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Green Marketing, Brand Trust, and Perceived Misleading Green Claims in Purchase Intention

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ABSTRACT

Purpose – To examine pooled cross-category associations of the green marketing mix (GMM), green brand trust (GBT), perceived misleading green claims (PMGC), and purchase intention (PI), including indirect and interaction relationships.
Design/methodology/approach - A cross-sectional survey of 180 consumers in Denpasar and Badung, Bali, was analyzed using SmartPLS 4 with a reflective-formative GMM specification and refined measures. Robustness was examined with fully re-estimated alternative GMM specifications (four single-component models and a global reflective model) and an equally weighted fixed-score composite.
Findings/Results - GMM was positively associated with GBT and PI; PMGC was negatively associated with both. The indirect association through GBT was positive within a positive total association. Neither interaction was statistically detectable in the main model. Across six fully re-estimated alternative specifications, the direction and significance of all main and indirect associations were unchanged, and H8 remained null; only a Green Promotion-based model showed a borderline attenuation of the GMM–GBT association.
Originality/Value - The study separates level effects of perceived misleading green claims from slope-based boundary conditions in pooled cross-category perceptions: PMGC was associated with lower trust and intention without a detectable change in the marginal effects of marketing signals or trust. GBT is the principal observed indirect association in this same-source cross-sectional model. Component collinearity and possible common-method covariance prevent stronger causal or measurement claims.

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1. Introduction

Green and sustainable marketing requires firms to communicate environmental product attributes that consumers often cannot verify before purchase. The green marketing mix (GMM), encompassing green product, price, place, and promotion practices, provides observable market cues about a firm's environmental orientation. Signaling theory (Spence, 1973; Connelly et al., 2011) therefore offers the primary explanatory logic for this study: coherent and verifiable green-marketing cues can reduce information asymmetry, strengthen credibility assessments, and support purchase-related decisions (Hutagaol & Laksmidewi, 2025; Xu et al., 2022). Because the model does not measure ecosystem restoration or regenerative value creation, the study is positioned within green and sustainable marketing rather than regenerative marketing.

Environmental claims may be perceived as misleading, exaggerated, selectively disclosed, or difficult to verify. The present construct, perceived misleading green claims (PMGC), denotes respondents' perceptions that a focal brand's environmental communication is misleading, whether through ambiguity, exaggeration, manipulative presentation, or concealment; it does not establish that a firm objectively engaged in deception or that respondents attributed deliberate intent. This distinction matters because unfavorable claim evaluations may be associated with lower trust and purchase intention, while potentially also altering the strength of the focal relationships (Andreoli et al., 2025; Promalessy & Handriana, 2024; Rehman et al., 2025).

Green brand trust (GBT) is proposed as an intervening evaluation linking perceived marketing signals with purchase intention. Within the stimulus-organism-response (S-O-R) framework (Mehrabian & Russell, 1974), GMM represents the external stimulus, GBT the internal credibility evaluation, and PI the intended response. Heuristic (attribute) substitution (Kahneman & Frederick, 2002) offers a theoretical explanation for reliance on trust when environmental attributes are technically difficult or costly to verify (Román-Augusto et al., 2023; Gattupalli et al., 2025). These perspectives motivate the hypothesized associations; their temporal and causal sequence is not established by the present design.

The theoretical contribution is therefore not simply the combination of familiar green-marketing constructs. The study explicitly distinguishes an additive negative-evaluation mechanism from an interaction-based boundary-condition mechanism. If PMGC mainly produces direct negative associations while interaction effects remain weak, the implication for signaling theory is that perceived misleadingness may shift consumers' evaluative baseline without necessarily changing the marginal effectiveness of every green-marketing signal. Conversely, significant interactions would indicate that perceived misleadingness changes how signals are processed. The study tests both possibilities without treating a non-significant interaction as universal evidence that moderation is absent.

This study consequently examines: (1) the direct associations of GMM, GBT, and PMGC with PI and GBT; (2) the mediating role of GBT in the GMM–PI relationship; and (3) two separate PMGC interaction effects on the GMM→GBT and GBT→PI paths. The model is an integrated mediation-and-moderation model rather than a moderated-mediation model because no conditional indirect effect or index of moderated mediation is estimated.

2. Literature Review & Hypothesis Development

2.1 Theoretical Framework

2.1.1 Signaling Theory as the Primary Explanatory Logic

Signaling theory explains how firms communicate otherwise difficult-to-observe environmental quality through market cues. Green product attributes, price justification, distribution practices, and promotional communication can jointly reduce information asymmetry when consumers perceive them as coherent and credible (Connelly et al., 2011; Hutagaol & Laksmidewi, 2025; Rahman & Nguyen-Viet, 2023). In the proposed model, GMM constitutes the signal bundle, GBT represents the receiver's credibility assessment, and PI represents the intended response. The theory therefore predicts that coherent green-marketing signals should be associated with stronger trust and, directly or indirectly, stronger purchase intention.

2.1.2 Complementary Explanatory Perspectives

The S-O-R framework organizes the sequence from marketing stimulus to internal evaluation and intended response, while heuristic substitution explains why trust may substitute for a technically demanding evaluation of environmental attributes. PMGC is positioned as a receiver-side assessment that may either depress baseline evaluations or alter the effectiveness of focal relationships. This separation between level effects and slope effects is central to the present theoretical test.

2.2 Hypothesis Development

2.2.1 Green Marketing Mix and Green Brand Trust

Green product, price, place, and promotion practices can communicate a consistent environmental orientation. When these cues are perceived as coherent and verifiable, consumers have greater reason to regard the brand as reliable and environmentally committed. Prior work links green marketing practices with trust and related favorable brand evaluations (Mahendra et al., 2025; Mawardi et al., 2024).

H1: The Green Marketing Mix is positively associated with Green Brand Trust.

2.2.2 Green Marketing Mix and Purchase Intention

Green marketing signals can also support purchase intention directly by making environmental attributes more salient, reducing uncertainty, and communicating added environmental value. Evidence from green-energy and sustainable-consumption settings indicates that perceived green marketing is positively related to purchase-oriented outcomes (Hutagaol & Laksmidewi, 2025; Aly & Al-Salfiti, 2025).

