

Authenticity Over Automation: How AI-Mediated Sustainability Communication Shapes Trust and Green Purchase Intention

Abstract

Purpose

Drawing on Signalling Theory and Trust Theory, the research explores how consumers' perceptions of AI involvement in sustainability communication shape perceived authenticity, green brand trust, and green purchase intention. It also investigates whether perceived greenwashing risk weakens or strengthens these relationships.

Design/Methodology/Approach

Data were collected from 379 UK-based e-commerce consumers who had recently purchased eco-labelled or sustainability-positioned products. The proposed model was examined using Partial Least Squares Equation Modelling (PLS-SEM), incorporating mediation and moderation analyses with bootstrapping procedures.

Findings

The results indicate that perceived AI-mediated sustainability communication is positively associated with perceived authenticity, which in turn is positively related to Green Brand Trust. Green Brand Trust mediates the relationship between perceived authenticity and Green Purchase intention. Furthermore, Perceived Greenwashing Risk weakens the positive association between Green Brand Trust and Green Purchase Intention, indicating that the effectiveness of trust-based relationships varies according to consumers' scepticism toward sustainability claims.

Originality/Value

Rather than treating sustainability communication as a purely informational input, this study conceptualizes it as a process of signal interpretation in which consumers infer credibility and intent under conditions of information asymmetry. The findings extend existing green marketing and trust literature by demonstrating how perceived AI involvement functions as a contextual signalling cue that shapes authenticity judgements and by identifying perceived greenwashing risk as a factor that limits the effectiveness of trust-based sustainability communication.

Implications

The analysis demonstrates that investments in AI-enabled sustainability communication do not automatically lead to enhanced consumer responses. Instead, firms must ensure that such communication supports perceptions of authenticity and trust, particularly in markets characterized by heightened concerns about greenwashing. The findings further suggest that transparent and credible communication is essential for strengthening consumer trust and encouraging green purchase intention.

Keywords: Signalling Theory, Trust Theory, Sustainability communication, Sustainability Claims, Perceived Authenticity, Green Brand Trust, Green Purchase Intention. Greenwashing Risk.

Paper type Research paper

Introduction

The growing emphasis on sustainability in online marketplaces has led businesses to increasingly use eco-labels, green certifications, and ethical narratives to attract environmentally conscious consumers (Bhatnagar et al., 2026; Citterio, 2026). This movement is driven by regulatory requirements and changing consumer needs (Kumar et al., 2021; Leonidou et al., 2013). Despite these efforts, however, consumers are becoming less trusting of these communications. This means that although consumers can sometimes be positive towards green products, that does not necessarily mean they will buy it, largely because they are sometimes skeptical about the authenticity of the sustainability claims (Delmas & Burbano, 2011; Lyon & Montgomery, 2015). Studies on sustainable consumption have been largely centered on the factors that affect Green Purchasing Behavior (Eşsiz, 2020; Zhang et al., 2025) including the consumer-related factors such as environmental concerns, moral values, and ecological orientation. These are crucial elements, but they don't tell the whole story; the meaning of communication of sustainability by firms, and the meaning that consumers draw from it is equally important. Consumer responses in online and e-commerce contexts are more likely to be based on perceived trustworthiness of sustainability claims and the underlying intent of the claims (Choubey et al., 2025; Szabo & Webster, 2021). Although previous research has thoroughly explored the factors influencing green purchasing behavior from the consumer's perspective, there has been relatively less focus on how consumers perceive technology-driven sustainability signals and how these perceptions affect trust and behavioral intentions in digital marketplaces.

To bridge this gap, the current research focuses on perceived authenticity as the key evaluative outcome of sustainability signalling. Authenticity reflects the extent to which sustainability claims are perceived as genuine, truthful, and consistent with the core values and practices, thereby functioning as an indicator of signal credibility (Monmoine, 2021). According to previous research, perceived authenticity is especially important in determining Green Brand Trust in online contexts, where customers do not have access to real-life experience (Yang et al., 2023). Trust, in turn, acts as a key psychological mechanism linking evaluative judgements and green purchase intentions.

Particularly, the focus of this paper is to put the authenticity evaluation into perspective within the growing trend of AI-supported sustainability communication in e-commerce. AI has been adopted in applications, including automated sustainability reports, AI-generated product descriptions, and system-generated indicators of verification, to communicate environmental data (Ding & Zou, 2024; Ghorbani, 2023; Qi, 2025). The focus context was chosen as AI-mediated sustainability communication, as AI-generated disclosures, automated reporting systems, and algorithmic verification mechanisms are becoming increasingly common in today's e-commerce landscape, but there is limited understanding about how these signals are perceived by consumers when assessing sustainability claims. Some studies point to algorithm aversion and automation bias, meaning that AI's involvement doesn't not always lead to positive reactions in the consumer. Research is also revealing algorithm aversion and automation bias, indicating that consumers are not uniformly positive about AI involvement when it is perceived to be ambiguous or strategic (Castelo et al., 2019). In fact, research on AI disclosure and algorithmic decision-making has revealed that people's reactions to AI-generated messages rely on their understanding of transparency, expertise, and intentions (Ou et al., 2026). This is in line with recent consumer research on AI disclosure in marketing

communication that shows that disclosure of AI involvement can positively or negatively impact consumer trust depending on the perceived intent. This research does not consider AI as a standalone persuasive presence, but rather as a contextual signalling cue that affects the interpretation of sustainability claims in the context of information space. While AI can help communicate sustainability in a more standardized, monitored, and consistent way, it can also raise consumer scepticism if the communication feels impersonal or driven by strategic intent.

Also, sustainability communication based on AI cannot be presumed to be effective. Its effects depend on how the consumer views the intent behind such communication, particularly in markets where the problem of greenwashing is a burning issue. Greenwashing can be defined as the exaggeration or misrepresentation of environmental performance and represents a signal-distortion mechanism that undermines the credibility of sustainability claims and reduces consumer trust (De Jong et al., 2020). Even technologically sophisticated sustainability claims may fail to generate trust when consumers perceive a high risk of greenwashing.

