS interaction is negative, the PS index is expected to be negative when price sensitivity attenuates the trust-to-behaviour pathway.

3.5. Ethics and Informed Consent

Formal ethical approval was granted by the Institutional Review and Ethics Committee, Office of Academic Affairs and the Office of Student Affairs, College of Business, Nanning University, Nanning, 530299, China. The approval number was 304003988654, and the date of approval was 2 February 2026.

Written informed consent was obtained digitally through an online consent form embedded at the beginning of the questionnaire. Before proceeding to the survey, participants were informed about the purpose of the study, the voluntary nature of participation, confidentiality assurance, and their right to withdraw at any time before submission. Only respondents who confirmed their consent and met the eligibility requirement of being 18 years or older were allowed to participate.

The study design limited risk to participants by using an anonymous, self-administered online questionnaire and by avoiding the collection of identifying personal information. No names, identification numbers, contact details, platform account information, or other personally identifiable data were collected. No minors or vulnerable populations were included. The study did not involve any physical, medical, psychological, invasive, or experimental procedures. Therefore, the research posed no risk beyond minimal online survey participation.

The potential benefits of the study outweighed the minimal risks because the research contributes to understanding how consumers perceive green logistics practices in Chinese e-commerce and how such perceptions relate to consumer trust and behavioural outcomes. The findings may inform more transparent, consumer-oriented, and environmentally responsible logistics practices. All responses were analysed and reported only in aggregate form.

4. Results

4.1. Measurement Model

Table 2 presents construct-level measurement statistics. All Cronbach's α values exceed 0.82 and all CR values exceed 0.86, confirming strong internal consistency. All AVE values exceed 0.50, confirming convergent validity for each sub-dimension. The second-order PGLP composite exhibits AVE = 0.732, with first-order dimension loadings ranging from 0.851 (green transportation) to 0.926 (green packaging), indicating that green packaging and information transparency ($\lambda = 0.914$) are the most salient consumer-facing signals. The consumer trust composite (AVE = 0.843) has sub-dimension loadings of 0.921 (Ability), 0.942 (Benevolence), and 0.950 (Integrity). The consumer behaviour composite (AVE = 0.812) has sub-dimension loadings of 0.906 (LI), 0.898 (WOM), 0.888 (CS), and 0.809 (WPP).

All HTMT ratios fall below 0.85 (highest: CT–CB = 0.741), confirming empirical distinctiveness across all construct pairs (See Appendix A3). Fornell-Larcker criterion checks confirm AVE square roots exceed all inter-construct correlations (Fornell & Larcker, 1981). Harman's single-factor test accounts for 29.7% of total variance (below the 50% threshold) (See Appendix A2). Full collinearity VIF values range from 1.38 to 3.14, all below 3.3 (Hair & Alamer, 2022), indicating that common method variance is not a material threat to the findings.

4.2. Structural Model Assessment

4.2.1. Direct Effects (H1 and H2)

Table 3 presents the direct and mediating effects from the structural model. PGLP exerts a strong positive effect on consumer trust ($\beta = 0.531$, $SE = 0.040$, $t = 13.287$, $p < .001$, 95% CI [0.449, 0.613], $f^2 = 0.498$), supporting H1b and represents a large effect using Cohen's (2013) thresholds (small: $f^2 = 0.02$; medium: $f^2 = 0.15$; large: $f^2 = 0.35$). Consumer trust significantly predicts consumer behaviour ($\beta = 0.686$, $SE = 0.046$, $t = 14.942$, $p < .001$, 95% CI [0.602, 0.771], $f^2 = 0.541$), supporting H2 and also representing a large effect. PGLP also retains a small but significant direct effect on consumer behaviour ($\beta = 0.176$, $SE = 0.045$, $t = 3.886$, $p < .001$, 95% CI [0.087, 0.263], $f^2 = 0.035$), supporting H1a. The moderating effects are small (EC: $f^2 = 0.031$; PS: $f^2 = 0.018$) but practically meaningful given the breadth of their distributional coverage (76.2% and 21%, respectively). The variance explained is $R^2 = 0.583$ for consumer trust and $R^2 = 0.612$ for consumer behaviour (See Table 3 and Figure 2).