H2: The Green Marketing Mix is positively associated with Purchase Intention.

2.2.3 Green Brand Trust and Purchase Intention

Trust reduces perceived risk and allows consumers to rely on brand credibility when they cannot independently verify environmental performance. From a heuristic-substitution perspective, GBT can therefore simplify environmental purchase decisions and strengthen purchase intention (de Sio et al., 2022; Román-Augusto et al., 2023; Mawardi et al., 2024).

H3: Green Brand Trust is positively associated with Purchase Intention.

2.2.4 Perceived Misleading Green Claims and Green Brand Trust

PMGC denotes a respondent's perception that a focal brand's green claims are misleading because they appear manipulative, vague or unverifiable, exaggerated, or selectively disclosed. The item content concerns evaluations of the focal brand's communication rather than a generalized tendency to doubt advertising. Two items refer to perceived intentional exaggeration or withholding, whereas ambiguity or unverifiability alone does not demonstrate intentional deception. The common denominator of the five judgments is that the claim is perceived as likely to create a false or unwarranted environmental impression, which

is the defining feature of a misleading claim regardless of attributed intent. PMGC is therefore interpreted as a perceived misleading-claim evaluation, not an assessment of verified corporate misconduct or proven intent. Such evaluations are expected to be negatively associated with brand trust (Andreoli et al., 2025; Persakis et al., 2025; Rehman et al., 2025).

H4: Perceived Misleading Green Claims are negatively associated with Green Brand Trust.

2.2.5 Perceived Misleading Green Claims and Purchase Intention

Perceived misleading claims can also discourage purchase intention directly because consumers may avoid brands whose environmental claims appear misleading or selectively disclosed. Most evidence on perceived greenwashing links misleading environmental communication with less favorable brand attitudes and purchase-related outcomes (Rehman et al., 2025; Khan et al., 2026). The evidence is not uniform, however: Balaskas et al. (2025) reported a positive association between perceived greenwashing and purchase intention among young consumers exposed to ESG-labeled digital advertising. The direction of this association therefore warrants testing in other consumer settings.

H5: Perceived Misleading Green Claims are negatively associated with Purchase Intention.

2.2.6 Mediating Role of Green Brand Trust

A substantial part of the GMM–PI relationship may operate through credibility formation. In S-O-R terms, GMM provides the stimulus, GBT is the organism-level evaluation, and PI is the response. If GMM is associated with greater GBT and GBT is associated with stronger PI, trust should transmit part of the GMM–PI association.

H6: Green Brand Trust mediates the association between the Green Marketing Mix and Purchase Intention.

2.2.7 PMGC as a Boundary Condition of the GMM→GBT Relationship

A direct negative PMGC effect does not necessarily imply moderation. Moderation requires that the marginal relationship between GMM and GBT changes as PMGC changes. From signaling theory, this is plausible because consumers who perceive environmental communication as misleading may discount otherwise favorable green-product, price, place, and promotion cues, thereby reducing their diagnostic value. H7 therefore tests whether PMGC produces slope attenuation beyond its direct negative association with trust.

H7: Perceived Misleading Green Claims weaken the positive relationship between the Green Marketing Mix and Green Brand Trust.

2.2.8 PMGC as a Boundary Condition of the GBT→PI Relationship

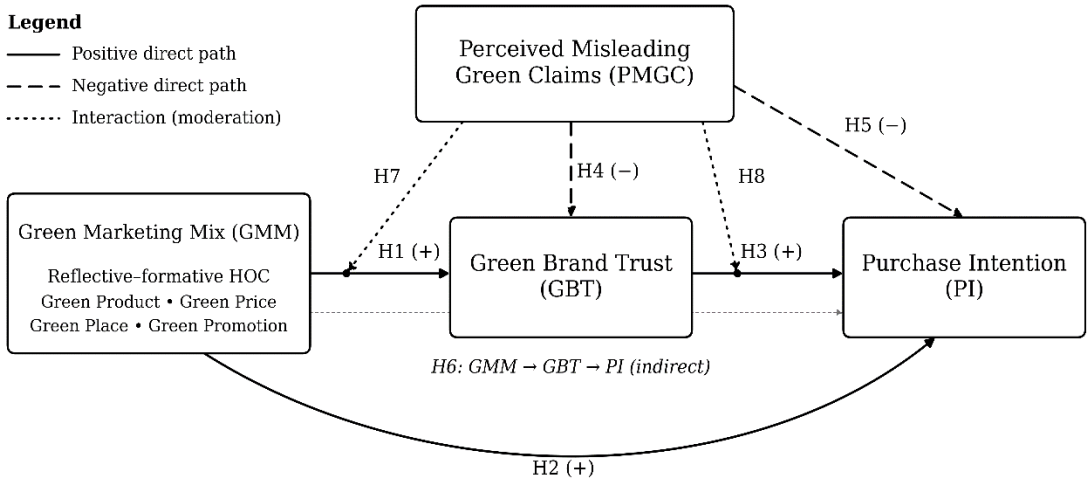
A second boundary-condition possibility concerns the conversion of trust into purchase intention. Even when consumers report relatively favorable brand trust, perceived misleadingness may create residual caution that reduces the behavioral translation of that trust. H8 tests this interaction separately from the direct negative effect of PMGC.

H8: Perceived Misleading Green Claims weaken the positive relationship between Green Brand Trust and Purchase Intention.

2.3 Theory Development and Conceptual Framework

The revised framework separates three mechanisms: signal formation (GMM→GBT), trust-mediated response (GMM→GBT→PI), and perceived-misleadingness effects that may operate either as direct evaluative penalties or as boundary conditions. This distinction permits the data to show whether perceived misleadingness mainly changes the level of trust and intention, the strength of focal slopes, or both. The framework does not imply moderated mediation because the conditional indirect effect is not estimated.

Figure 1. Revisead conceptual framework. Solid arrows denote hypothesized positive direct paths, dashed arrows negative direct paths, and dotted arrows interaction (moderation) paths; H6 denotes the indirect GMM→GBT→PI path.