This research study drew on Signalling theory and the theory of trust to conceptualise sustainability communication as a process of signal interpretation rather than persuasion (Bartolacci et al., 2022). Signalling Theory explains how consumers interpret signals under conditions of information asymmetry and use those signals to form evaluations and behavioural intentions. By means of the synthesis of these perspectives, the study explores the interaction between perceived AI-mediated sustainability communication and perceived authenticity, the connection between authenticity and Green Brand Trust, the interrelation between trust and Green Purchase Intention, and the varying levels of risk of greenwashing (Mohammed et al., 2026). By so doing, the research builds upon the current body of sustainability communication studies by empirically testing the effect of AI-related cues on authenticity and trustworthiness in e-commerce contexts. This research makes three notable contributions to the body of literature. First, it theorises the perceived AI-mediated sustainability communication as a contextual signalling cue rather than a technological feature, thereby extending Signalling theory by showing how AI-mediated cues act as interpretive signals that influence authenticity judgements. Second, it explains the serial process by which perceived authenticity affects the intent to purchase green using green brand trust. Third, it positions perceived greenwashing risk as a boundary condition within the signalling and trust framework that limits the effectiveness of trust-based sustainability communication.

This research primarily aims to explain the circumstances under which sustainability communication is linked to green purchase intentions in online markets. Particularly, the research aims to: (i) test the association between perceived AI-mediated sustainability communication and perceived authenticity of sustainability claims; (ii) examine whether Green Brand Trust mediates the relationship between perceived authenticity and Green Purchase Intention; (3) determine whether Perceived Greenwashing Risk weakens trust-based relationships within the proposed framework.

Theoretical Support and Literature Review

Sustainability Signalling Communication

Signalling Theory explains how the information asymmetry may be reduced with the help of credible signals (Spence, 1978). Green marketing sustainability claims are messages that convey a signal of commitment to the environment and responsibility in conduct. However, they do not necessarily turn out to be effective signals. Their success hinges on their perceived

efficacy by the consumers, especially regarding credibility and intention (Liu, 2015; Pham, 2020; Sultan, 2020).

Past research has suggested that the effectiveness of signals is likely to be maximized by clarity, specificity, and relevance of information (Bhattacharjee & Sanford, 2006). These properties improve the diagnostic strength of signals by making signals more interpretable and less ambiguous in case of uncertainty.

These qualities in sustainability communication can hardly be checked in reality, especially in e-commerce, where consumers cannot access production processes or supply chain data. Consequently, consumers do not use objective verification to assess the sustainability claims, but interpretive heuristics (Eberhart (Née Moser) & Naderer, 2017). Signalling-wise, sustainability communication within the online space can thus be viewed as a process of signal interpretation, where consumers derive sincerity and intent in a state of uncertainty, as opposed to a direct information transmission (Barbeisch, 2025).

AI-Mediated Sustainability Communication as a Contextual Signal

Sustainability communication in e-commerce is progressively more conveyed through AI-enhanced platforms, such as AI-generated product descriptions, algorithmic sustainability reporting, and verification cues produced by the system (Rovčanin, 2025). Instead of regarding AI as an independent force of persuasion, this paper theorizes perceived AI-mediated sustainability communication as a contextual signalling resource that can influence the way sustainability claims are evaluated.

When AI is involved, the standardization, surveillance, and decreased discretion on the part of the manager can become apparent and therefore may build perceived credibility in certain situations (Aloisi & Gramano, 2019). Nevertheless, the previous studies of algorithm aversion and automation bias provide evidence that consumers can negatively react to the algorithmic intervention when its purpose is not clear or seen as a strategy (Jones-Jang & Park, 2023). This reflects consumer ambivalence toward algorithmic systems, particularly when motivations are unclear.

In addition, recent studies on AI-disclosure in marketing communication suggest that consumer responses to AI-generated content vary depending on perceived transparency, competence, and intention (Desveaud & Pavone, 2025). Thus, AI-mediated communication does not always have to be supported by sustainability cues; its impacts will be dependent on how the consumer sees the intent of the AI use. The usefulness of AI-related cues as signifiers, in line with the signalling Theory, is not in their technological sophistication, but in their capacity to help in the development of perceptions of authenticity by eliminating uncertainty about the commitment to sustainability by a firm.

Notably, the conceptual difference between perceived AI-mediated sustainability communication and more general cues of credibility or transparency lies in the fact that perceived AI-mediated sustainability communication is not the perception of the accuracy or completeness of a message but of the source and process in which sustainability information is created.

Perceived Authenticity and Trust Formation

Perceived authenticity is the judgment of consumers regarding the perceived sincerity, honesty, and alignment of sustainability claims with the values and real practices of a firm (Eşsiz, 2020).

Authenticity is important as an evaluative heuristic in green marketing, especially in situations where assertions cannot be proven objectively.

Trust Theory is a theory that argues that trust is established when a brand is credible, truthful, and benevolent (Isaeva et al., 2020). The role of Trust is particularly pronounced in the context of an online environment, since the consumer themselves will not be able to oversee the process of production, and verify the sustainability of his/her success. True or perceived honesty, sincerity, and alignment between the values and the actual behaviour are more predictive of trust, on their own, compared to mere factual material (Hanhimäki, 2025; Monmoine, 2021). Where the consumers know that the assertions of sustainability are genuine, the consumers are likely to be convinced that the environmental pledge of the brand is genuine, and therefore, trust is improved, and subsequently, the green purchase intention (Paul et al., 2016).

Therefore, Trust Theory provides a useful framework for explaining how sustainability signals are converted into behavioural outcomes through psychological assessment rather than information processing. Hence, authenticity is not expected to directly translate into behavioural intention unless it is first transformed into trust, positioning Green Brand Trust as a central mediating mechanism rather than a parallel predictor.

Greenwashing Risk as a Boundary Condition

Perceived Greenwashing Risk means how much consumers assume that a company is likely to overstate or mislead the public on its environmental activities to make it look more environmentally friendly than it is in reality (De Jong et al., 2020). These perceptions contribute to scepticism and undermine the diagnostic value of sustainability signals. Signalling-wise, the risk of greenwashing minimizes signal reliability by raising the uncertainty about the intent of the sender (Malmlund, 2024; Mohammed et al., 2026). Although the claims made about sustainability seem genuine, the possibility of high greenwashing risk may preclude the transfer of these assessments into trust and consequent behaviour intentions. Thus, greenwashing risk is conceptualized as a boundary condition within the signalling and trust framework, which weakens the effectiveness of trust-based relationships by undermining signal credibility.

Development of Hypotheses

AI-Mediated Sustainability Communication and Authenticity

Perceived AI-Mediated Sustainability Communication can be defined as consumers' perceptions regarding sustainability claims being created, edited, or checked by some AI-based procedures. According to the Signalling Theory, this kind of communication acts as a credibility-enhancing signal, which serves to diminish information asymmetry between firms and consumers (Spence, 1978). In an online market, where the sustainability attributes are difficult to verify, the AI-mediated signals can be portents of stronger and more costly signals, such as greater structure, predictability, and surveillance (Parguel et al., 2011).

