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The Impact of Generative AI-Enabled Sustainable Marketing on Green Brand Equity: The Mediating Role of Green Brand Trust and the Moderating Role of AI Transparency

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The rapid diffusion of generative artificial intelligence (AI) is reshaping how organizations design and deliver sustainability-oriented marketing communications, yet little empirical evidence exists on whether such AI-generated content builds genuine consumer trust or brand value. This study develops and tests an integrated model examining the influence of Generative AI-Enabled Sustainable Marketing (GAISM) on Green Brand Equity (GBE), with Green Brand Trust (GBT) proposed as a mediating mechanism and AI Transparency (AIT) proposed as a moderator of the GAISM-GBT relationship. Grounded in signaling theory, brand equity theory, and the stimulus-organism-response framework, five hypotheses were formulated and tested using Partial Least Squares Structural Equation Modeling (PLS-SEM) on survey data collected from consumers with direct experience of AI-assisted digital platforms and sustainability-related marketing communication. The measurement model demonstrated strong reliability and validity, with all constructs exceeding recommended thresholds for Cronbach's alpha, composite reliability, and average variance extracted, and discriminant validity confirmed via the Fornell-Larcker criterion and HTMT ratio. Structural model results supported all five hypotheses: GAISM significantly enhanced GBT ($\beta = 0.621$) and GBE ($\beta = 0.377$); GBT strongly predicted GBE ($\beta = 0.505$) and partially mediated the GAISM-GBE relationship (indirect effect $\beta = 0.314$); and AI Transparency positively moderated the GAISM-GBT relationship ($\beta = 0.182$), with simple slope analysis confirming that this relationship strengthened progressively from low to high transparency. The model explained substantial variance in both GBT ($R^2 = 0.674$) and GBE ($R^2 = 0.676$). These findings demonstrate that generative AI, when deployed with genuine transparency and authenticity, can meaningfully strengthen consumer trust and brand equity in sustainability contexts rather than triggering skepticism or perceived greenwashing. The study contributes to emerging AI-marketing and green branding literature and offers practical guidance for organizations seeking to responsibly integrate generative AI into sustainability communication strategies.

Introduction

The rapid advancement of artificial intelligence (AI) is transforming the marketing landscape by enabling organizations to create personalized, interactive, and data-driven customer experiences. Among recent technological developments, Generative Artificial Intelligence (Generative AI) has emerged as one of the most influential innovations, allowing firms to automatically generate text, images, videos, advertisements, and customer communications with unprecedented efficiency (Dwivedi et al., 2023; Grewal et al., 2025). Simultaneously, growing environmental concerns, increasing regulatory pressure, and rising consumer awareness have encouraged organizations to adopt sustainable marketing practices that promote environmentally responsible products and long-term stakeholder value (Kotler, 2011; Belz & Peattie, 2012; Kumar et al., 2023).

The convergence of these two developments has given rise to Generative AI-driven Sustainable Marketing (GAISM), whereby organizations employ generative AI technologies to create, personalize, and deliver sustainability-oriented marketing communications. AI-powered marketing enables firms to provide customized sustainability information, promote environmentally friendly products, educate consumers regarding sustainable consumption, and improve customer engagement through personalized interactions (Huang & Rust, 2021; Grewal et al., 2025). Despite these advantages, consumers may question the authenticity, credibility, and reliability of AI-generated environmental messages because sustainability claims are often difficult to verify and may be perceived as greenwashing or AI-generated persuasion rather than genuine corporate commitment (Chen, 2010; Delmas & Burbano, 2011).

In sustainable marketing, consumer trust plays a crucial role because environmental attributes such as carbon neutrality, ethical sourcing, recyclable materials, and environmental responsibility cannot easily be evaluated before purchase. Consequently, consumers rely heavily on trustworthy brands when making environmentally responsible purchasing decisions (Chen, 2010; Delgado-Ballester & Munuera-Alemán, 2005). Green brand trust may therefore represent an important mechanism through which AI-generated sustainable marketing influences consumers' perceptions of green brand value.

Furthermore, the effectiveness of AI-generated sustainability communication may depend on AI transparency, which refers to the extent to which organizations openly disclose and explain the use of AI in generating marketing content. According to signaling theory, transparent communication reduces information asymmetry and strengthens consumers' confidence in organizational messages (Spence, 1973). Recent AI research also suggests that transparency and explainability influence consumers' perceptions of AI-assisted decision-making and marketing communication (Shin, 2021; Rai, 2020).

Accordingly, this study proposes an integrated framework examining the effect of Generative AI-driven Sustainable Marketing on Green Brand Equity through the mediating role of Green Brand Trust and the moderating role of AI Transparency. By integrating artificial intelligence, sustainable marketing, and green branding literature, this study contributes to the emerging body of knowledge on responsible AI-enabled marketing and provides practical implications for organizations seeking to leverage AI while maintaining consumer trust.

Background of the Study

Environmental sustainability has become one of the most important strategic priorities for organizations worldwide. Consumers increasingly evaluate companies based on their environmental responsibility, ethical business practices, and sustainability commitments, encouraging firms to incorporate sustainability into their products, branding strategies, and marketing communications (Belz & Peattie, 2012; Kotler, 2011). Sustainable marketing has therefore evolved beyond promoting environmentally friendly products to creating long-term value for consumers, society, and the natural environment (Kumar et al., 2023).

Simultaneously, digital transformation has fundamentally changed marketing practice. Artificial intelligence has become an important technological capability supporting customer relationship management, recommendation systems, marketing analytics, customer segmentation, and personalized advertising (Huang & Rust, 2021). More recently, Generative AI has significantly expanded these capabilities by enabling organizations to automatically generate personalized marketing content that closely aligns with consumers' interests and preferences (Dwivedi et al., 2023; Grewal et al., 2025).

Although previous studies have extensively investigated green marketing, green branding, AI marketing, and digital personalization independently, limited research has examined how Generative AI can be effectively integrated into sustainable marketing strategies. Moreover, consumers' responses to AI-generated sustainability communication remain uncertain because personalization may improve relevance while AI-generated content may simultaneously reduce perceived

authenticity and increase skepticism (Shin, 2021; Grewal et al., 2025). This emerging context highlights the importance of understanding how AI-enabled sustainable marketing contributes to consumer trust and green brand equity.