3. Methodology

3.1 Research Design

The study used an explanatory quantitative, cross-sectional design. Because all variables were observed at one point in time, the analysis is interpreted associationally rather than as evidence of temporal or causal ordering. PLS-SEM was used to estimate a mediation path together with two separate interaction effects.

3.2 Population, Sampling, and Statistical Power

The target population consisted of adult consumers in Denpasar City and Badung Regency, Bali. Purposive sampling recruited respondents who had encountered advertisements for environmentally friendly products during the preceding six months and had purchased, or had a genuine interest in purchasing, such products. Each respondent evaluated an environmentally friendly product or brand with which the respondent was familiar. No single focal brand or category was imposed; therefore, the unit of inference is a cross-category perception of green marketing among consumers in the two study areas. Bali is a relevant setting because green trust has previously been shown to shape green purchase behavior among consumers in the province (Ekawati et al., 2023). The final sample comprised 180 respondents, and the non-probability design does not support statistical generalization to all consumers in Bali. All substantive conclusions refer to pooled cross-category perceptions within this purposively recruited sample, not category-specific relationships or observed green-purchasing behavior.

A sensitivity analysis for an incremental one-predictor interaction test, with N = 180, $\alpha = 0.05$, power = 0.80, and three to four predictors in the relevant endogenous equation, indicated a minimum detectable incremental effect of approximately $f^2 = 0.044$ (Cohen, 1988). The sample therefore had reasonable sensitivity to interaction effects around this magnitude or larger, but very small interaction effects could remain undetected.

3.3 Measurement and Operationalization

All measures used five-point Likert-type response scales. The Green Price item assessing willingness to pay a higher price (questionnaire item X2.4) was excluded because it reflects a consumer disposition rather than a perceived firm pricing practice. The three retained Green Price items (X2.1–X2.3) concern perceived firm pricing practices, including the internalization of environmental costs (questionnaire item X2.3). The former green-claim skepticism measure was relabeled perceived misleading green claims (PMGC) to reflect its focal-brand claim evaluations; the label deliberately avoids implying that respondents attributed intentional deception to the firm. PI was restricted to future buying inclination, product preference, and switching intention (Y.1, Y.2, Y.4); information-search, additional-effort, and recommendation items were excluded.

PMGC was specified reflectively because the five items are expected to co-vary as expressions of a general negative evaluation of the focal brand's green claims: a consumer who regards a brand's environmental communication as misleading should express that judgment in perceptions of misleading wording, manipulative visuals, vagueness, exaggeration, and concealment. These are not identical judgments, and only W.4 and W.5 explicitly refer to perceived intent. The label "misleading" was therefore chosen as their common denominator, because a claim can be perceived as misleading without being attributed to deliberate deception. Internal consistency and convergent validity support shared variance without establishing content validity or unidimensionality by themselves. No independent expert content-validation evidence is presented; as an empirical check, the model was re-estimated without the ambiguity item (W.3), which is the judgment least related to intent (Section 4.4.4).

GMM was modeled as a reflective-formative higher-order construct. Green Product, Green Price, Green Place, and Green Promotion were estimated as reflective first-order components in Stage 1. Their latent variable scores were then used as formative indicators of the higher-order GMM construct in Stage 2. This specification treats the four Ps as distinct managerial components that jointly form the broader GMM rather than as interchangeable manifestations of a single latent trait (Becker et al., 2012; Sarstedt et al., 2022). The theoretical distinction between the components is not treated as proof that they are empirically distinguishable in this sample.

Table 1. Revised operationalization and retained measurement items.

Construct	Specification	Retained measurement content
Green Product	Reflective first-order component	X1.1 certified ecological, safe/non-toxic materials; X1.2 recyclable/reusable/biodegradable packaging; X1.3 recognized and valid ecological labels/certifications; X1.4 design intended to avoid pollution and protect consumer health
Green Price	Reflective first-order component	X2.1 price premium commensurate with environmental benefits; X2.2 price reflects quality and sustainable production; X2.3 price reflects

Construct	Specification	Retained measurement content
		environmental-cost internalization (questionnaire item X2.3)
Green Place	Reflective first-order component	X3.1 access and ease of finding the product; X3.2 outlets/distribution channels support environmental conservation; X3.3 efficient distribution minimizes logistics emissions/carbon footprint; X3.4 availability of a sufficient range of green products
Green Promotion	Reflective first-order component	X4.1 accurate environmental advertising without exaggeration; X4.2 promotion educates and encourages green lifestyles; X4.3 advertising reinforces an environmentally responsible company image; X4.4 campaign media encourage ecological concern
Green Brand Trust	Reflective	M.1 reputation for health/environmental benefits; M.2 perceived reliability of green-product performance; M.3 trust in the brand/company; M.4 fulfillment of environmental promises
Perceived Misleading Green Claims	Reflective	W.1 misleading marketing wording; W.2 perceived manipulation through green visuals; W.3 vague/unverifiable environmental claims; W.4 perceived intentional exaggeration of green functions/impacts; W.5 perceived intentional withholding of pollution information
Purchase Intention	Reflective, purified	Y1 future purchase inclination; Y2 prioritize/select the green product; Y4 intention to switch from conventional to green products

3.4 Data Analysis

Data were analyzed using SmartPLS 4. Reflective measures were assessed using outer loadings, Cronbach's alpha, rho_A, composite reliability (rho_C), AVE, and HTMT (Hair et al., 2019; Henseler et al., 2015). The reflective-formative GMM higher-order construct was estimated using the disjoint two-stage approach (Becker et al., 2012; Sarstedt et al., 2022) and evaluated using formative outer weights, bootstrap significance, outer loadings as absolute-

contribution evidence, and indicator VIF. The structural model was assessed using path coefficients, R^2, adjusted R^2, f^2 (Cohen, 1988), inner VIF, and SRMR. Bootstrapping used 5,000 subsamples, two-tailed testing at $\alpha = 0.05$, and BCa 95% confidence intervals.
SmartPLS 4 generated each moderation effect using its two-stage interaction procedure based on latent-variable scores (Becker et al., 2018). Standardized PLS-SEM results were used; the moderator main effect was included in the relevant endogenous equation, and interaction collinearity was assessed using inner VIF. The analysis tests two interaction paths but does not estimate a conditional indirect effect or an index of moderated mediation.