As long as the consumers think that sustainability claims are upheld by the use of AI-driven processes, they can conclude that the brand takes these claims more seriously, which increases the perceived honesty. However, prior research on algorithm aversion suggests that such effects depend on whether AI involvement is perceived as appropriate and trustworthy (Jussupow et al., 2020). Nonetheless, even technologically sophisticated signals may fail when the receiver of the information is suspicious about the motive of the sender, because signalling effectiveness, in addition to the presence of the signal, is determined by the interpretation of the signal (Spence, 1978; Testa et al., 2015). In line with this, AI-mediated sustainability

communication will be positively associated with perceived authenticity in cases where the consumers do not doubt the intentions behind the signal.

H1: Perceived AI-Mediated Sustainability Communication positively influences the Perceived Authenticity of Sustainability Claims.

Authenticity and Green Brand Trust

Perceived Authenticity of Sustainability Claims demonstrates the perceived honesty, sincerity, and consistency of the environmental undertakings of a brand. Authenticity determines whether the sustainability messages are reinforced by the values and practices of a brand or not, but not symbolically or opportunistically. According to Trust Theory, trust is built once consumers develop a perception that a brand is credible, truthful, and in good faith (Kang & Hustvedt, 2014; Rejitha & Jayalakshmi, 2025). Morhart et al. (2015) explain that a consumer will have confidence in a brand that sustains itself by displaying real commitment and not acting as a performer. Authenticity, in green marketing, relates to emotional congruence and moral uprightness whose dynamics are vital in building trust (Chen, 2010). Claimed sustainability, when it is perceived to be authentic, will lead consumers to believe that the environmental initiatives of the brand are plausible and sustainable. Therefore, it is predicted that perceived authenticity ought to positively influence Green Brand Trust.

H2: There is a positive relationship between Perceived Authenticity of Sustainability Claims and Green Brand Trust.

Green Brand Trust and Green Purchase Intention

Green Brand Trust is the trust of consumers in the environmental claims and the ethical behavior. Trust is a crucial factor guiding consumer purchasing decisions, especially in the online sphere, where one cannot have first-hand verification of sustainability practices. The Trust Theory is based on the assumption that trust minimises the perception of risk and promotes cooperative behaviour, such as the decision to buy (Abid et al., 2023). Green purchasing behaviour is more probable to be observed when consumers believe in a brand and are confident about the validity of its environmental promises (Paul et al., 2016). Green Brand Trust is a sign of trust in the reliability and integrity of the brand, which reduces the perceived risk and enhances purchase intention of environmentally responsible products (Chen, 2010). Thus, the increased Green Brand Trust is supposed to result in greater Green Purchase Intention.

H3: Green Brand Trust positively influences Green Purchase Intention.

Mediating Role of Green Brand Trust

Whereas perceived authenticity positively affects positive brand appraisals, it does not always seek to convert into behavioural intention in the absence of trust. The role of trust is that of a psychological process by which the evaluative cues are transformed into action, and this is in line with the Trust Theory, which focuses on trust as a state between belief and behaviour (Chen, 2010; Mohammed et al., 2026; Rejitha & Jayalakshmi, 2025). Trust enables consumers to convert perceptions into purchase-related intentions when they think that the sustainability claims are genuine (Chen, 2010; Morhart et al., 2015). Trust functions as the psychological mechanism through which authenticity-based evaluations are converted into behavioural intentions.

H4: Green Brand Trust is a mediator between the Perceived Authenticity of Sustainability Claims and the Green Purchase Intention.

Moderating Role of Perceived Greenwashing Risk

Perceived Greenwashing Risk introduces doubt regarding the credibility and intent behind sustainability communication. From a signalling perspective, greenwashing increases ambiguity and reduces signal reliability, making it difficult for consumers to distinguish genuine from opportunistic claims (Spence, 1978). Greenwashing makes people have doubts that the brands are overstating or lying about their environmental activities to earn a reputation (De Jong et al., 2020).

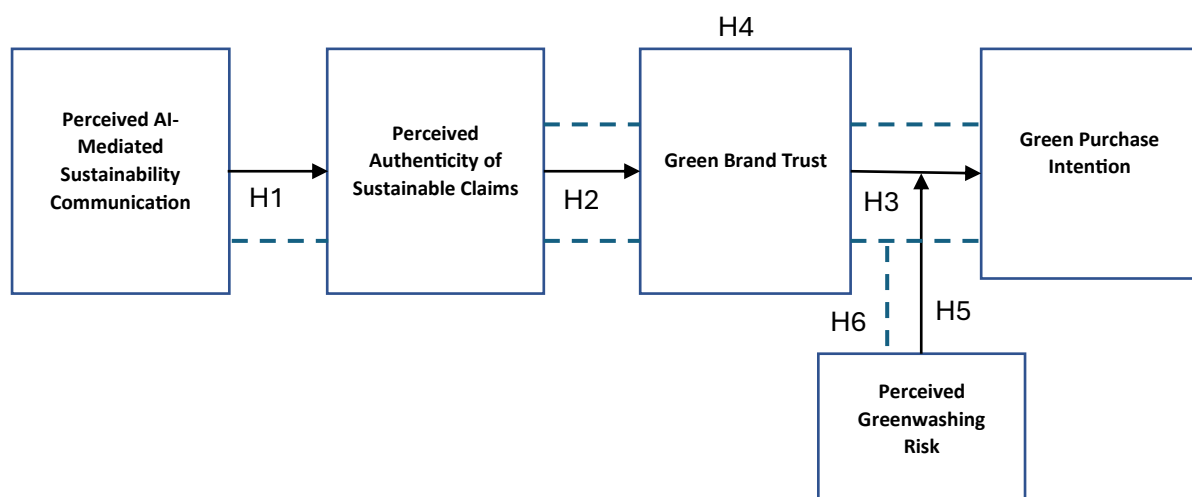
In such conditions, perceived greenwashing risk weakens the extent to which green brand trust translates into green purchase intention by increasing scepticism towards sustainability claims.

H5: Perceived Greenwashing Risk weakens the positive relationship between Green Brand Trust and Green Purchase Intention.

Moderated Mediation effect

This detrimental effect of greenwashing risk is also applied to the general signal interpretation process. Though AI-mediated communication could increase the signal strength due to consistency and standardization, consumers might perceive high levels of perceived greenwashing risk, and thus interpret this communication as strategic or manipulative instead of authentic. In such circumstances, the signalling value of AI is impaired. This is in line with Signalling Theory, according to which signals fail when their receivers are unsure of the sender's intentions (Spence, 1978).

H6: The indirect relationship between perceived AI-mediated sustainability communication and green purchase intention through perceived authenticity and green brand trust is weaker when perceived greenwashing risk is high.