Problem Statement

Organizations are increasingly integrating Generative AI into their marketing activities to improve efficiency, personalization, and customer engagement (Dwivedi et al., 2023). However, despite its growing adoption, limited empirical evidence exists regarding whether AI-generated sustainability communication enhances consumers' trust in environmentally responsible brands or strengthens green brand equity.

Consumers may perceive AI-generated environmental messages as informative and personalized, yet they may also question their authenticity, credibility, and alignment with actual organizational sustainability practices (Chen, 2010; Delmas & Burbano, 2011). Such concerns may reduce consumer trust and limit the effectiveness of AI-enabled sustainable marketing.

Furthermore, existing research provides inconsistent findings regarding the role of AI transparency. While transparency may reduce uncertainty and strengthen confidence in AI-generated information, excessive disclosure may also reduce perceptions of authenticity or increase consumers' concerns regarding automation and manipulation (Shin, 2021; Rai, 2020). Consequently, organizations lack clear guidance regarding how AI-generated sustainable marketing should be implemented to maximize consumer trust and green brand value.

Research Gap

Existing literature has significantly advanced knowledge regarding green marketing, green brand equity, artificial intelligence, and digital marketing. However, several important research gaps remain.

First, previous studies have primarily examined traditional green marketing, green advertising, green brand image, green trust, and green purchase intention (Chen, 2010; Kumar et al., 2023), while relatively little attention has been given to Generative AI-driven Sustainable Marketing. As Generative AI represents one of the newest developments in digital marketing, its influence on sustainable branding remains underexplored (Dwivedi et al., 2023; Grewal et al., 2025).

Second, although Green Brand Trust has been established as an important antecedent of Green Brand Equity (Chen, 2010; Delgado-Ballester & Munuera-Alemán, 2005), limited empirical evidence explains whether green brand trust serves as the underlying psychological mechanism through which Generative AI-driven Sustainable Marketing creates green brand equity.

Third, prior AI marketing studies have mainly investigated personalization, customer experience, technology adoption, and purchase intention (Huang & Rust, 2021; Dwivedi et al., 2023), while largely overlooking AI Transparency as a boundary condition influencing consumers' trust in AI-generated sustainability communication. Considering the increasing emphasis on ethical AI, explain ability, and responsible AI governance, examining AI transparency as a moderator represents an important extension of existing knowledge (Rai, 2020; Shin, 2021).

Finally, few studies have integrated Generative AI-driven Sustainable Marketing, Green Brand Trust, AI Transparency, and Green Brand Equity within a single conceptual framework, particularly in emerging economies. Therefore, this study addresses this gap by proposing and empirically testing an integrated moderated-mediation model that extends both sustainable marketing and AI marketing literature.

Purpose of the Study

The primary purpose of this study is to examine the influence of Generative AI-driven Sustainable Marketing on Green Brand Equity. Specifically, the study investigates whether Green Brand Trust mediates this relationship and whether AI Transparency strengthens the positive influence of Generative AI-driven Sustainable Marketing on Green Brand Trust. By doing so, this study contributes to the growing literature on sustainable marketing and artificial intelligence while providing practical guidance for organizations seeking to utilize AI responsibly in sustainability communication.

Research Questions

- RQ1: Does Generative AI-driven Sustainable Marketing positively influence Green Brand Trust?

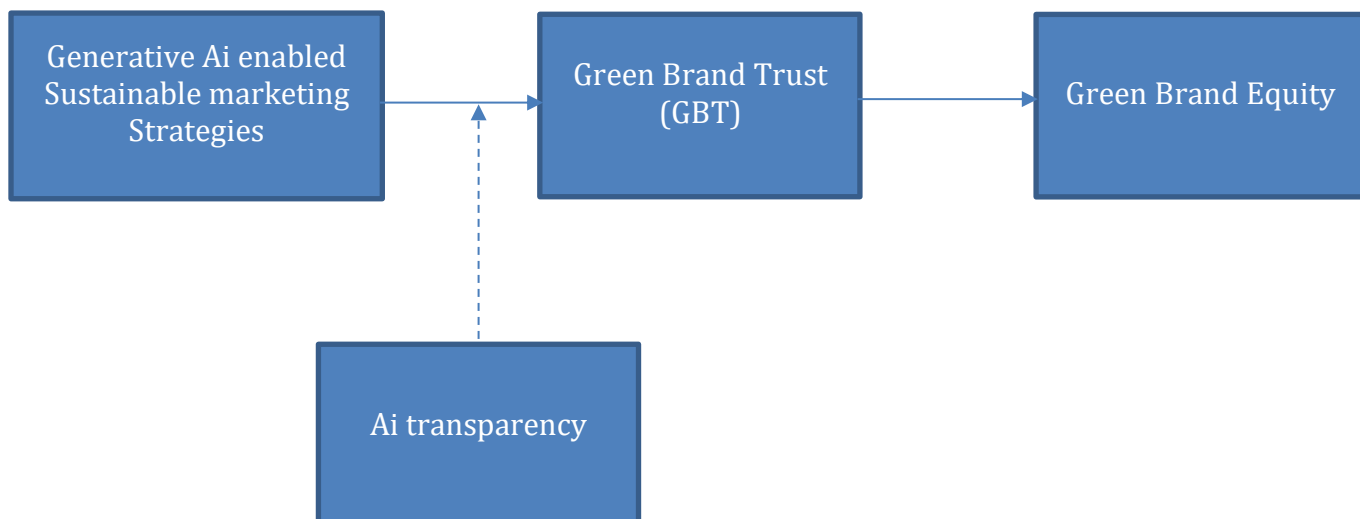
- RQ2: Does Green Brand Trust positively influence Green Brand Equity?
- RQ3: Does Green Brand Trust mediate the relationship between Generative AI-driven Sustainable Marketing and Green Brand Equity?
- RQ4: Does AI Transparency moderate the relationship between Generative AI-driven Sustainable Marketing and Green Brand Trust?
- RQ5: Does Generative AI-driven Sustainable Marketing positively influence Green Brand Equity?