A supplementary fixed-score sensitivity analysis examined whether the aggregate structural associations depended on the estimated formative GMM weights. The exported Stage 1 scores for Green Product, Green Price, Green Place, and Green Promotion were standardized, averaged with equal weights, and standardized again to form a global GMM composite. This composite replaced the estimated higher-order GMM score while the exported Stage 2 GBT, PMGC, and PI scores were held fixed. Both original structural equations and interaction terms were retained and estimated by ordinary least squares with intercepts. Interactions were products of standardized main scores and were not subsequently standardized. Case bootstrapping used 5,000 resamples, a fixed seed of 20261020, and 95% BCa intervals with delete-one jackknife acceleration. Standardization and composite construction were repeated within resamples. This analysis was conducted outside SmartPLS and did not reestimate PLS measurement weights in each resample; its intervals are conditional on the exported measurement scores.

To address the instability of the component weights more directly, three further sets of models were fully re-estimated from the raw indicator data. First, four single-component models replaced the higher-order GMM with Green Product, Green Price, Green Place, or Green Promotion in turn, retaining all other constructs, paths, and interaction terms. Entering the four components simultaneously as separate predictors was not pursued because inter-component HTMT values near or above one and formative VIFs above 6 would make their unique coefficients uninterpretable. Second, a parsimonious global model specified GMM as a single reflective first-order construct measured by all 15 retained component indicators. Third, to examine whether the PMGC results depended on the item least related to intent, the main model was re-estimated with the ambiguity item (W.3) omitted. Unlike the fixed-score analysis, these models re-estimate measurement weights in every bootstrap resample. They were estimated with a Python implementation of the PLS-SEM algorithm configured to the SmartPLS 4 settings used for the main model (path weighting scheme, stop criterion 10^{-7}, disjoint two-stage higher-order estimation, and the two-stage interaction approach); this implementation reproduced the SmartPLS main-model path coefficients, outer weights, and R^2 values to within 0.0002. Inference used 5,000 case resamples (seed 20261020) with BCa 95% intervals.

3.5 Common Method, Administration, and Ethics

Two post hoc common-method diagnostics were retained (Podsakoff et al., 2003). The first unrotated component accounted for 48.91% of total indicator variance, while full-collinearity VIF values ranged from 1.365 to 3.347. Because one value marginally exceeded the conservative 3.3 threshold (Kock, 2015) and no marker variable was included, common

method variance cannot be ruled out. Same-source covariance may therefore inflate some favorable-evaluation paths, including GMM→GBT and the mediated association.

Data-collection period: March to July 2026. Respondent screening procedure: The questionnaire began with two eligibility filters. Respondents were required to report recent exposure to green-product advertising within the preceding six months and either prior purchase experience or a genuine purchase interest in environmentally friendly products. A negative response to either screening item terminated the questionnaire, and only eligible respondents continued to the demographic profile and substantive measurement sections.

Ethical Considerations: This study was not submitted for formal review by an external institutional ethics committee. Written informed consent was obtained before questionnaire administration: the opening consent statement explained the study purpose, anonymity, and voluntary participation and required explicit agreement before substantive responses were collected. Eligibility screening preceded the substantive measurement items. Field data collection was authorized under internal research permit No.132/DPPM-Unwar/III/2026 for March–July 2026. This internal research authorization and the informed-consent procedures are distinct from formal institutional ethics approval and are reported separately for the journal's assessment.

4. Results and Discussion

4.1 Respondent Profile

The sample comprised 180 adult consumers. Women represented 52.78% of respondents and men 47.22%. Respondents aged 26–35 years formed the largest group (37.22%), followed by those aged 18–25 years (32.78%); 30.00% were older than 35 years. More than half held a bachelor's degree (56.11%). The sample therefore represents educated adult consumers with varied occupations and income levels rather than a sample restricted to Generation Z or Millennials. Because the questionnaire did not record the evaluated product or brand in a form that permits standardized category coding, the product-category composition cannot be reported, and category-based control or multigroup analysis was not possible; cross-category heterogeneity is therefore treated explicitly as a scope condition and limitation.

Table 2. Respondent characteristics.

Characteristic	Category	n	%
Gender	Male	85	47.22
	Female	95	52.78
Age	18–25	59	32.78
	26–35	67	37.22
	36–45	40	22.22
	>45	14	7.78
Education	Senior High School	18	10.00
	Diploma	32	17.78
	Bachelor (S1)	101	56.11
	Graduate (S2/S3)	29	16.11
Occupation	Student	50	27.78

Characteristic	Category	n	%
	Private-sector employee	43	23.89
	Entrepreneur	32	17.78
	Civil servant/SOE employee	31	17.22
	Other	24	13.33
Income	< IDR 3 million	25	13.89
	IDR 3–5 million	49	27.22
	IDR 5–8 million	56	31.11
	IDR 8–12 million	32	17.78
	> IDR 12 million	18	10.00

4.2 Measurement Model Assessment

The revised reflective measures demonstrated satisfactory internal consistency and convergent validity. All retained first-order GMM indicators loaded between 0.842 and 0.895. GBT loadings ranged from 0.858 to 0.877, PMGC from 0.869 to 0.898, and purified PI from 0.860 to 0.894. Cronbach's alpha, rho_A, rho_C, and AVE met conventional thresholds for all reflective constructs. HTMT among the focal peer constructs was 0.830 for GBT–PI, 0.320 for PMGC–GBT, and 0.407 for PMGC–PI. By contrast, inter-component HTMT among Green Product, Green Price, Green Place, and Green Promotion ranged from approximately 0.999 to 1.025, indicating substantial empirical overlap among the four first-order components. This overlap is treated as a measurement warning rather than evidence that the four managerial instruments are conceptually interchangeable.

Table 3. Reflective measurement-model assessment.