Source: Author's own work

Figure 1: Conceptual Model

Methodology

The study context and research design

The research design used in this study is a quantitative and cross-sectional research design. The objective of the study was theory testing rather than theory building. It is about analysing relationships between latent psychological constructs of Signalling Theory and Trust Theory within an e-commerce context (Barbeisch, 2025). The empirical setting is e-commerce, where the sustainability information is presented via the product pages, eco-labels, and certifications, and more and more via AI-informed interfaces like the automatic descriptions and algorithmic suggestions. Such a context fits adequately since the attributes of sustainability are fairly imperceptible before the purchase. The level of information asymmetry is consequently high, and signalling and trust formation are particularly acute in terms of consumer decision-making (Parguel et al., 2011; Testa et al., 2015).

Population and sampling frame

This research study was based on adult customers located in the United Kingdom. The UK context is particularly appropriate due to its advanced e-commerce market and strong institutional emphasis on sustainability and consumer protection, as evidenced by literature (Altintzoglou et al., 2025; Wadud et al., 2025). Prior research highlights the UK as a leading market in online retail adoption and sustainability awareness (Abdinazar, 2025; John et al., 2023).

To ensure contextual relevance, the respondents were required to confirm that they had purchased at least one eco-labelled or sustainability-positioned product through an online platform during the previous six months. This criterion made sure that participants experienced the sustainability claims recently and directly in an e-commerce context, which is very in line with the theoretical focus of the study on the interpretation of signals in the condition of uncertainty.

Sample size and sampling method

A purposive, non-probability sampling approach was employed, as the study required respondents with prior experience of sustainability communication in online purchasing contexts. The data were obtained in the form of an online questionnaire that was deployed by means of the consumer research panels and other digital resources associated with online purchases. This sampling method is common in green marketing and e-commerce studies, whereby there is no detailed population frame (Chen, 2010). A total of 406 responses were collected, of which 379 were retained after data screening. A priori power analysis indicates that this sample size exceeds the minimum requirement for detecting medium effects ($f^2=0.15$) at 0.80 power with a 5% significance level in models with multiple predictors (Cohen, 1988; Hair et al., 2021).

Measures

Multi-item scales based on established and validated sources were used to measure all of the constructs. The measurement of items was done on a five-point Likert scale that ranged between strongly disagree and strongly agree. Minor verbal modifications were carried out to adhere to the e-commerce and sustainability communication situation, preserving conceptual similarity with the original scales. Perceived AI-Mediated Sustainability Communication was assessed based on items that were modified and adapted to the research on algorithmic decision-making and communication credibility through AI as a mediator. Items of the study capture the perceptions of system-driven verification, technological engagement, and trust in automated processes in sustainability communication (Castelo et al., 2019; Longoni et al., 2019). Perceived AI-mediated sustainability communication is conceptually distinct from general credibility or transparency cues, as it reflects perceptions of the source and process of information generation rather than evaluations of message accuracy or completeness. The Perceived Authenticity of Sustainability Claims was evaluated on the items modified according to Morhart et al. (2015) that gauge the perceived integrity, honesty, and consistency of the sustainability communication with the values and behaviours of a brand. Consistent with the signalling theory, these items assess perceived AI-involvement as a contextual signalling cue rather than objective technological usage.

The scales to measure Green Brand Trust were based on a scale by Chen (2010), which is based on Trust Theory (Morgan & Hunt, 1994) and gauges the consumer trust in the environmental statement of a brand, ethical behaviour, and trustworthiness to honour sustainability pledges. The scale of Green

Purchase Intention has been constructed based on items modified by Chen (2010) and Paul et al. (2016), which represent the intention of consumers to buy eco-friendly products of the brand, the probability of buying them, and the preference to use them. The measure of Perceived Greenwashing Risk was built on the basis of the items modified by De Jong et al. (2020) and Nyilasy et al. (2014) and included measures of consumer mistrust in exaggerated or deceptive environmental claims, as well as suspicion about the authenticity of sustainability communication. Table 1 presents the constructs, measurement items, and sources.

Table 1: Constructs and Indicators

Codes	Items	Source
Perceived AI-Mediated Sustainability Communication		
PAIMSC1	The sustainability information provided by this brand appears to be generated using AI-based systems.	Castelo et al. (2019); Longoni et al. (2019).
PAIMSC2	The sustainability claims of this brand seem to rely on algorithmic analysis rather than manual judgment.	
PAIMSC3	The use of AI makes the brand's sustainability information appear systematic and consistent.	
PAIMSC4	The involvement of AI increases my perception that sustainability claims are monitored and evaluated objectively.	
Perceived Authenticity of Sustainability Claims		
PASC1	This brand's sustainability claims feel genuine rather than exaggerated.	Morhart et al. (2015).
PASC2	The sustainability messages of this brand are consistent with its overall values.	
PASC3	This brand appears sincere in its commitment to sustainability.	
PASC4	The sustainability claims of this brand reflect real actions, not just marketing.	
Green Brand Trust		
GBT1	I trust this brand's environmental claims.	Chen (2010)
GBT2	This brand is reliable in delivering on its environmental promises.	
GBT3	This brand is honest about its environmental performance.	
GBT4	I feel confident about this brand's environmental responsibility.	
GBT5	This brand can be relied upon to act in an environmentally friendly manner.	
Perceived Greenwashing Risk		
PGR1	This brand exaggerates its environmental achievements.	De Jong et al. (2020)
PGR2	The sustainability claims of this brand are misleading.	
PGR3	This brand makes itself appear more environmentally friendly than it actually is.	
PGR4	I am sceptical about the truthfulness of this brand's sustainability claims.	
Green Purchase Intention		

GPI1	I intend to purchase environmentally friendly products from this brand in the future.	Chen (2010);
GPI2	I would choose this brand over others because of its environmental commitment.	Paul et al. (2016)
GPI3	I am willing to buy this brand's products due to its sustainability practices.	

Control variables

Several control variables were added to minimise alternative explanations and account for the possible confounding effects. To control for concern about the environment, questions were adapted from (Dunlap et al., 2000), with greater concern about the environment being the more sensitive to messages about sustainability. The reason for including prior green purchasing behaviour was because the habitual green consumers may show high purchase intentions regardless of the communication cues. Other demographic factors such as age, gender, education, and online shopping frequency were also controlled as they are known to affect online trust and sustainability perceptions (Joshi & Rahman, 2015). All the control variables were included in the structural model as exogenous variables.