Research Objectives

- RO1: To examine the influence of Generative AI-driven Sustainable Marketing on Green Brand Trust.
- RO2: To examine the influence of Green Brand Trust on Green Brand Equity.
- RO3: To investigate the mediating role of Green Brand Trust in the relationship between Generative AI-driven Sustainable Marketing and Green Brand Equity.
- RO4: To examine the moderating role of AI Transparency in the relationship between Generative AI-driven Sustainable Marketing and Green Brand Trust.
- RO5: To examine the direct influence of Generative AI-driven Sustainable Marketing on Green Brand Equity.

Conceptual Framework

The conceptual framework positions Generative AI-Enabled Sustainable Marketing (GAISM) as the independent variable, Green Brand Trust (GBT) as the mediating variable, AI Transparency (AIT) as the moderating variable acting on the GAISM → GBT path, and Green Brand Equity (GBE) as the dependent variable. GAISM is hypothesized to influence GBE both directly (H5) and indirectly through GBT (H1, H2, H3), while AIT strengthens the GAISM → GBT relationship (H4).



Literature Review

Generative AI-Enabled Sustainable Marketing

Generative artificial intelligence refers to AI systems capable of creating new content, including text, images, videos, recommendations, advertising messages, and interactive consumer communications. In marketing, generative AI allows organizations to produce customized advertisements, automate customer interactions, analyze consumer preferences, and deliver content that is more relevant to individual customers. Recent marketing literature suggests that generative AI is transforming advertising and brand communication by increasing the speed, scale, creativity, and personalization of marketing activities (Cillo et al., 2025; Duivenvoorde et al., 2025). However, researchers also emphasize that the value of generative AI depends on how responsibly, authentically, and transparently it is incorporated into consumer-brand interactions. The growing application of artificial intelligence extends beyond marketing communication to broader organizational functions, demonstrating its strategic potential for achieving sustainability-oriented outcomes. Ahmed et al. (2025) found that AI adoption in HR processes and AI-enabled strategic HR planning significantly contributed to sustainable organizational performance through green organizational learning and green employee engagement. Their findings indicate that AI can facilitate sustainability not merely through automation and efficiency but also by strengthening organizational learning, employee involvement, and sustainability-oriented capabilities. Building on this perspective, the present study extends the application of AI from the internal HRM context to the consumer-facing marketing context by examining whether generative AI-enabled sustainable marketing can strengthen green brand trust and ultimately green brand equity.

In the present study, generative AI-enabled sustainable marketing refers to the use of generative AI technologies to design, personalize, deliver, and manage marketing communications that communicate a brand's environmental commitments, sustainable products, ecological benefits, and responsible business practices. It may include AI-generated green advertisements, personalized sustainability messages, virtual assistants providing environmental product information, automatically generated sustainability content, and AI-supported recommendations for eco-friendly products. This construct therefore combines the technological capabilities of generative AI with the environmental and societal orientation of sustainable marketing.

Generative AI can support sustainable marketing by helping brands communicate complex environmental information in accessible and personalized formats. For example, AI systems can adjust sustainability messages according to consumers' environmental values, product preferences, and prior purchasing behavior. They can also generate educational content about carbon footprints, sustainable sourcing, recycling, energy efficiency, or product durability. Nevertheless, the use of AI in sustainable communication can create concerns regarding manipulation, artificiality, misinformation, and greenwashing. Therefore, consumers' responses may depend not only on the quality of AI-generated communication but also on whether they consider the brand's environmental claims credible and trustworthy.

Generative AI-Enabled Sustainable Marketing and Green Brand Trust

Green brand trust is defined as consumers' willingness to rely on a brand based on their confidence in its environmental credibility, performance, and commitments. It reflects the extent to which consumers believe that a brand is capable, honest, and dependable in fulfilling its environmental promises (Chen, 2010). In sustainable markets, trust is particularly important because consumers usually cannot independently verify claims concerning carbon reduction, renewable materials, sustainable production, ethical sourcing, or environmental performance. Consequently, consumers must rely on the information and signals communicated by the brand.

Generative AI-enabled sustainable marketing may enhance green brand trust by improving the relevance, accessibility, and consistency of environmental communication. AI-generated content can present sustainability information according to consumers' personal interests and information requirements. For example, environmentally knowledgeable consumers may receive detailed information regarding product materials, emissions, and certifications, whereas less knowledgeable consumers may receive simpler explanations regarding environmental benefits. Research on AI-powered personalized advertising indicates that perceived relevance and usefulness can support consumer trust because consumers are more likely to value communications that address their actual needs rather than delivering irrelevant promotional content (An et al., 2025).

Generative AI can also improve the consistency of sustainability messages across websites, social media platforms, applications, chatbots, and digital advertisements. Consistent communication reduces ambiguity and enables consumers to develop clearer expectations about a brand's environmental values. From a signaling theory perspective, consistent and

informative sustainable marketing activities serve as signals of environmental commitment. When consumers perceive these signals as credible, they are more likely to believe that the brand is genuinely capable of fulfilling its ecological promises.

Recent studies have also shown that the perceived authenticity of AI-generated content can positively influence consumer trust. Bui et al. (2024), for example, found that the perceived authenticity of AI-generated images contributed positively to trust and patronage intentions. Similarly, research on AI-generated marketing communication demonstrates that trust is influenced by how authentic, human-like, and transparent the generated communication appears to consumers.

In the sustainable marketing context, the effect may be particularly important because consumers frequently question whether environmental claims reflect genuine corporate commitment or promotional greenwashing. When generative AI is used to deliver detailed, specific, personalized, and verifiable sustainability information, it can reduce uncertainty and strengthen confidence in the brand. Research on green marketing has shown that transparency, green brand image, and consumers' receptivity to green advertising are important antecedents of green brand trust (Şimşek, 2024). Moreover, misleading or inconsistent green claims can reduce trust and increase consumer skepticism (Promalessy & Giantari, 2024).