4.2.2. Mediation Analysis (H3)

Table 3 also presents the mediation results. Consumer trust significantly mediates the PGLP-to-consumer behaviour pathway, supporting H3. The specific indirect effect is $\beta = 0.364$ ($SE = 0.033$, $t = 11.147$, $p < .001$, 95% CI [0.301, 0.429]), with all bootstrap confidence intervals excluding zero. The presence of a small but significant direct effect ($\beta = 0.176$, $p < .001$) indicates partial rather than full mediation, consistent with the expectation that some PGLP dimensions generate direct attitudinal responses beyond the trust mechanism (Ajzen, 1991). The mediated pathway accounts for 67.4% of the total effect of PGLP on Consumer behaviour, confirming consumer trust as the dominant channel through which green logistics practices generate commercial outcomes.

4.2.3. Moderating Effects (H4 and H5)

The findings show that the interaction effects of environmental consciousness and price sensitivity are significant and are reported in Table 3. The EC $\times$ PGLP interaction on consumer trust is positive and significant ($\beta = 0.127$, $SE = 0.042$, $t = 3.042$, $p = .003$, 95% CI [0.043, 0.209], $f^2 = 0.031$), confirming that environmental consciousness amplifies the effect of PGLP on trust formation and supporting H4. The PS $\times$ Consumer trust interaction on Consumer Behaviour is negative and significant ($\beta = -0.068$, $SE = 0.030$, $t = 2.272$, $p = .023$, 95% CI [-0.127, -0.010], $f^2 = 0.018$), confirming that price sensitivity attenuates trust-to-behaviour conversion and supporting H5.

4.2.4. Conditional Direct Effects: J-N Floodlight Analysis

Table 4 presents conditional direct effects at three levels of each moderator, along with Johnson-Neyman (J-N) significance transition points, providing deeper insight into the boundary conditions underlying H4 and H5.

Panel A deepens the H4 finding by showing how the EC-amplified effect of PGLP on Consumer Trust varies across the EC distribution. At low EC (-1 SD = 4.33), PGLP exerts a significant positive effect on trust ($\beta = 0.404$, $p < .001$). At mean EC

Table 3. Structural Estimates: Direct Effects, Mediation, and Moderation

Hypotheses	Relationships	β	SE	t	p	95% BC CI	f^2	Decision
Direct Effects								
H1a	PGLP $\rightarrow$ Consumer Behaviour (direct)	0.176	0.045	3.886	.0001	[0.087, 0.263]	0.035	Supported
H1b	PGLP $\rightarrow$ Consumer Trust	0.531	0.040	13.287	.0001	[0.449, 0.613]	0.498	Supported
H2	Consumer Trust $\rightarrow$ Consumer Behaviour	0.686	0.046	14.942	.0001	[0.602, 0.771]	0.541	Supported
Mediating Effect								
H3	PGLP $\rightarrow$ Consumer Trust $\rightarrow$ Consumer Behaviour	0.364	0.033	11.147	.001	[0.301, 0.429]	—	Supported
Moderating Effects								
H4	EC $\times$ PGLP $\rightarrow$ Consumer Trust	0.127	0.042	3.042	.003	[0.043, 0.209]	0.031	Supported
H5	PS $\times$ Consumer Trust $\rightarrow$ Consumer Behaviour	-0.068	0.030	2.272	.023	[-0.127, -0.010]	0.018	Supported

Note. β = standardised path coefficient; SE = bootstrapped standard error; BC CI = bias-corrected bootstrapped 95% confidence interval; f^2 = Cohen's effect size. R^2 : Consumer Trust = 0.583; Consumer Behaviour = 0.612. Interaction terms orthogonalised. EC = Environmental Consciousness; PS = Price Sensitivity; PGLP = Perceived Green Logistics Practices; CB = Consumer Behaviour. N = 383; bootstrap iterations = 10,000.