Ethical considerations

Ethical approval was obtained in accordance with the institutional research ethics requirements. Participation was voluntary and based on informed consent. Respondents were informed about the study purpose, anonymity, confidentiality, and their right to withdraw at any stage. No personally identifiable information was collected, and all data were used solely for academic research purposes in compliance with applicable data protection regulations.

Common Method Bias

As the data was gathered using a self-reported survey, common method bias (CMB) was tested to address potential bias. First, Herman's Single-Factor Test indicated that no single factor accounted for the majority of the variance, suggesting that CMB was unlikely to be a serious concern. Second, full collinearity variance inflation factors (VIFs) were examined, with all values falling below the conservative threshold of 3.3, indicating that common method bias is unlikely to pose a serious concern (Kock, 2017).

Data analysis

Data analysis was conducted using structural equation modelling. A two-step analytical approach was followed. Following the recommended two-stage analytical procedure for PLS-SEM, the measurement model was first assessed to evaluate factor loadings (>0.70), composite reliability (>0.70), and average variance extracted (>0.50), which were examined to establish convergent validity. Discriminant validity was assessed using the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio (<0.85) (Hair et al., 2017).

Second, the structural model was tested to examine the hypothesised relationships. Mediation effects were assessed using bootstrapping with 5,000 resamples. Moderation effects of perceived greenwashing risk were tested using interaction terms. Given the corrected model specification, moderation was assessed on the relationship between green brand trust and green purchase intention. Moderated mediation was examined through the estimated conditional indirect effects at different levels of greenwashing risk. Model evaluation focused on explanatory power (R^2), effect sizes (f^2), predictive relevance (Q^2), and collinearity diagnostics (VIF), consistent with the established PLS-SEM reporting standards.

Results

Descriptive Statistics and Sample Characteristics

The final sample consisted of 379 adult consumers in the UK who had purchased eco-labelled or sustainability-positioned products online during the last six months. The demographic profile (Table 2)

shows that the sample was diverse and appropriate for examining perceptions of sustainability communication in e-commerce contexts.

The gender distribution was comparatively even, with 196 male respondents (51.7) and 183 female respondents (48.3) registered. In terms of age, the percentage of respondents between the ages of 18-24 was 20.6, 25-34 years was 29.6, 35-44 years was 25.3, 45-54 years was 16.1, and 55 years and above was 8.4. The education level was between secondary education (16.9%), undergraduate (52.2%), and postgraduate education (30.9%).

Regarding purchase frequency, a substantial portion of respondents reported repeated exposure to sustainability communication, with 37.7 percent reporting having made one to two purchases of eco-labelled products, 42.5 percent making three to five purchases, and 19.8 percent making over five purchases over the last six months.

Table 2: Demographic Profile of Respondents

Demographic variable	Frequency	Percentage (%)
Gender		
Male	196	51.7
Female	183	48.3
Age		
18–24 years	78	20.6
25–34 years	112	29.6
35–44 years	96	25.3
45–54 years	61	16.1
55 years and above	32	8.4
Education		
Secondary education	64	16.9
Undergraduate degree	198	52.2
Postgraduate degree	117	30.9
Employment status		
Full-time employed	231	61
Part-time employed	54	14.2
Self employed	48	12.7
Not currently employed	46	12.1
Frequency of Purchasing eco-labelled or sustainability-positioned products online in the past six months		
1–2 times	143	37.7
3–5 times	161	42.5
More than 5 times	75	19.8

Measurement Model Testing

The data analysis was performed using Partial Least Squares Structural Equation Modelling, which is suitable for predictive research models and for testing moderation effects in complex models with latent constructs (Hair et al., 2017). Table 3 shows that Indicator reliability was established as all item loadings exceed the recommended minimum threshold of 0.70, indicating adequate representation of the underlying constructs (Hair et al., 2019). Internal consistency reliability was strongly supported, with Cronbach's alpha, and composite reliability values for all constructs above 0.80, exceeding the acceptable benchmark of 0.70 suggested in the literature (Nunnally & Bernstein, 1994). Convergent validity is confirmed, as the average variance extracted values range from 0.671 to 0.787, all above the minimum threshold of 0.50, demonstrating that constructs explain more than half of the variance in their indicators (Fornell & Larcker, 1981). Furthermore, collinearity diagnostics indicate no concerns about multicollinearity, with all VIF values well below the conservative threshold of 5, as recommended by Kock (2017), including those associated with interaction terms.

Table 3: Measurement Model

	Factor Loadings	Cronbach's alpha	Composite Reliability (CR)	Average variance extracted (AVE)	Variance Inflation Factor (VIF)	R ²
PAIMSC	0.756 – 0.868	0.835	0.890	0.671	1.508 - 2.413	0.243
PASC	0.832 – 0.876	0.820	0.893	0.735	1.688 – 2/010	
GBT	0.792 - 0.860	0.882	0.913	0.679	2.192 – 3.115	
PGR	0.850 – 0.920	0.865	0.917	0.787	1.919 - 2.645	
GPI	0.741-0.901	0.804	0.886	0.724	1.311 – 2.998	0.321

The Fornell-Larcker criterion and the heterotrait-monotrait ratio were used to measure discriminant validity, both of which provided strong evidence of construct distinctiveness (Fornell & Larcker, 1981; Henseler et al., 2015). The Fornell-Larcker findings (Table 4) show that the square root of the AVE of each construct is greater than the correlation of each construct with other constructs, which means that the discriminant validity is satisfactory. The findings of table 5 are further supported by the HTMT values, which are all less than the recommended value of 0.85, thus proving that the constructs are empirically different (Henseler et al., 2015). Although interaction term indicators show relatively higher values, this is expected in moderation models and does not indicate multicollinearity issues (Hair et al., 2021). Overall, the measurement model satisfied established reliability and validity criteria, providing a robust foundation for interpreting the structural model results.

Table 4: Fornell-Larcker Criterion

	GBT	GPI	PAIMSC	PASC	PGR
GBT	0.824				
GPI	0.517	0.851			
PAIMSC	0.400	0.340	0.819		
PASC	0.520	0.423	0.493	0.857	
PGR	0.433	0.321	0.357	0.386	0.887

Table 5: HTMT

	GBT	GPI	PAIMSC	PASC	PGR
GBT					
GPI	0.609				
PAIMSC	0.464	0.411			
PASC	0.608	0.520	0.593		
PGR	0.495	0.382	0.417	0.459	

Structural Model Testing

The structural model results indicate satisfactory explanatory power and significant relationships among the constructs. The values of the R-squared indicate that the model accounts for 27 percent of the value of GBT, 32.1 percent of GPI, and 24.3 percent of PASC, representing a moderate level of explanatory power according to PLS SEM guidelines (Hair et al., 2017). The adjusted R-squared values were very close to the corresponding R-squared values, indicating model stability and low likelihood of overfitting. Further, the substantive relevance of the relationships is supported by the effect size analysis. The effect size between PAIMSC and PASC has a high F-squared of 0.321, whereas between PASC and GBT, it is also high with an F-squared value of 0.370 (Table 6). Contrarily, the size of the effect of GBT on GPI and the interaction term on GPI are insignificant in strength because their F-squared values are 0.069 and 0.063, respectively, which are nevertheless substantial by standards where F-squared values of 0.02, 0.15, and 0.35 can be viewed as small, medium, and large impacts (Cohen, 1988).