However, generative AI does not automatically produce trust. AI-generated content may reduce perceived authenticity when consumers believe that the brand is using automation to replace genuine creativity or conceal its actual practices. Brüns and Meißner (2024) found that the use of generative AI for social media content could reduce perceived brand authenticity. Therefore, the positive effect proposed in this study assumes that generative AI is used responsibly to provide accurate, useful, specific, and environmentally relevant communication rather than exaggerated or misleading claims.

On balance, generative AI-enabled sustainable marketing is expected to build green brand trust when it improves the relevance, consistency, specificity, and credibility of sustainability communication. Therefore, the following hypothesis is proposed:

H1: Generative AI-enabled sustainable marketing positively influences green brand trust.

Green Brand Trust and Green Brand Equity

Green brand equity represents the additional value that a brand obtains from consumers' positive perceptions of its environmental performance and ecological commitments. It reflects consumers' overall preference for a green brand compared with competing brands offering similar functional benefits. Green brand equity may be expressed through stronger brand recognition, favorable environmental associations, perceived green quality, loyalty, and willingness to select the brand over alternatives.

The relationship between trust and brand equity is well established in branding literature. Brand equity develops when consumers hold favorable, strong, and distinctive associations regarding a brand (Aaker, 1991; Keller, 1993). Trust strengthens these associations by reducing perceived risk and increasing confidence in the brand's promises. When consumers trust a brand, they are more likely to view it as reliable, valuable, and superior to competing brands. Brand trust therefore represents a relational asset that contributes to long-term consumer preference and brand strength.

In the environmental context, trust becomes even more important because green products frequently contain qualities that consumers cannot easily assess before or even after purchase. Consumers may not be able to verify whether a product has genuinely reduced emissions, uses responsibly sourced materials, minimizes waste, or complies with environmental standards. Green brand trust helps consumers manage this uncertainty by giving them confidence that the brand's environmental claims and performance are dependable.

Chen's (2010) foundational study established green brand trust as a major driver of green brand equity. The study found that green trust was positively related to green brand equity in the information and electronics product market. It also demonstrated that green trust partially transmitted the influence of green brand image to green brand equity. These findings suggest that positive environmental associations alone may not be sufficient to generate strong brand equity unless consumers also believe that the brand's environmental promises are credible.

More recent evidence supports the continued importance of green trust in developing brand-related outcomes. Dangaiso et al. (2024) found that green satisfaction contributed to green trust, green brand image, and green brand equity in the organic food context. Sustainable and ESG-related marketing research has also shown that credible environmental and social activities can strengthen brand trust and favorable brand attitudes.

Green brand trust can contribute to green brand equity in several ways. First, trust improves consumers' confidence in the functional and environmental quality of the brand. Second, it lowers the perceived risk associated with purchasing products carrying environmental claims. Third, it encourages consumers to develop stable and favorable brand associations. Fourth, it protects the brand from uncertainty and negative information because consumers are less likely to immediately reject a brand that they already consider dependable. Finally, trust strengthens loyalty, advocacy, and willingness to maintain a relationship with the brand.

Social exchange theory also supports this relationship. When a brand consistently fulfils its environmental commitments, consumers may reciprocate through preference, loyalty, positive word of mouth, and continued support. These responses enhance the brand's value in consumers' minds and contribute to consumer-based green brand equity. Therefore, brands that establish high levels of green trust are expected to enjoy stronger environmental positioning and greater marketplace differentiation.

Based on the theoretical reasoning and empirical evidence, the following hypothesis is proposed:

H2: Green brand trust positively influences green brand equity.

The Mediating Role of Green Brand Trust

The direct use of generative AI in sustainable marketing may not be sufficient to produce green brand equity. Consumers are unlikely to value a brand merely because it employs advanced technology. Rather, the technology must create meaningful psychological evaluations that shape consumers' perceptions of the brand. Green brand trust is proposed as a central mechanism through which generative AI-enabled sustainable marketing develops green brand equity.

The stimulus-organism-response framework provides a strong theoretical basis for this mediating process. In this framework, generative AI-enabled sustainable marketing operates as an external stimulus. It exposes consumers to personalized environmental content, sustainability recommendations, green advertising, and AI-generated information about the brand's ecological performance. Green brand trust represents the internal organismic state that develops when consumers evaluate these communications as credible, reliable, and authentic. Green brand equity represents the response reflected in the consumer's favorable overall evaluation of the brand.

Generative AI-enabled marketing can improve the quality and usefulness of sustainability communication, but consumers must first interpret that communication as trustworthy before it strengthens brand equity. AI-generated environmental content may explain product characteristics, provide customized recommendations, highlight green certifications, or communicate corporate sustainability initiatives. These activities can create awareness and favorable associations, but their impact on green brand equity is likely to be greater when consumers trust the brand behind the communication.

Signaling theory also explains this mediating mechanism. Sustainable marketing messages function as signals because the actual environmental performance of a product or organization is not always directly observable. Generative AI can make these signals more frequent, relevant, interactive, and personalized. However, signals influence consumer evaluations only when they are interpreted as credible. Green brand trust therefore represents consumers' confidence in the validity of the environmental signals conveyed through AI-enabled marketing.

Previous green branding research supports this reasoning. Chen (2010) found that green trust was both a direct antecedent of green brand equity and a mediator between green brand image and green brand equity. This indicates that positive green communication and environmental brand associations generate equity partly because they establish confidence in the brand's environmental reliability.

Research concerning sustainability communication similarly shows that trust frequently transmits the influence of corporate environmental activities to consumer outcomes. For example, recent ESG marketing evidence indicates that trust can mediate the influence of environmental, social, and governance activities on green purchase intention. Sustainable advertising research also identifies green trust as an important mechanism connecting corporate environmental responsibility with consumer engagement and behavioral responses.

The mediating role of green brand trust is especially relevant in an AI context because generative AI introduces both benefits and risks. On one hand, AI can produce specific, informative, and personalized green communication. On the other hand, it may create concerns about fabricated information, artificial content, data manipulation, and reduced authenticity. Consumers

must therefore determine whether the brand's use of AI represents genuine environmental engagement or merely a more sophisticated promotional technique. When AI-enabled sustainable marketing successfully establishes green trust, consumers are more likely to translate their positive evaluations into stronger green brand equity.