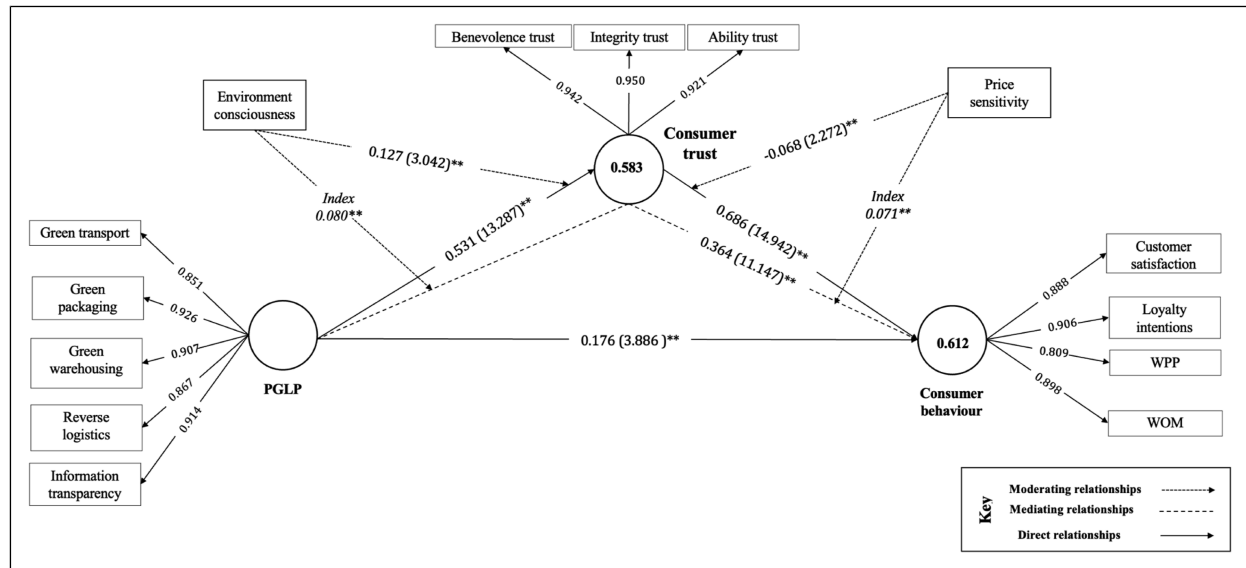


Figure 2. Structural model (Path Coefficient)

(5.21), the conditional effect equals the full-sample estimate of $\beta = 0.531$. At high EC (+1 SD = 6.09), the conditional effect increases to $\beta = 0.658$. This indicates a 62.9% amplification over the low-EC condition. The J-N floodlight analysis identifies a significance transition point at EC = 4.56 (−0.74 SD below the mean). Below this threshold (23.8% of the sample), the marginal EC amplification is non-significant; above it (76.2% of the sample), the amplification effect is significant at $p < .05$. This broad coverage indicates that green logistics trust amplification is not limited to eco-niche consumer segments.

Panel B deepens the H5 finding by tracing the PS-attenuated effect of consumer trust on consumer behaviour across the PS distribution. At low PS (−1 SD = 3.69), trust exerts a substantially elevated effect on behaviour ($\beta = 0.754$, $p < .001$). At high PS (+1 SD = 5.97), the effect is attenuated but remains highly significant ($\beta = 0.618$, $p < .001$), confirming that consumer trust retains positive commercial efficacy across the full range of price sensitivity. The J-N analysis identifies a significance transition for PS moderation at PS = 5.75 (+0.81 SD from mean). Below this threshold (79.0% of the sample), the PS attenuation does not produce statistically significant differential conversion rates; above it (21.0% of the sample), the attenuation is statistically significant and managerially consequential.

4.2.5. Full Moderated Mediation Matrix

Table 5 presents the complete conditional indirect effects of PGLP on consumer behaviour via consumer trust across all nine EC × PS level combinations, directly testing H6a and H6b. All nine conditional indirect effects are statistically significant (all