Construct	Cronbach α	rho_A	rho_C	AVE
Green Product	.884	.884	.920	.741
Green Price	.850	.855	.909	.769
Green Place	.887	.889	.922	.747
Green Promotion	.873	.873	.913	.724
Green Brand Trust	.889	.889	.923	.750
Perceived Misleading Green Claims	.931	.936	.948	.783
Purchase Intention	.857	.862	.913	.778

Source: SmartPLS 4 Output

4.2.1 Reflective-Formative Higher-Order GMM Assessment

In Stage 2, the four first-order scores formed the higher-order GMM. Absolute loadings were high (0.946–0.970), but only Green Promotion had a statistically significant unique outer weight. Formative VIFs of 6.254–7.233 indicate substantial component collinearity. High absolute loadings do not resolve the inability to estimate unique component contributions reliably. The four components were retained to preserve the theoretically specified marketing-mix domain; the results do not establish a well-differentiated higher-order measurement model. The weights are not interpreted as stable relative-importance coefficients. Section 4.4.4

tests whether the structural conclusions are sensitive to this specification, using both a fixed-score weighting check and fully re-estimated alternative models.

Table 4. Reflective-formative higher-order GMM assessment.

GMM component	Outer weight	t	p	BCa 95% CI	Outer loading	VIF
Green Product	.190	1.088	.277	[-.133, .553]	.946	6.526
Green Price	.245	1.337	.181	[-.113, .607]	.950	6.254
Green Place	.233	1.110	.267	[-.155, .662]	.957	7.218
Green Promotion	.375	2.165	.030	[.034, .707]	.970	7.233

Source: SmartPLS 4 Output

4.3 Structural Model Assessment

The revised structural model explained 63.8% of the variance in GBT (adjusted $R^2 = 0.632$) and 57.9% of the variance in PI (adjusted $R^2 = 0.570$). Inner VIF values ranged from 1.007 to 2.745, indicating no problematic structural-predictor collinearity. The estimated-model SRMR was 0.043. The GMM→GBT effect was large ($f^2 = 1.442$), whereas GMM→PI was small ($f^2 = 0.062$). GBT→PI and PMGC→GBT showed medium-sized effects ($f^2 = 0.190$ and 0.215), PMGC→PI was small ($f^2 = 0.096$), and both interaction effects were negligible ($f^2 = 0.008$ and approximately 0.000).

Table 5. Structural-model assessment.

Endogenous variable / relationship	R^2	Adj. R^2	f^2	SRMR	Interpretation
Green Brand Trust	.638	.632	-	-	Moderate-to-substantial
Purchase Intention	.579	.570	-	-	Moderate
GMM → GBT	-	-	1.442	-	Large
GMM → PI	-	-	.062	-	Small
GBT → PI	-	-	.190	-	Medium
PMGC → GBT	-	-	.215	-	Medium
PMGC → PI	-	-	.096	-	Small
GMM × PMGC → GBT	-	-	.008	-	Negligible
GBT × PMGC → PI	-	-	≈.000	-	Negligible
Estimated model	-	-	-	.043	Acceptable

Source: SmartPLS 4 Output

4.4 Hypothesis Testing

Table 6. Hypothesis testing results.

H	Relationship	β	t	p	BCa 95% CI	Decision
H1	GMM → GBT	.732	21.325	<.001	[.656, .794]	Supported
H2	GMM → PI	.259	3.210	.001	[.097, .417]	Supported
H3	GBT → PI	.468	5.451	<.001	[.297, .640]	Supported

H	Relationship	β	t	p	BCa 95% CI	Decision
H4	PMGC → GBT	-.280	6.379	<.001	[-.371, -.197]	Supported
H5	PMGC → PI	-.222	3.575	<.001	[-.345, -.103]	Supported
H6	GMM → GBT → PI	.343	5.347	<.001	[.218, .474]	Supported
H7	GMM × PMGC → GBT	-.051	1.358	.174	[-.131, .018]	Not supported
H8	GBT × PMGC → PI	.001	.018	.986	[-.106, .107]	Not supported

Source: SmartPLS 4 Output

4.4.1 Green Marketing Mix, Green Brand Trust, and Purchase Intention

GMM was positively associated with GBT ($\beta = 0.732$, $p < 0.001$) and PI ($\beta = 0.259$, $p = 0.001$), supporting H1 and H2. The observed GMM→GBT association was larger ($f^2 = 1.442$) than the direct GMM→PI association ($f^2 = 0.062$). This pattern is consistent with the proposed credibility-based interpretation of signaling theory and accords with studies linking green marketing practices to green trust in Indonesian hospitality and food-service settings (Mahendra et al., 2025; Mawardi et al., 2024) and the green marketing mix to consumer decision-making for green energy products (Hutagaol & Laksmidewi, 2025). However, shared-source measurement and the cross-sectional design prevent attribution of these differences to a verified trust-formation process. The findings refer to pooled cross-category consumer perceptions.

4.4.2 Green Brand Trust and the Observed Indirect Association

GBT was positively associated with PI ($\beta = 0.468$, $p < 0.001$), supporting H3. The specific indirect GMM→GBT→PI association was positive ($\beta = 0.343$, BCa 95% CI [0.218, 0.474], $p < 0.001$), supporting H6 within the specified model. The direct association remained positive ($\beta = 0.259$, BCa 95% CI [0.097, 0.417], $p = 0.001$), and the total association was $\beta = 0.602$ (BCa 95% CI [0.498, 0.685], $p < 0.001$; Table 7). Because the model includes interactions, these main and indirect-effect summaries refer to the moderator reference value rather than a constant effect at all PMGC levels. The pattern is consistent with complementary partial statistical mediation, but it does not establish temporal or causal mediation. It parallels evidence that green trust transmits the associations of advertising skepticism and environmental knowledge with intention to buy green food (de Sio et al., 2022), links green perceived value and satisfaction with green word of mouth (Román-Augusto et al., 2023), and partially mediates antecedents of green purchase behavior among consumers in Bali (Ekawati et al., 2023). GBT is the principal observed indirect association in this cross-sectional same-source model. Common-method covariance remains a plausible source of inflation, particularly for the large GMM→GBT path. The indirect-to-total ratio (approximately 57%) is reported only descriptively; the inferential evidence is the bootstrap interval of each effect in Table 7.