Table 6: Path Coefficients (Direct Effects)

	Estimated Direct Effect	T-Statistics	P values	F ²
PAIMSC -> PASC	0.493	6.718	0.000	0.321
PASC -> GBT	0.520	5.871	0.000	0.370
GBT -> GPI	0.297	5.016	0.000	0.069
PGR x GBT -> GPI	-0.109	4.782	0.000	0.063

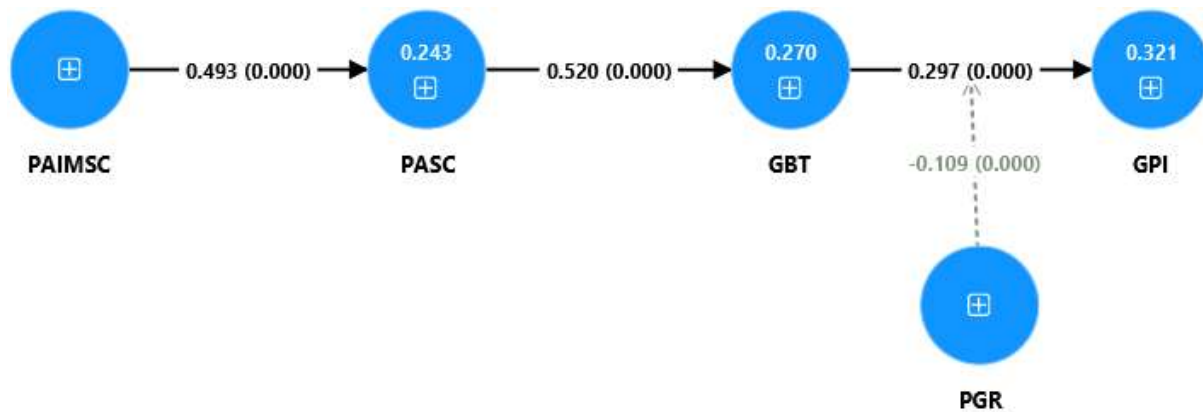


Figure 2: Structural model with path coefficients and Significance Levels

Bootstrapping Hypothesis testing shows that there are several statistically significant direct, indirect, and moderating effects. All the direct relationships between GBT and GPI, PAIMSC and PASC, and PASC and GBT are positive and significant with t-statistics greater than 1.96 and p-values lower than 0.001, and show that the relationship has strong support (Hair et al., 2017). The correlations between PGR and GBT with GPI are unfavorable and substantial enough to suggest that PGR dilutes the favorable association between GBT and GPI, confirming a significant moderating effect. The mediating role of Green Brand Trust (H4) was assessed using bootstrapped indirect effects. Table 7 demonstrates the specific indirect effects and their significance values. The indirect effect of perceived authenticity of sustainability claims on green purchase intention via green brand trust was positive and statistically significant ($\beta=0.155$, $t=3.484$, $p<0.001$). The direct effect of perceived authenticity of sustainability claims on green purchase intention became non-significant after the inclusion of green brand trust, providing evidence consistent with full mediation and supporting H4. Moreover, bootstrapped confidence intervals did not include zero, further confirming the significance of the indirect effects.

Additionally, the sequential indirect effect of perceived AI-mediated sustainability communication on green purchase intention through perceived authenticity and green brand trust was significant ($\beta=0.076$, $t=2.517$, $p=0.012$), providing further evidence for the proposed signal interpretation mechanism.

Table 7: Specific Indirect Effects

	Estimated Indirect Effect	T-Statistics	P values
PASC -> GBT -> GPI	0.155	3.484	0.000
PAIMSC -> PASC -> GBT -> GPI	0.076	2.517	0.012
PAIMSC -> PASC -> GBT	0.256	3.421	0.001