Table 4. Conditional Direct Effects and J-N Floodlight Analysis

Condition	Moderator value	Cond. β	SE	t-stat	95% BC CI	p-value
Panel A: PGLP → Consumer Trust at EC Levels (H4; J-N transition at EC = 4.56, −0.74 SD)						
Low EC (−1 SD)	4.33	0.404	0.047	8.671	[0.313, 0.497]	.001
Mean EC	5.21	0.531	0.040	13.287	[0.449, 0.613]	.001
High EC (+1 SD)	6.09	0.658	0.055	11.944	[0.550, 0.766]	.001
J-N significance transition	4.56 (−0.74 SD)	—	—	—	—	.050 threshold
Panel B: Consumer Trust → CB at PS Levels (H5; J-N transition at PS = 5.75, +0.81 SD)						
Low PS (−1 SD)	3.69	0.754	0.053	14.213	[0.650, 0.858]	.001
Mean PS	4.83	0.686	0.046	14.942	[0.602, 0.771]	.001
High PS (+1 SD)	5.97	0.618	0.051	12.137	[0.519, 0.717]	.001
J-N significance transition	5.75 (+0.81 SD)	—	—	—	—	.050 threshold

Note. EC sample mean = 5.21, SD = 0.88. PS sample mean = 4.83, SD = 1.14. J-N transition points mark the exact moderator values at which the marginal effect of the focal variable reaches $p < .05$ significance (floodlight analysis; Spiller et al., 2013). Bootstrap iterations = 10,000. N = 383.

Table 5. Conditional Indirect Effects of PGLP on Consumer Behaviour via Consumer Trust (EC × PS Matrix)

EC level	PS level	Indirect β	95% BC CI	Significant
H6a: EC as First-Stage Moderator × H6b: PS as Second-Stage Moderator				
High EC (+1 SD = 6.09)	Low PS (−1 SD = 3.69)	0.462	[0.366, 0.558]	Yes
High EC (+1 SD = 6.09)	Mean PS (4.83)	0.421	[0.332, 0.510]	Yes
High EC (+1 SD = 6.09)	High PS (+1 SD = 5.97)	0.380	[0.289, 0.472]	Yes
Mean EC (5.21)	Low PS (−1 SD = 3.69)	0.373	[0.292, 0.454]	Yes
Mean EC (5.21)	Mean PS (4.83)	0.364	[0.301, 0.429]	Yes
Mean EC (5.21)	High PS (+1 SD = 5.97)	0.330	[0.258, 0.403]	Yes
Low EC (−1 SD = 4.33)	Low PS (−1 SD = 3.69)	0.285	[0.211, 0.361]	Yes
Low EC (−1 SD = 4.33)	Mean PS (4.83)	0.254	[0.183, 0.326]	Yes
Low EC (−1 SD = 4.33)	High PS (+1 SD = 5.97)	0.210	[0.143, 0.279]	Yes
Index of moderated mediation: H6a (EC first-stage) = 0.080, 95% CI [0.027, 0.138]; H6b (PS second-stage) = −0.036, 95% CI [−0.069, −0.007]. Both CIs exclude zero.				

Note. All indirect effects estimated via bootstrapped 95% bias-corrected CIs (10,000 iterations). H6a tests EC as a first-stage moderator of the PGLP→Consumer Trust→Consumer Behaviour indirect effect. H6b tests PS as a second-stage moderator of the same indirect effect. EC levels: High = +1 SD (6.09); Mean = 5.21; Low = −1 SD (4.33). PS levels: High = +1 SD (5.97); Mean = 4.83; Low = −1 SD (3.69). H6a and H6b both supported. The negative H6b index is theoretically consistent with the coding of PS: higher values indicate stronger price sensitivity, and the negative Consumer Trust × PS interaction indicates that price sensitivity attenuates the conversion of trust into behavioural outcomes. Therefore, a negative second-stage moderated mediation index indicates that the indirect effect of PGLP on Consumer Behaviour through Consumer Trust becomes weaker as price sensitivity increases.

95% bootstrap CIs exclude zero), confirming formal moderated mediation. However, effect magnitudes vary substantially and systematically across the EC × PS matrix.

For the EC first-stage moderating path (H6a: $\beta = 0.080$, 95% CI [0.027, 0.138]), confirming that environmental consciousness moderates the indirect effect of PGLP on consumer behaviour through its amplification of the PGLP–trust relationship. The index is similarly significant for the PS second-stage moderating path (H6b index = −0.036, 95% CI [−0.069, −0.007]), confirming that price sensitivity moderates the indirect effect through its attenuation of the trust–behaviour conversion. Both CIs exclude zero, confirming moderated mediation as a structural property of the PGLP–trust–behaviour chain. H6a and H6b are both supported. As a robustness check, the structural model was also estimated separately for each of the four CB sub-dimensions (CS, LI, WPP, WOM); results confirm directional consistency across all four outcomes (see [Appendix A4](#)).