Table 7. Decomposition of the GMM–PI association.

Effect	Path	β	p	BCa 95% CI	Note
Direct (H2)	GMM → PI	.259	.001	[.097, .417]	Remains positive
Specific indirect (H6)	GMM → GBT → PI	.343	<.001	[.218, .474]	Via GBT
Total	GMM → PI	.602	<.001	[.498, .685]	Direct + indirect
Indirect / total	—	.57	—	—	Descriptive only

Source: SmartPLS 4 Output; the indirect/total ratio is descriptive only.

4.4.3 Perceived Misleading Green Claims: Direct Penalty versus Boundary Condition

PMGC was negatively associated with both GBT (β = −0.280, p < 0.001) and PI (β = −0.222, p < 0.001), supporting H4 and H5. These associations are consistent with evidence that perceived greenwashing heightens green skepticism and negative green word of mouth (Promalessy & Handriana, 2024) and is associated with less favorable brand attitudes and purchase intentions (Rehman et al., 2025). They differ from the positive greenwashing–intention association reported by Balaskas et al. (2025) for young consumers responding to ESG-labeled digital advertising, suggesting that the consequences of perceived misleadingness may depend on the communication context and consumer segment. The interaction patterns were different. For H7, the GMM×PMGC coefficient was negative and directionally consistent with attenuation (β = −0.051), but the effect was not statistically detectable (p = 0.174; BCa 95% CI [−0.131, 0.018]) and its f^2 was only 0.008. The corresponding simple slopes were approximately 0.783 at low PMGC (−1 SD), 0.732 at the mean, and 0.681 at high PMGC (+1 SD). The pattern is therefore a weak directional attenuation rather than evidence of a reliable moderator effect.

For H8, the GBT×PMGC point estimate was close to zero (β = 0.001, p = 0.986; BCa 95% CI [−0.106, 0.107]), with f^2 approximately zero. The corresponding simple slopes were 0.467, 0.468, and 0.469 at low, mean, and high PMGC. These point estimates indicate little slope variation in this sample, but the interval still reflects uncertainty. Neither H7 nor H8 provides statistically detectable interaction evidence; neither test establishes equivalence to zero or a universal absence of moderation.

The statistical power sensitivity analysis further qualifies the interaction results. With a minimum detectable incremental f^2 of approximately 0.044, the study was not designed to reliably detect interactions as small as the observed f^2 values for H7 (0.008) or H8 (approximately 0.000). Failure to reject these hypotheses does not establish that practically relevant moderation is impossible in other samples or categories. Within these limits, perceived misleadingness behaved mainly as a level shift: respondents who perceived claims as more misleading reported lower trust and intention across the observed range of GMM and GBT, whereas the slopes differed only by small, statistically undetectable amounts (Figures 2a and 2b). For signaling theory, this pattern suggests that perceived misleadingness lowers the credibility baseline additively rather than proportionally reducing the diagnostic value of each green-marketing signal, at least for effects of the size this sample could detect. Interestingly, the only specification in which attenuation met the interval criterion was the model in which Green Promotion represented the marketing mix (Section 4.4.4). Green Promotion was also the only component with a significant unique outer weight. This pattern is consistent with the view that perceived misleadingness discounts advertising-based cues, which carry environmental claims most directly, more than product, price, or distribution cues, but it is borderline and requires confirmatory testing.

Figure 1. Simple slopes for H7: predicted GBT across GMM at low (−1 SD), mean, and high (+1 SD) PMGC. Lines include the PMGC main effect (β = −0.280) and the interaction term; vertical separation reflects the level effect, and differences in steepness reflect the interaction.

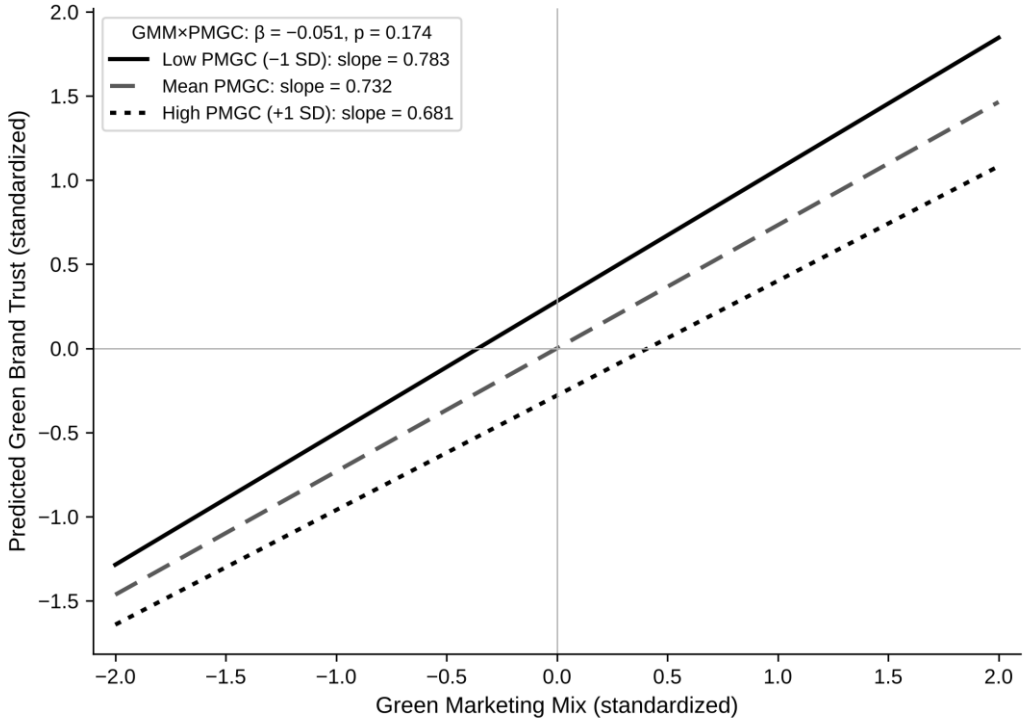
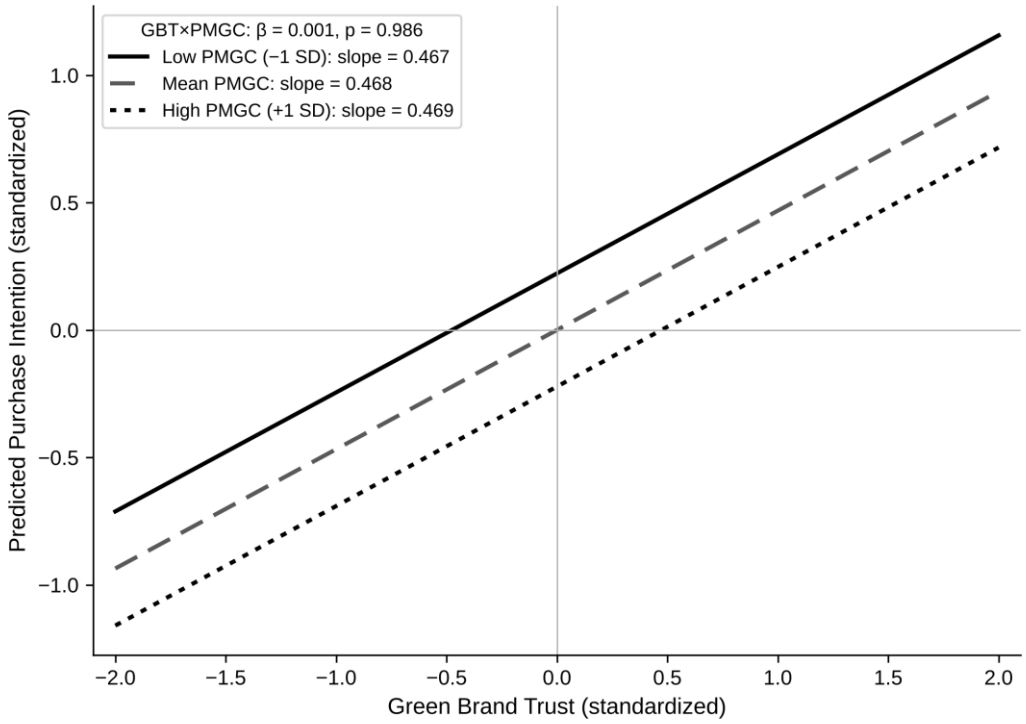