Accordingly, the impact of generative AI-enabled sustainable marketing on green brand equity is expected to occur partly through the development of green brand trust. Therefore, the following hypothesis is proposed:

H3: Green brand trust mediates the relationship between generative AI-enabled sustainable marketing and green brand equity.

The Moderating Role of AI Transparency

AI transparency refers to the extent to which an organization clearly communicates that AI has been used, explains the nature and purpose of that use, and provides understandable information regarding how AI-generated outputs are produced or supervised. In a marketing context, transparency may include identifying AI-generated advertisements, explaining how personalization decisions are made, informing consumers about the use of their data, distinguishing AI-generated content from human-created content, and describing the presence of human review.

Transparency is particularly important in generative AI-enabled sustainable marketing because both AI and environmental communication involve information asymmetry. Consumers generally cannot observe how an AI system generated a message, which data were used, whether the content was reviewed by humans, or whether the environmental claims accurately reflect the firm's actual performance. When brands fail to disclose such information, consumers may perceive the communication as manipulative, misleading, or inauthentic.

Signaling theory suggests that voluntary transparency can act as a signal of honesty, accountability, and confidence. A company willing to explain its use of AI may appear less likely to be hiding misleading practices. Transparency can therefore reduce uncertainty and strengthen consumers' belief that AI-generated sustainability communications are being used responsibly. Research on trustworthy AI similarly identifies transparency and explain ability as important foundations of user confidence, although transparency must be accompanied by accuracy, accountability, and appropriate human judgment.

Recent empirical evidence directly supports the importance of disclosure in AI-generated green advertising. Li et al. (2026) conducted three experiments involving 632 participants and found that the type of AI disclosure used in green advertisements influenced brand attitudes and purchase intentions. Disclosure of AI-generated green images increased the perceived specificity and authenticity of environmental claims under particular conditions. The researchers conceptualized AI disclosure as a form of algorithmic transparency and demonstrated that transparency signals can influence how consumers evaluate AI-generated green advertising.

AI transparency may therefore strengthen the relationship between generative AI-enabled sustainable marketing and green brand trust. When transparency is high, consumers know that AI has been used and understand its role in producing or personalizing sustainability messages. This knowledge may reduce perceptions of deception and enable consumers to evaluate the communication more confidently. Transparent disclosure may also demonstrate that the brand accepts responsibility for AI-generated environmental claims rather than treating the technology as an unaccountable source.

By contrast, when AI transparency is low, consumers may become uncertain about whether the communication is authentic, independently produced, or manipulated. If consumers later discover that supposedly human-created sustainability content was generated by AI, they may perceive the omission as deceptive. This perception can damage trust, especially when the communication concerns socially important environmental issues.

Nevertheless, the influence of AI transparency is not universally positive. Some studies indicate that disclosure can reduce perceived advertising value, authenticity, or trust when consumers hold negative attitudes toward AI. Research has shown that detailed AI disclosure can sometimes create a transparency dilemma in which consumers appreciate disclosure but simultaneously evaluate AI-assisted content less favorably. Other research has found that disclosed AI involvement may reduce advertising value or purchase intentions.

Similarly, Kirkby et al. (2023) examined AI-disclosed brand voice and showed that disclosure can influence brand authenticity evaluations. Brüns and Meißner (2024) also demonstrated that generative AI involvement in social media content may reduce

authenticity. These findings indicate that transparency must be meaningful and appropriately designed rather than limited to a generic AI-generated label.

For the present study, AI transparency is expected to have a positive moderating influence because sustainable marketing involves strong ethical expectations. Consumers may respond more favorably when a brand openly explains the use of AI, provides verifiable evidence for environmental claims, and maintains human accountability. Thus, transparency is expected to strengthen the positive influence of generative AI-enabled sustainable marketing on green brand trust.

Based on these arguments, the following hypothesis is proposed:

H4: AI transparency positively moderates the relationship between generative AI-enabled sustainable marketing and green brand trust, such that the relationship is stronger when AI transparency is high.

Generative AI-Enabled Sustainable Marketing and Green Brand Equity

Generative AI-enabled sustainable marketing may directly enhance green brand equity by creating distinctive, relevant, and memorable environmental brand experiences. Brand equity develops when consumers recognize a brand, associate it with desirable qualities, perceive it as superior, and prefer it over competitors (Aaker, 1991; Keller, 1993). AI-enabled sustainable marketing can contribute to each of these dimensions by improving the quality, frequency, creativity, and personal relevance of green brand communication.

First, generative AI can increase green brand awareness by producing content at scale across multiple consumer touchpoints. Brands can use AI-generated text, images, video, social media posts, and interactive communications to consistently emphasize their environmental values. Repeated exposure to clear sustainability messages can improve consumers' recognition and recall of the brand as environmentally responsible.

Second, generative AI can strengthen green brand associations. Personalized content can connect a brand's sustainability practices with issues that are especially important to individual consumers, such as plastic reduction, ethical sourcing, climate change, biodiversity, recycling, or energy efficiency. These personally relevant associations may become stronger and more accessible in memory, enhancing the brand's environmental positioning.

Third, generative AI can improve perceived green quality by providing detailed explanations of sustainable product attributes. AI-based systems may communicate how products are manufactured, how materials are sourced, how environmental impacts are reduced, and how products compare with less sustainable alternatives. When this information is accurate and credible, consumers may perceive the brand as more competent and committed to environmental performance.

Fourth, generative AI can create interactive and individualized brand experiences. Consumers may communicate with AI assistants, ask questions about product sustainability, compare environmental characteristics, or receive personalized recommendations for greener alternatives. Such interactive experiences can make the brand appear more responsive, innovative, and customer-oriented.

Recent research suggests that generative AI adoption can shape brand authenticity, brand image, self-brand congruity, engagement, and behavioral intentions. AI-generated marketing materials can also affect consumers' attitudes toward brands and their subsequent purchasing responses.