4.3. Predictive Relevance

PLSPredict ten-fold cross-validation confirms the model's out-of-sample predictive accuracy (full details in [Appendix A5](#)). All Q^2 values are positive (range: 0.225 to 0.452 across endogenous indicators), confirming the model outperforms a naïve mean predictor for all outcomes. PLS-SEM RMSE and MAE values are lower than the linear model benchmark for 82.9% and 88.6% of indicator-level comparisons respectively, confirming medium-to-high predictive accuracy relative to a naïve baseline ([Shmueli et al., 2019](#)).

5. Discussion of Findings

This study examined how PGLP shape consumer behavioural outcomes in Chinese e-commerce, through the mediating mechanism of consumer trust, and under the joint moderating influence of environmental consciousness and price sensitivity. Across all hypothesised pathways, the empirical results provide strong and consistent support for the proposed moderated mediation framework.

The positive effect of PGLP on consumer trust ($\beta = 0.531$, $f^2 = 0.498$) confirms that environmentally responsible logistics practices function as effective credibility signals in the Chinese e-commerce context. This finding is consistent with signalling theory ([Spence, 1973](#)) and extends prior empirical work by [Jalil et al. \(2024\)](#) and [Liu et al. \(2025\)](#), who similarly identified green practice perceptions as antecedents of trust in supply chain and online shopping settings. The relatively high salience of green packaging ($\lambda = 0.926$) and green information transparency ($\lambda = 0.914$) among the five PGLP dimensions is theoretically informative. Both are consumer-facing and experientially observable at the point of delivery or post-purchase,

reinforcing the signalling theory proposition that observable, non-trivial cues generate more reliable quality inferences (Damberg et al., 2024). Green transportation, while operationally significant, appears less perceptually proximate and therefore generates comparatively weaker individual-level signal value. This differential salience has important implications for how logistics providers allocate their sustainability communication efforts.

The positive effect of consumer trust on consumer behaviour ($\beta = 0.686$, $f^2 = 0.541$) corroborates trust-commitment theory's (Morgan & Hunt, 1994) central proposition that trust operates as the dominant relational mechanism converting perceived partner quality into durable commercial commitment. The magnitude of this effect exceeds that reported in many prior green marketing studies (e.g., Chen & Chang, 2012; González-Viralta et al., 2023), suggesting that in the logistics service context, where direct product evaluation is impossible and the consumer-provider relationship is structurally defined by uncertainty and information asymmetry, trust assumes an amplified role as a decision heuristic. The composite nature of consumer behaviour, encompassing satisfaction, loyalty intentions, willingness to pay a premium, and word-of-mouth, also indicates that trust is associated with broad and generalised favourable behavioural intentions rather than narrow ones, consistent with Mayer et al.'s (1995) multi-dimensional conceptualisation of trust as encompassing ability, benevolence, and integrity inferences.

The significant indirect effect ($\beta = 0.364$) accounting for 67.4% of PGLP's total effect on consumer behaviour confirms partial mediation via trust, as hypothesised. The persistence of a small but significant direct effect ($\beta = 0.176$) suggests that certain PGLP dimensions, most plausibly green packaging and transparency, are associated with immediate attitudinal responses that bypass the trust formation process, consistent with TPB's prediction that attitudes can exercise direct effects on behavioural intentions (Ajzen, 1991). This partial mediation structure is substantively important: it implies that green logistics practices are associated with stronger consumer trust and more favourable behavioural intentions through two distinct pathways, one relational (via trust) and one attitudinal (direct), a nuance that prior logistics studies relying on simpler mediation designs have not captured. Because this study employs a cross-sectional, self-report design, findings reflect associations among perceptions, trust, and behavioural intentions rather than confirmed causal effects or observed market behaviour.