Figure 2. Simple slopes for H8: predicted PI across GBT at low (−1 SD), mean, and high (+1 SD) PMGC, with GMM held at its mean. Lines include the PMGC main effect (β = −0.222) and the interaction term.



4.4.4 Robustness to GMM Specification and PMGC Item Content

The supplementary fixed-score analysis replaced the estimated formative GMM score with an equally weighted global composite of the four standardized component scores (Table 8). The principal coefficients were nearly unchanged: GMM→GBT changed from 0.7318 to 0.7311, GMM→PI from 0.2590 to 0.2592, and GBT→PI from 0.4683 to 0.4685. The indirect association through GBT remained positive (β = 0.3425, BCa 95% CI [0.2149, 0.4644]); both interaction intervals included zero. R^2 changed from 0.6378 to 0.6357 for GBT and from 0.5793 to 0.5794 for PI. These results support insensitivity of the observed aggregate associations to this change in component weighting, conditional on the exported measurement scores.

The original and equally weighted GMM scores were very highly correlated (r = 0.9990), so this is a limited test of weighting sensitivity rather than a test of substantively different construct content. Measurement weights for GBT, PMGC, and PI were not reestimated in the resamples. The comparison therefore does not fully propagate measurement-score uncertainty, resolve HTMT values near or above one, or establish distinct unique effects of the four Ps. The earlier comparison involving simultaneous item and specification changes is not used as evidence that isolates GMM weighting.

Table 8. Main-model estimates and supplementary fixed-score GMM sensitivity analysis.

Relationship / metric	Main model	Equal weights	BCa 95% CI
GMM → GBT	0.7318	0.7311	[0.6519, 0.7917]
GMM → PI	0.2590	0.2592	[0.1043, 0.4153]
GBT → PI	0.4683	0.4685	[0.2907, 0.6239]
PMGC → GBT	-0.2798	-0.2798	[-0.3654, -0.1925]
PMGC → PI	-0.2220	-0.2219	[-0.3479, -0.1071]
GMM × PMGC → GBT	-0.0513	-0.0473	[-0.1263, 0.0258]
GBT × PMGC → PI	0.0010	0.0016	[-0.1048, 0.1015]
GMM → GBT → PI	0.3427	0.3425	[0.2149, 0.4644]
GMM → PI (direct + indirect)	0.6017	0.6017	[0.5047, 0.6905]
R^2 GBT	0.6378	0.6357	—
R^2 PI	0.5793	0.5794	—

Source: SmartPLS 4 Output and fixed-score sensitivity analysis (Section 3.4); BCa 95% CIs refer to the equal-weights model.

The fully re-estimated alternative specifications provide a stronger test (Table 9). Across the four single-component models, the global reflective GMM model, and the model omitting W.3, the signs and significance of H1–H6 were unchanged: the GMM→GBT coefficient ranged from .689 to .732, the direct GMM→PI coefficient from .191 to .259, and the indirect association through GBT from .343 to .372, with every BCa interval excluding zero. Notably, the global reflective GMM (loadings .803–.855; α = .966; ρC = .970; AVE = .681) reproduced the main-model estimates almost exactly, and omitting W.3 left the PMGC paths virtually unchanged (PMGC→GBT = −.276; PMGC→PI = −.217; r = .992 between the two PMGC scores). H8 remained close to zero in every specification. H7 remained statistically undetectable in five of the six specifications; in the Green Promotion model, however, the attenuation was somewhat

larger (β = −.085, BCa 95% CI [−.179, −.007], bootstrap t-test p = .050, f^2 = .020). Because this borderline result appeared in only one of six specifications and its effect size lies below the minimum detectable effect of the design ($f^2 \approx .044$), it is treated as exploratory rather than as support for H7. Consequently, the substantive structural conclusions do not depend on treating GMM as a well-differentiated higher-order construct or on the ambiguity item within PMGC. Because each single-component model contains only one of the four Ps, its coefficients describe the association of that component with the outcomes when it stands in for the marketing-mix domain; they are not estimates of unique component contributions.