Sustainable marketing literature similarly indicates that environmental marketing practices contribute to favorable brand associations, consumer commitment, perceived quality, and other components of brand equity. For example, Nguyen et al. (2025) showed that the green marketing mix influenced consumer commitment and willingness to pay through green brand loyalty, association, and perceived quality. These variables are closely related to the development of green brand equity.

The relationship can also be explained through the stimulus-organism-response framework. Generative AI-enabled sustainable marketing acts as a stimulus that produces cognitive and emotional evaluations regarding the brand. These evaluations may include perceived innovation, relevance, ecological responsibility, and differentiation. Such evaluations subsequently contribute to stronger overall green brand equity.

However, the direct relationship may be weakened when AI-generated sustainability content appears artificial, misleading, or disconnected from actual corporate practices. Consumers may reject AI-generated communications if they perceive them as

impersonal, less credible, or professionally inappropriate. Research comparing AI-generated and real images has found that AI-generated content may sometimes be perceived as less credible and more misleading.

Therefore, the proposed positive relationship assumes that firms align AI-generated communication with verifiable environmental performance, ethical data practices, brand values, and human oversight. When these conditions are met, generative AI-enabled sustainable marketing is likely to create differentiated environmental associations and increase the value consumers attach to the brand.

Based on these arguments, the following hypothesis is proposed:

H5: Generative AI-enabled sustainable marketing positively influences green brand equity.

Methodology

Research Design

This study adopts a quantitative research approach using a cross-sectional survey design to examine the relationships among Generative AI-driven Sustainable Marketing (GAISM), Green Brand Trust (GBT), AI Transparency (AIT), and Green Brand Equity (GBE). A quantitative design is appropriate because it enables the empirical examination of causal relationships among multiple latent constructs and facilitates hypothesis testing using statistical techniques (Creswell & Creswell, 2023). The cross-sectional design allows data to be collected from respondents at a single point in time, making it suitable for investigating consumers' perceptions and behavioral intentions regarding AI-enabled sustainable marketing practices (Sekaran & Bougie, 2021).

The study is based on a positivist research philosophy, which assumes that reality is objective and can be measured through observable variables and statistical analysis. A deductive research approach is employed because the proposed hypotheses are developed from established theories and previous empirical studies, including Signaling Theory (Spence, 1973), Brand Equity Theory (Aaker, 1991; Keller, 1993), and Green Brand Theory (Chen, 2010). The study therefore seeks to validate theoretical relationships through empirical evidence.

The proposed conceptual framework consists of one independent variable (Generative AI-driven Sustainable Marketing), one mediating variable (Green Brand Trust), one moderating variable (AI Transparency), and one dependent variable (Green Brand Equity). The relationships among these constructs are tested using Partial Least Squares Structural Equation Modeling (PLS-SEM) because the model contains mediation and moderation effects and includes relatively new constructs associated with Generative AI.

Population and Sampling

The target population of this study comprises consumers who have experience interacting with AI-generated marketing content and have purchased or considered purchasing environmentally friendly products or services. These consumers are expected to possess sufficient knowledge and experience to evaluate AI-enabled sustainable marketing communications and their influence on trust and brand perceptions.

The study focuses on consumers using digital platforms such as social media, e-commerce websites, mobile applications, and brand websites where AI-generated sustainability-related marketing communications are increasingly employed. Respondents will be selected from major metropolitan areas to ensure exposure to digital marketing technologies and sustainable consumption practices.

A non-probability purposive sampling technique will be employed because the study requires respondents who satisfy specific eligibility criteria. To participate, respondents must:

- Be at least 18 years of age.
- Have experience using AI-assisted digital platforms (e.g., ChatGPT, AI chatbots, AI recommendation systems, or AI-generated advertisements).

- Have purchased or shown interest in environmentally friendly or sustainable products within the previous twelve months.
- Have been exposed to sustainability-related marketing communications on digital platforms.

Purposive sampling is considered appropriate because respondents possessing these characteristics are more capable of providing meaningful evaluations of the proposed constructs (Hair et al., 2022). The required sample size will be determined using G*Power 3.1 to ensure adequate statistical power. Following Cohen (1988), a medium effect size ($f^2 = 0.15$), significance level of 0.05, statistical power of 0.95, and three predictor variables indicate a minimum sample requirement of approximately 220 respondents. However, considering the complexity of the structural model and recommendations for PLS-SEM, this study aims to collect approximately 350–450 valid responses to improve statistical reliability and model stability (Hair et al., 2022).

Data Collection Procedure

Primary data will be collected using a structured self-administered questionnaire distributed through online survey platforms such as Google Forms or Qualtrics. Online data collection is appropriate because the target respondents are active users of digital platforms where AI-generated marketing communications are commonly encountered.

Prior to the main survey, the questionnaire will be reviewed by experts in marketing and artificial intelligence to ensure content validity and clarity of wording. A pilot study involving approximately 30–50 respondents will then be conducted to identify ambiguous questions and evaluate the preliminary reliability of the measurement scales. Necessary revisions will be made before the full-scale survey is administered.

Participation in the survey will be voluntary. Respondents will receive an introductory statement explaining the purpose of the study, assuring anonymity and confidentiality, and emphasizing that participation is entirely voluntary. No personally identifiable information will be collected, and respondents may withdraw from the survey at any time without consequence.

To improve data quality, incomplete questionnaires, duplicate submissions, and responses exhibiting straight-lining or unrealistically short completion times will be excluded from the final dataset. The cleaned data will subsequently be prepared for statistical analysis.

Measurement Instrument

Data will be collected using a structured questionnaire consisting of two sections. The first section will gather respondents' demographic information, including gender, age, education level, occupation, income, and frequency of purchasing environmentally friendly products. The second section will measure the study constructs using previously validated measurement scales adapted from existing literature. All constructs will be measured using a five-point Likert scale, ranging from 1 = Strongly Disagree to 5 = Strongly Agree, as this scale is widely adopted in consumer behavior and marketing research and is appropriate for measuring attitudes and perceptions (Sekaran & Bougie, 2021). The measurement scales will be adapted from established studies to ensure construct validity.