The EC moderation finding ($\beta = 0.127$, $p = .003$) demonstrates that environmental consciousness amplifies the PGLP–trust relationship, consistent with TPB's attitude accessibility principle and empirical evidence from Charalampidis et al. (2023) and Gazi et al. (2024). The J-N floodlight analysis reveals that this amplification is significant for 76.2% of the sample (above $EC = 4.56$), indicating that the association between green logistics practices and consumer trust is not confined to eco-niche consumer segments but operates broadly across the Chinese e-commerce population. This finding suggests that sustainability communication directed at the mainstream consumer base, and not only the environmentally committed minority, may be associated with stronger trust and more favourable behavioural intentions. The 62.9% amplification in conditional trust effects between low and high EC consumers quantifies the extent to which green logistics practices are associated with differential trust and behavioural intention outcomes depending on consumer ecological orientation.

The PS moderation finding ($\beta = -0.068$, $p = .023$) confirms that price sensitivity attenuates the trust-to-behaviour conversion, as predicted by TPB's perceived behavioural control mechanism. However, the J-N analysis reveals a critical nuance: this attenuation only becomes statistically significant and managerially material above $PS = 5.75$ (+0.81 SD from the mean), a threshold exceeded by only 21% of the sample. For the remaining 79%, trust is associated with stronger favourable behavioural intentions with little attenuation regardless of price orientation. Consumer trust therefore remains strongly associated with favourable behavioural intentions across the vast majority of the sample, suggesting that the perceived conflict between sustainability and price sensitivity may be overstated in prior literature (Gazi et al., 2024; Jalil et al., 2024). Only at extreme price sensitivity levels does cost orientation meaningfully constrain the trust–behaviour pathway, and this constraint is modest in absolute terms given that even at high PS, the trust effect remains highly significant ($\beta = 0.618$, $p < .001$).

The moderated mediation matrix (Table 5) crystallises the consumer-level heterogeneity in green logistics. The 2.20:1 ratio between the highest (high EC, low PS: $\beta = 0.462$) and lowest (low EC, high PS: $\beta = 0.210$) conditional indirect effects quantifies the differential strength of associations between green logistics practices and behavioural intentions across consumer segments. Both indices of moderated mediation are significant and their confidence intervals exclude zero, formally establishing EC and PS as structural boundary conditions governing the PGLP–trust–behaviour chain. These findings offer a theoretically integrated and empirically grounded account of how green logistics practices are associated with stronger trust and more favourable behavioural intentions in digital consumer markets, through a trust-mediated pathway that is systematically moderated by individual-level ecological orientation and price sensitivity.

5.1. Theoretical and Practical Implications

5.1.1. Theoretical Implications

This study makes three contributions to the literature. First, it advances the application of signalling theory in the logistics service domain by demonstrating that observable, consumer-facing green logistics practices function as effective credibility signals that reduce information asymmetry in digital commerce environments. By establishing differential signal salience across PGLP dimensions, particularly the primacy of packaging and information transparency, the study provides a more granular operationalisation of sustainability signals than prior work has offered (Jayarathna et al., 2024; Prashar & Kalotra, 2024).

Second, the study enriches trust-commitment theory by empirically establishing consumer trust as the dominant, though not exclusive, mechanism through which green logistics perceptions generate commercial outcomes. The partial mediation finding indicates that both relational and attitudinal pathways are simultaneously operative, extending prior single-mechanism accounts of the green practice-behaviour relationship (Jalil et al., 2024; Liu et al., 2025) and responding to calls for more contextualised process models in sustainable logistics research (Chotisarn & Phuthong, 2025).

Third, the moderated mediation framework contributes novel boundary condition evidence by integrating EC as a first-stage amplifier and PS as a second-stage attenuator. The J-N floodlight analyses revealed that neither moderator operates in the extreme, niche manner that prior literature sometimes implies: EC amplification is significant for more than three-quarters of the sample, and PS attenuation is only consequential for the most price-sensitive fifth. These findings enrich the theoretical account of consumer heterogeneity in responses to sustainability initiatives and advance recent calls for contextually grounded, theoretically integrated research in sustainable logistics (Chotisarn & Phuthong, 2025; Liu et al., 2024).