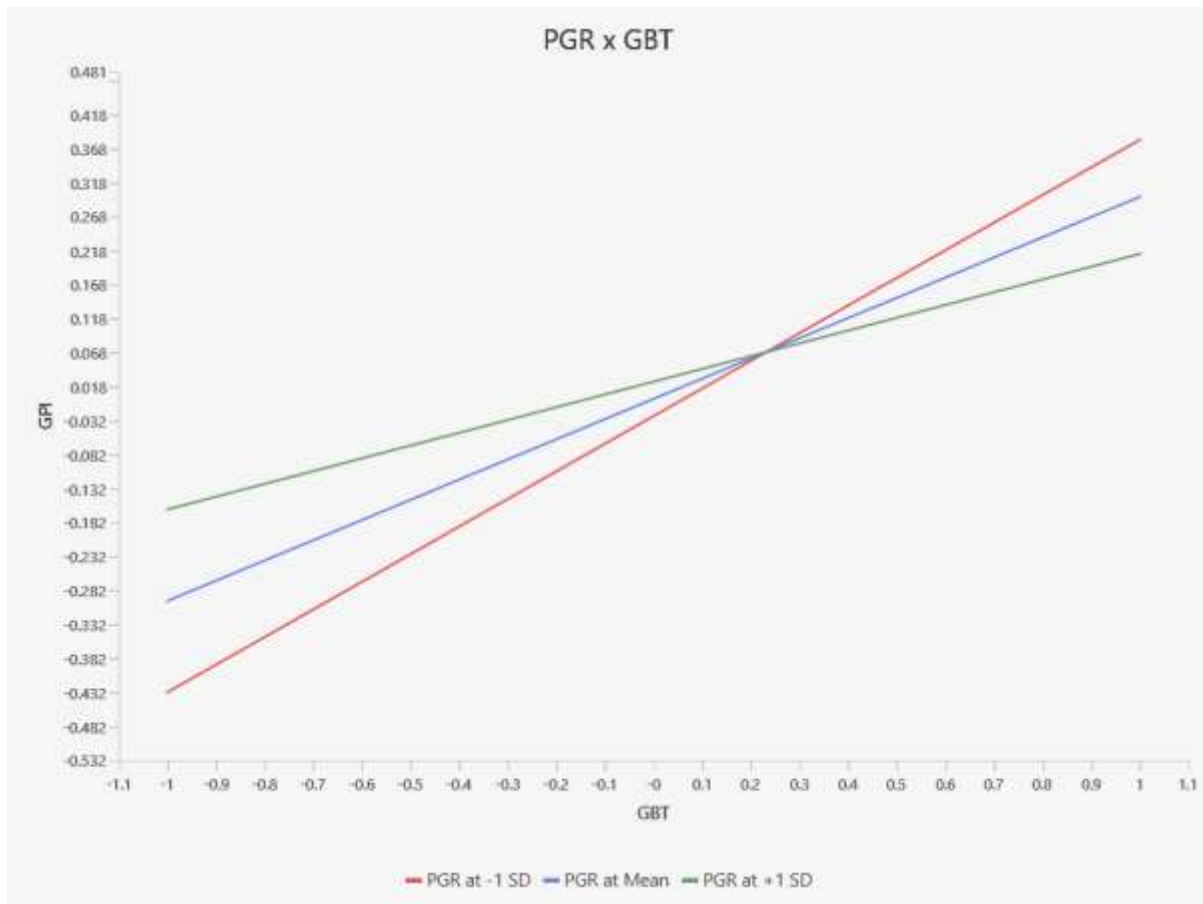


Figure 2: Moderating Effect of Perceived Greenwashing Risk on the Relationship between Green Brand Trust and Green Purchase Intention

To test the moderating role of perceived greenwashing risk (H5), an interaction term between green brand trust and perceived greenwashing risk was included in the structural model. The interaction effect was negative and statistically significant ($\beta = -0.109$, $t = 4.782$, $p < 0.001$), indicating that higher levels of perceived greenwashing risk weaken the positive association between green brand trust and green purchase intention. These results support H5 and suggest that the influence of green brand trust on purchase intention varies according to the level of perceived greenwashing risk. Simple slope analysis further illustrates that the relationship between green brand trust and green purchase intention is stronger at low levels of perceived greenwashing risk and progressively weaker at moderate and high levels of greenwashing risk (Figure 3).

The moderated mediation hypothesis (H6) was examined by assessing whether the indirect effects of perceived AI-mediated sustainability communication on green purchase intention via perceived authenticity and green brand trust varied across levels of perceived greenwashing risk.

The findings indicate that the conditional indirect effect becomes weaker at higher levels of perceived greenwashing risk, suggesting that greenwashing concerns constrain the effectiveness of the indirect pathway. This result validates H6 and demonstrates that the success of AI-mediated sustainability communication is conditional on the scepticism of consumers towards the environmental claims.

PLS Predict

The Stone-Geisser Q-squared statistic obtained through the blindfolding procedure was used to evaluate the predictive relevance of the model. Table 8 shows positive Q-squared values of GBT, GPI, and PASC, with the values of 0.167, 0.221, and 0.161, respectively, demonstrating that the model has satisfactory predictive relevance to the variables that are the endogenous constructs (greater than zero values).

indicate out-of-sample predictive relevance of the model in PLS SEM) (Geisser, 1979; Stone, 1974). Among the endogenous constructs, GPI shows the highest predictive relevance, implying that the model is particularly effective in predicting green purchase intention. Conversely, the Q-squared values of PAIMSC and PGR are 0.000, which is anticipated since they are exogenous constructs in the model and they are not forecasted by other factors. On the whole, these results give additional reasons to believe that the structural model is sufficient because it can be used to anticipate important endogenous outcomes rather than only provide in-sample explanatory power.

Table 8: PLS Predict

	SSO	SSE	Q² (=1-SSE/SSO)
GBT	1895.000	1578.893	0.167
GPI	1137.000	886.249	0.221
PAIMSC	1516.000	1516.000	0.000
PASC	1137.000	954.317	0.161
PGR	1137.000	1137.000	0.000

Discussion

This paper aimed to describe the way sustainability communication can be translated into green purchase intention in e-commerce contexts through Signalling Theory and Trust Theory, and, specifically, the AI-mediated communication, perceived authenticity, and greenwashing risk. The results emphasize the role of consumers' interpretation of sustainability signals in the case of information asymmetry, rather than assuming that sustainability messages have a uniform persuasive effect.

First, the results validate the hypothesis H1, showing that there is a significant and positive relationship between Perceived AI-Mediated Sustainability Communication and Perceived Authenticity of Sustainability Claims. The results indicate that the presence of AI-powered systems in the background can create the impression of a more consistent, monitored, and standardized approach to sustainability information, which can foster greater trust in sustainability signals and improve the authenticity rating. Importantly, this link should not be interpreted as meaning that the credibility of an AI is inherently increased, but rather as meaning that the perception of the AI is a signal that might mitigate uncertainty in a digital environment (Amitrano et al., 2021).

The findings also unite with recent studies into “algorithm aversion” and “automation bias,” indicating that consumer reactions to AI aren't necessarily positive. Some consumers may perceive that the calculations and conclusions derived from algorithms lack the human touch and are, therefore, less useful and/or less reliable, while others may feel that the calculations and conclusions derived from algorithms may be more objective and reliable due to the presence of AI. The present research goes further by showing that when the cues are perceived as a credibility-enhancing cue rather than a manipulative cue, the use of AI-related cues can enhance the authenticity perception in sustainability communication. (Hsieh & Lee, 2024). Secondly, the study reveals that perceived authenticity, as high indicator, is significantly associated with Green Brand Trust (in line with H2). The discovery is in line with the Trust Theory and previous studies on

aspects of authenticity that contribute to the development of trust (Chen, 2010; Morhart et al., 2015). Interestingly, the findings confirm the hypothesis that consumers do not merely compare the information a claim offers, but that a claim is perceived as real, value congruent and action oriented (Monmoine, 2021). Authenticity thus functions as a credibility-based evaluative heuristic in digital marketplaces where direct verification of environmental performance is not possible.

Third, Green Purchase Intention is supported by Green Brand Trust, which impacts on it significantly, and H3 is confirmed. The result is in line with the previous studies which have indicated that trust is one of the factors affecting green consumption behaviour (Chen, 2010; Paul et al., 2016; Rejitha & Jayalakshmi, 2025). Given the general characteristics of the e-commerce system, typified by high information asymmetry, in the current research, the perceived risk of sustainability claims and the interest of consumers to act on sustainability cues was lower.

Fourth, the mediation analysis indicates that Green Brand Trust is a complete mediator of the association between perceived authenticity and green purchase intention, which confirms H4. This finding suggests that authenticity alone may not be sufficient to influence behavioural intention unless it is translated into trust. Instead, authenticity operates indirectly by shaping trust judgments, which then inform consumers' willingness to engage in green purchasing (Xu et al., 2021).