Table 9. Structural estimates across fully re-estimated alternative specifications.

Path	Main model	Product only	Price only	Place only	Promotion only	Global GMM	PMGC w/o W.3
H1 GMM → GBT	.732***	.689***	.689***	.706***	.711***	.731***	.732***
H2 GMM → PI	.259**	.230**	.228**	.191**	.228**	.258**	.255**
H3 GBT → PI	.468***	.502***	.505***	.527***	.498***	.469***	.473***
H4 PMGC → GBT	−.280***	−.280***	−.277***	−.282***	−.282***	−.280***	−.276***
H5 PMGC → PI	−.222***	−.212***	−.211***	−.206***	−.214***	−.222***	−.217***
H6 GMM → GBT → PI	.343***	.346***	.348***	.372***	.354***	.343***	.346***
H7 GMM × PMGC → GBT	−.051 ns	−.051 ns	−.041 ns	−.060 ns	−.085†	−.048 ns	−.051 ns
H8 GBT × PMGC → PI	.001 ns	−.009 ns	.005 ns	−.002 ns	−.008 ns	.001 ns	.000 ns
R^2 GBT	.638	.572	.576	.606	.612	.636	.636
R^2 PI	.579	.578	.576	.568	.576	.579	.578

*Source: SmartPLS 4 Output (main model) and full PLS-SEM re-estimation (Section 3.4). *** p < .001; ** p < .01; ns = not significant; † BCa 95% CI excludes zero, p = .050.*

4.4.5 Practical Implications

The positive associations involving GBT suggest that credibility merits attention in green-marketing practice. Managers may align product attributes, pricing explanations, distribution practices, and promotional messages with verifiable environmental performance. The negative PMGC associations support attention to clear evidence, accessible documentation, substantiated certification, and transparent comparison baselines. These are implications informed by pooled cross-category perceptions; the study does not identify category-specific interventions or demonstrate that changing these practices causes purchasing behavior.

The unsupported interaction hypotheses do not imply that perceived misleading claims are harmless or that moderation cannot occur. In this sample, negative main associations were observed without statistically detectable interaction terms. The results support careful management of claim credibility while leaving category differences, causal effectiveness, and actual purchasing outcomes for further research.

5. Conclusion

Among 180 purposively recruited consumers in Denpasar and Badung, perceived GMM was positively associated with GBT and PI, while PMGC was negatively associated with both. GBT formed the principal observed indirect association between GMM and PI in the specified cross-sectional same-source model, within a positive total association. Neither interaction was statistically detectable in the main model. The direction and significance of all main and indirect associations were unchanged under equal component weighting, in four single-component models, in a global reflective GMM model, and after omitting the ambiguity item of PMGC. A borderline attenuation of the GMM–GBT association appeared only when Green Promotion represented the marketing mix.

The study contributes by separating level effects from slope effects of perceived misleading green claims. PMGC was associated directly with lower trust and purchase intention, whereas neither interaction was detectable. Within the effect range this sample could detect, perceived misleadingness therefore appears to lower the credibility baseline rather than proportionally weakening each green-marketing signal or the conversion of trust into intention; the borderline result for Green Promotion suggests that advertising-based cues may be a partial exception that warrants confirmatory testing. These findings are consistent with, but do not establish, the proposed credibility-based explanation. They do not verify a causal mechanism, category-specific green-consumer behavior, or stable unique contributions of the four Ps, and substantial component overlap and possible common-method covariance remain relevant to interpretation.

6. Limitations and Future Research

First, the cross-sectional, same-respondent design does not establish temporal or causal ordering and remains vulnerable to common method variance. The first unrotated component accounted for 48.91% of variance, and the maximum full-collinearity VIF reached 3.347. Because no marker variable was included, same-source covariance may inflate direct and mediated associations. Future studies should separate measurement occasions, combine survey responses with behavioral purchase data, or incorporate third-party evidence of green-marketing activities.

Second, respondents evaluated familiar products or brands across categories without a common focal product. The evaluated product or brand was not recorded in a form that permits standardized category coding, preventing category-composition reporting and category-based controls or subgroup analyses. Differences in price, purchase frequency, environmental involvement, certification visibility, and perceived risk may confound the pooled associations; product type has been shown to condition how strongly consumers weigh information credibility in green purchasing (Gattupalli et al., 2025). Conclusions are therefore limited to pooled cross-category perceptions in the observed non-probability sample and should not be generalized to category-specific relationships or actual green-purchasing behavior. Future research should record product and brand categories prospectively and use bounded-category designs or adequately supported subgroup analyses.

Third, the four GMM components showed substantial overlap (HTMT approximately 0.999–1.025) and formative collinearity (VIF 6.254–7.233). The fixed-score weighting check and the fully re-estimated alternative specifications supported stability of the structural conclusions, not empirical separation of the components or reliable estimation of their unique weights.

Future scale development should distinguish the four managerial instruments more clearly and evaluate alternative specifications with full measurement reestimation.

Fourth, the power sensitivity analysis indicates that very small interaction effects could remain undetected. Replication with larger probability-based samples would provide more precise estimates of small moderation effects. Future work should also estimate conditional indirect effects only when the theoretical model explicitly proposes moderated mediation and should assess out-of-sample predictive performance.

Fifth, PMGC combines judgments about ambiguity, manipulative presentation, exaggeration, and concealment. These may reflect related facets of unfavorable claim credibility without necessarily representing one homogeneous reflective trait. No independent expert content-validation evidence is presented; the label "misleading" was chosen to avoid attributing intent, and the robustness check omitting W.3 addresses only one source of item heterogeneity. Future research should validate the item content and dimensionality prospectively and distinguish perceived misleadingness from verified intentional deception.

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Declaration of AI and AI-Assisted Technologies in the Writing Process

During preparation of this work, the authors used Grammarly for language editing and SciSpace for literature discovery. The authors are responsible for verifying the item mapping, analytical results, references, and final manuscript and for meeting the journal's disclosure requirements.

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