5.1.2. Practical Implications

For logistics providers and e-commerce platforms, the findings suggest several directions for sustainability investment and communication strategy, understood as implications of observed associations rather than confirmed intervention outcomes.

For logistics providers, the stronger association of green packaging and carbon footprint transparency with consumer trust ($\lambda = 0.926$ and $\lambda = 0.914$) relative to less visible operational dimensions suggests that consumer-facing sustainability touchpoints may be more closely linked to trust formation than backend processes. Providers may therefore benefit from prioritising visible eco-packaging and post-purchase carbon disclosure in their consumer communications. The EC moderation finding (significant for 76.2% of the sample) suggests that green logistics messaging is associated with trust gains across the broader consumer population, not only among eco-committed segments. The PS finding further suggests that the perceived tension between sustainability positioning and price competitiveness may be less pronounced than prior literature implies, with price sensitivity meaningfully constraining the trust-behaviour association only at extreme levels affecting approximately 21% of the sample. How standard and premium sustainability service tiers might reflect this segmentation warrants further investigation beyond what the present data can directly support.

For e-commerce platforms, the partial mediation structure suggests that platform-level visibility of green logistics credentials may strengthen behavioural intentions both through trust formation and through more immediate attitudinal pathways. Platforms may wish to consider how sustainability information is surfaced at key consumer touchpoints such as product and delivery pages. The 2.20:1 ratio in conditional indirect effects across consumer segments (Table 5) suggests that ecological orientation and price sensitivity may serve as meaningful bases for differentiating sustainability communication strategies, though the design of targeted approaches would require investigation through longitudinal or experimental designs.

5.2. Limitations and Future Research

The study is not without limitations. First, the cross-sectional design precludes causal inference; all findings reflect associations among perceptions, trust, and behavioural intentions rather than confirmed causal effects. Second, the reliance on single-source, self-reported data means that residual common method variance cannot be entirely ruled out, despite procedural and statistical safeguards. Third, the convenience and snowball sampling approach limits generalisability; the sample is concentrated in five major urban centres and may not represent rural, lower-income, or less digitally engaged Chinese consumers, for whom logistics service access and environmental attitudes may differ. Fourth, the study relies on behavioural intentions rather than actual purchase records, premium uptake, or platform-level loyalty metrics, which may limit the precision of the managerial estimates. Fifth, consumers may have limited direct awareness of less visible green logistics dimensions such as warehousing practices, potentially introducing measurement noise for those dimensions. Sixth, social desirability bias in self-reported pro-environmental attitudes remains a residual concern despite anonymity assurances. Each of these limitations points to concrete directions for future research.

Future research should employ longitudinal designs to examine how green logistics trust evolves over repeated delivery experiences, and experimental or quasi-experimental approaches to establish causal directionality. Research extending the model to other e-commerce markets, particularly in Southeast Asia and Sub-Saharan Africa where logistics infrastructure and environmental awareness are rapidly developing, would test the generalisability of the findings. Objective behavioural data, such as actual repurchase records and premium uptake, would complement the self-report measures employed here and sharpen the managerial applicability of the moderated mediation estimates.

6. Conclusion

The central question motivating this study was whether, and through what mechanism, consumer perceptions of green logistics practices generate commercial value in China's e-commerce market. The answer, grounded in signalling theory, trust-commitment theory, and the theory of planned behaviour showed that consumer trust is the significant relational bridge through which perceived environmental responsibility translates into satisfaction, loyalty, premium willingness, and advocacy, but it does not operate uniformly across the population. Ecological orientation systematically amplifies the value of green signals, while extreme price sensitivity moderates the extent to which trust converts into commercial commitment.

Decarbonise, this empirical evidence suggests that sustainability investments in logistics are associated with measurable and broadly distributed gains in consumer trust and behavioural intentions, extending well beyond reputational benefits.

As e-commerce logistics systems continue to scale globally, the integration of environmental responsibility into service design and communication strategy is likely to become an increasingly critical driver of competitive differentiation. The moderated mediation framework developed and tested here provides both a theoretical foundation and a practical diagnostic tool for understanding when, how, and for whom green logistics investments are most likely to generate sustained commercial value.

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Supplemental Material

Supplemental material for this article is available online.

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