Fifth, the moderating analysis results show that perceived greenwashing risk weakens the positive relationship between Green Brand Trust and Green Purchase Intention, supporting H5. This indicates that even when consumers trust a brand, high levels of perceived greenwashing risk can offset the behavioural impact of that trust. The outcome of this result highlights how much consumers may reduce the behavioural effects of brand trust in the presence of increased concerns about greenwashing despite trusting the brand on the environmental claims (Nisa et al., 2022; Salo, 2020). This finding highlights greenwashing risk as a signal –distortion mechanism that limits the effectiveness of trust-based sustainability communication (De Jong et al., 2020; Nyilasy et al., 2014). It also reinforces signalling theory by showing that the credibility of signals depends not only on their content but also on perceived sender intent.

Finally, the results of the moderated mediation suggest that the indirect effect of sustainability communication mediated by AI on the green purchase intention by using authenticity and trust is smaller in the example of high risk of greenwashing, which proves H6. This confirms that the degree of technological development does not protect brands against scepticism. Instead, mediated interactive processes can be stripped of signalling value in case consumers mistrust opportunistic sustainability communication (Cotrufo, 2023). Collectively, the results support the view that sustainability communication operates as a process of signal interpretation rather than a direct persuasion mechanism. The findings indicate that the effectiveness of sustainability communication in e-commerce depends less on technological sophistication and more on consumers' perceptions of authenticity and trustworthiness within sceptical market environments.

Theoretical Implications

This study has three important contributions to the body of literature. Initially, it enhances the understanding of sustainability communication by framing perceived AI-mediated sustainability communication as a contextual signalling cue, rather than just a technological aspect. Previous research has largely centred on static disclosures, eco-labels or corporate storytelling, while this study indicates that the presence of AI can impact how sustainability is perceived and is especially relevant for perceptions of authenticity in cases of information asymmetry. The theoretical

development is vital, since it situates the AI in signalling mechanisms, not just as a context or as a technology (Hanhimäki, 2025; Monmoine, 2021).

Second, the study has extended the trust theory by empirically proving that perceived authenticity does not directly affect behavioral intention but does so through the mechanism of green trust of brands. This elucidates the psychological chain in which sustainability-related assessments impact consumer choices and supports the conceptual difference between authenticity (as an evaluative judgment) and trust (as a relational belief that leads to action) (Nisa et al., 2022; Salo, 2020).

Third, in the signalling and trust framework, greenwashing risk is considered as a boundary condition, which restricts the effectiveness of trust-based relationships. This finding demonstrates that signal effectiveness depends not only on signal characteristics but also on consumers' interpretations of the credibility and motives underlying sustainability communication. Past research has tended to view greenwashing perceptions as the end result or initial cause of consumer scepticism, whereas the results of the present study suggest that greenwashing perceptions adversely affect the effectiveness of the trust-behaviour relationship, allowing a more nuanced understanding of how greenwashing perceptions influence the outcomes of sustainability communication. Finally, the research has tested the empirical moderated sequential mediation model, an extension from the previous research which has mainly focused on mediation or moderation. The results indicate that sustainability communication is a multi-stage interpretative process, with contextual scepticism influencing the process, which provides a more comprehensive framework for further research on sustainability communication (Xu et al., 2021).

Practical Implications

The findings have several practical implications for the managers operating within digital markets that are sustainability-driven. Firstly, companies must understand that AI-mediated sustainability communication does not inherently enhance credibility; its effectiveness depends on how consumers interpret AI-related sustainability signals. It will be effective depending on how it enhances the perceptions of authenticity. However, for the development of AI applications, such as automated sustainability reporting or algorithm-generated product descriptions, transparent communication, a clear message, and alignment with real-life sustainability must be complemented. Second, the message of authenticity needs to be seen not just as a promotional message but as an integral part of sustainability communication. All sustainability statements require actions and commitments to be verified. If the message is overstated, lacks clarity, or is symbolic, it is likely to increase the perceived greenwashing risk and undermine consumer confidence.

Thirdly, the results placed green brand trust in the context of an important predictor of green purchase intention. Thus, managers should avoid using persuasive communication, instead establishing trust by making sure communication is consistent in every channel, there are no deceptive disclosures, and sustainability issues and limitations are acknowledged. Finally, the perceived greenwashing risk is a strategic threat and is critical. While levels of trust may be raised, so may be purchase intentions if scepticism is high. To help reduce scepticism and ensure the sustainability of sustainability communications, companies should adopt transparency, independent verification, and accountability mechanisms. Overall, the findings suggest that the success of sustainability communication is not so much a function of the technology, but rather of consumers' perceptions of the legitimacy, authenticity and credibility of sustainability signals.

Conclusions, limitations, and implications for future research

This research contributes to the sustainability communication literature by showing that sustainability communication is more likely to influence green purchase intention when it generates perceptions of authenticity and trust. Even though AI-mediated sustainability communication has the potential of reinforcing the perceptions of authenticity, its success requires situational conditions based on consumer

consideration of the credibility and the risk of greenwashing. Trust plays a vital role in translating sustainability signals into green purchase intention and serves as a key psychological mechanism within the proposed framework. The findings do not substantiate the assumption that automation or technological development is adequate to achieve a competitive edge in the sustainability markets. They, instead, show that competitors achieve a competitive edge via interpretations of sustainability signals by consumers under the circumstances of heightened scepticism. Those companies not connecting the AI-assisted communication to the actual sustainability efforts can even lose the trust and even the competitive advantages that these companies are meant to achieve.

This study has some limitations that suggest a direction for future studies. A cross-sectional design is unable to make causal inferences. Thus, future studies should utilize a longitudinal or experimental design to more effectively capture the change of trust and scepticism from AI-supported sustainability communication over time. Also, the subjects of the study were UK consumers. The model, therefore, needs to be tested in other institutional and cultural settings to ensure generalizability, and so further research is needed. Moreover, the results of purposive non-probability sampling may not be representative beyond the scope of customers who share similar qualities and online shopping experiences. Furthermore, future research could examine the various types of AI-mediated communication (chatbots, recommendation systems, or a separate AI verifier platform) to find out which technologies are best suited for improving the perceived authenticity and trust. Lastly, a comparison between the mechanisms of communication and the actual outcomes of the organization, in terms of customer retention, willingness to pay premium prices, etc. or, in other words, the relationship between sustainability communication and objective organizational results, will add to the practical relevance of this research and link sustainability communication with measurable organizational outcomes.

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