Construct	Source
Generative AI-driven Sustainable Marketing	Adapted from Dwivedi et al. (2023), Grewal et al. (2025), Huang and Rust (2021)
Green Brand Trust	Chen (2010); Delgado-Ballester (2004)
Green Brand Equity	Chen (2010); Keller (1993)
AI Transparency	Shin (2021); Rai (2020)

Before hypothesis testing, the measurement model will be evaluated using the following criteria:

- Indicator loadings (> 0.70)
- Cronbach's Alpha (> 0.70)
- Composite Reliability (> 0.70)
- ρ_A (> 0.70)
- Average Variance Extracted (AVE > 0.50)
- Discriminant Validity using Fornell-Larcker Criterion
- Heterotrait-Monotrait Ratio (HTMT < 0.85)

These criteria are recommended for evaluating reliability and validity in PLS-SEM studies (Hair et al., 2022).

Data Analysis Technique

The collected data will first be screened using IBM SPSS Statistics (Version 29). Preliminary analyses will include checking for missing values, outliers, normality, common method bias, and descriptive statistics.

Subsequently, SmartPLS 4 will be employed to test both the measurement model and structural model using Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is selected because it is suitable for prediction-oriented research, accommodates complex research models containing mediation and moderation effects, and performs effectively when investigating relatively new theoretical constructs such as Generative AI-driven Sustainable Marketing (Hair et al., 2022).

The analysis will proceed in two stages.

Measurement Model Assessment

The reliability and validity of the measurement model will be assessed using:

- Indicator reliability
- Cronbach's Alpha
- Composite Reliability
- ρ_A
- Convergent Validity (AVE)
- Discriminant Validity (Fornell-Larcker Criterion)
- Heterotrait-Monotrait Ratio (HTMT)

Structural Model Assessment

The structural model will be evaluated using:

- Variance Inflation Factor (VIF) to assess multicollinearity.
- Path coefficients (β).
- Bootstrapping with 5,000 resamples to examine hypothesis significance.

- Coefficient of Determination (R^2).
- Effect Size (f^2).
- Predictive Relevance (Q^2) using Blindfolding.
- Standardized Root Mean Square Residual (SRMR).
- Mediation analysis for Green Brand Trust.
- Moderation analysis for AI Transparency.
- Importance-Performance Map Analysis (IPMA) (optional) to identify managerial priorities.

Hypotheses will be accepted when the t-value exceeds 1.96 and the p-value is less than 0.05 at the 95% confidence level (Hair et al., 2022).

Findings

Measurement Analysis

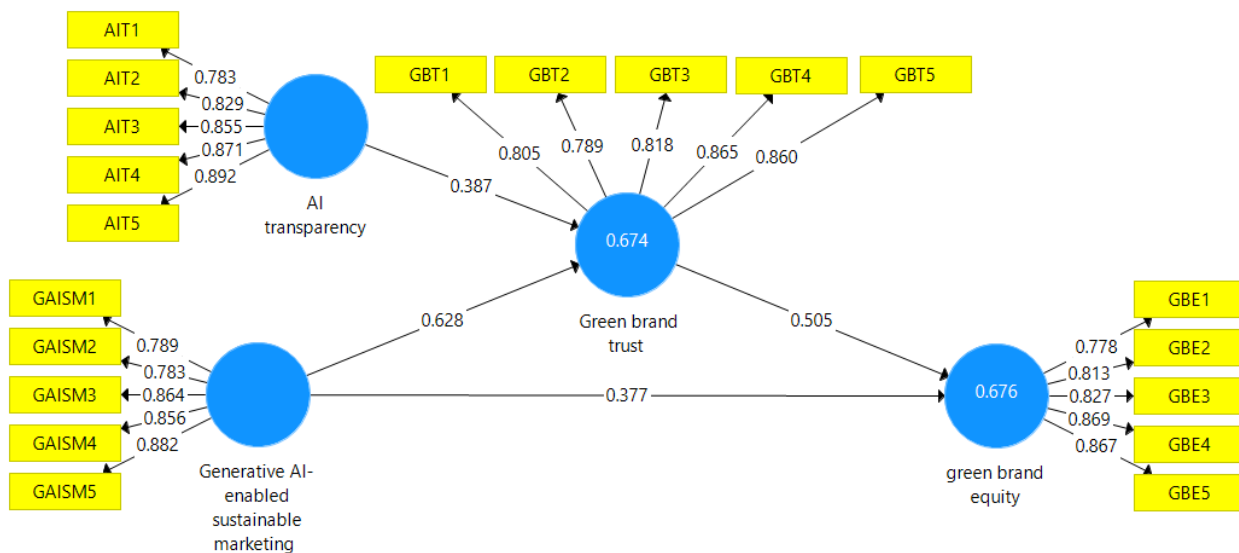


Figure 1. Measurement Model

Table 1. Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Green brand trust	0.885	0.889	0.916	0.686
AI transparency	0.901	0.912	0.927	0.717
Generative AI-enabled sustainable marketing	0.892	0.896	0.920	0.699
Green brand equity	0.888	0.893	0.918	0.691

Table 2. Fornell-Larcker Criterion

	GBT	AI-T	GAISM	GBE
Green brand trust	0.828			
AI transparency	0.554	0.847		
Generative AI-enabled sustainable marketing	0.731	0.266	0.836	
Green brand equity	0.781	0.375	0.746	0.832

Table 3. Heterotrait-Monotrait Ratio (HTMT)

	GBT	AI-T	GAISM	GBE
Green brand trust				
AI transparency	0.613			
Generative AI-enabled sustainable marketing	0.820	0.294		
Green brand equity	0.877	0.411	0.835	

Table 4. Model Fit Summary

	Saturated Model	Estimated Model
SRMR	0.046	0.046
d_ULS	0.438	0.439
d_G	0.182	0.182
Chi-Square	309.089	309.225
NFI	0.925	0.925

Structural Analysis

Following the satisfactory assessment of the measurement model, the structural model was evaluated to examine the predictive power of the proposed model and to test the hypothesized relationships among the constructs. The assessment included the coefficient of determination (R^2), path coefficients (β), bootstrapping results, mediation analysis, and moderation analysis in accordance with the guidelines proposed by Hair et al. (2022).

The explanatory power of the model was first assessed using the coefficient of determination (R^2). As shown in Table 5, the model explained 67.4% of the variance in Green Brand Trust ($R^2 = 0.674$) and 67.6% of the variance in Green Brand Equity ($R^2 = 0.676$). According to Hair et al. (2022), R^2 values of 0.75, 0.50, and 0.25 represent substantial, moderate, and weak explanatory power, respectively. Therefore, the obtained R^2 values indicate that the proposed model possesses moderate to

substantial predictive accuracy, demonstrating that Generative AI-enabled Sustainable Marketing and AI Transparency explain a considerable proportion of consumers' trust in green brands, while Generative AI-enabled Sustainable Marketing and Green Brand Trust jointly account for a substantial amount of variance in Green Brand Equity.

The significance of the structural relationships was examined using the bootstrapping procedure with 5,000 resamples. The results presented in Table 6 reveal that all proposed hypotheses were statistically supported. Specifically, H₁ proposed that Generative AI-enabled Sustainable Marketing positively influences Green Brand Trust. The results indicate a strong and positive relationship ($\beta = 0.621$, $t = 20.344$, $p < 0.001$), suggesting that organizations employing AI to develop transparent, personalized, and sustainability-oriented marketing communications are more likely to enhance consumers' trust in their environmental commitments. Consequently, H₁ was accepted.

The findings further demonstrate that Green Brand Trust positively influences Green Brand Equity, supporting H₂ ($\beta = 0.505$, $t = 9.976$, $p < 0.001$). This result confirms that consumers who perceive a brand as environmentally trustworthy are more likely to assign greater value, credibility, and competitive advantage to that brand. The finding is consistent with the green branding literature, which identifies trust as one of the strongest antecedents of Green Brand Equity (Chen, 2010). Therefore, H₂ was accepted.

The mediating role of Green Brand Trust was subsequently examined. As reported in Table 6, the indirect effect of Generative AI-enabled Sustainable Marketing on Green Brand Equity through Green Brand Trust was statistically significant ($\beta = 0.314$, $t = 8.745$, $p < 0.001$). These findings indicate that Generative AI-enabled Sustainable Marketing enhances Green Brand Equity not only directly but also indirectly by strengthening consumers' trust in environmentally responsible brands. Accordingly, Green Brand Trust partially mediates the relationship between Generative AI-enabled Sustainable Marketing and Green Brand Equity, providing empirical support for H₃.

The direct relationship between Generative AI-enabled Sustainable Marketing and Green Brand Equity was also found to be positive and statistically significant ($\beta = 0.377$, $t = 7.311$, $p < 0.001$), supporting H₅. This finding suggests that AI-enabled sustainable marketing contributes directly to consumers' perceptions of environmental brand value, even after accounting for the mediating influence of Green Brand Trust. Since both the direct and indirect effects remain significant, the mediation can be interpreted as partial mediation, indicating that Green Brand Trust explains part, but not all, of the influence of Generative AI-enabled Sustainable Marketing on Green Brand Equity.

The moderating role of AI Transparency was examined by estimating the interaction effect between AI Transparency and Generative AI-enabled Sustainable Marketing on Green Brand Trust. As presented in Table 6, the interaction effect was positive and statistically significant ($\beta = 0.182$, $t = 6.388$, $p < 0.001$), providing strong empirical support for H₄. This result indicates that AI Transparency strengthens the positive influence of Generative AI-enabled Sustainable Marketing on Green Brand Trust. In other words, consumers are more likely to trust AI-generated sustainability communication when organizations openly disclose and explain how AI is used to create marketing content.

To further interpret the moderating effect, a simple slope analysis was conducted. As illustrated in Table 7, the relationship between Generative AI-enabled Sustainable Marketing and Green Brand Trust becomes progressively stronger across different levels of AI Transparency. At low AI Transparency (-1 SD), the relationship remains positive but relatively weaker ($\beta = 0.439$, $t = 11.203$, $p < 0.001$). At the mean level of AI Transparency, the relationship increases substantially ($\beta = 0.621$, $t = 20.344$, $p < 0.001$), while under high AI Transparency ($+1$ SD), the relationship becomes strongest ($\beta = 0.803$, $t = 15.877$, $p < 0.001$). These findings clearly demonstrate that transparent disclosure regarding AI-generated sustainability communication substantially enhances consumers' confidence in environmentally responsible brands.

The interaction effect also produced an effect size of $f^2 = 0.064$, which represents a small-to-moderate moderating effect according to Cohen's (1988) guidelines. Although the magnitude of the moderation is modest, it is practically meaningful because it demonstrates that AI Transparency functions as an important boundary condition influencing consumers' responses to AI-enabled sustainable marketing. Figure 2 visually illustrates this interaction, showing that higher levels of AI Transparency significantly strengthen the positive relationship between Generative AI-enabled Sustainable Marketing and Green Brand Trust.

Overall, the structural model provides strong empirical support for the proposed conceptual framework. All five hypotheses were accepted, demonstrating that Generative AI-enabled Sustainable Marketing significantly enhances Green Brand Trust and Green Brand Equity. Furthermore, Green Brand Trust partially mediates this relationship, while AI Transparency positively strengthens the influence of Generative AI-enabled Sustainable Marketing on Green Brand Trust. These findings

highlight the importance of combining AI-driven personalization with transparent communication to maximize consumers' trust and build stronger environmentally responsible brands.

Table 5. R^2

	R Square	R Square Adjusted
Green brand trust	0.674	0.672
Green brand equity	0.676	0.674

Table 6. Specific Direct and Indirect Pathways

Hyp.	Hypothesis	Beta	T Value	P Value	Result
H1	GAISM → Green brand trust	0.621	20.344	0.000	Accepted
H2	Green brand trust → Green brand equity	0.505	9.976	0.000	Accepted
H3	GAISM → Green brand trust → Green brand equity	0.314	8.745	0.000	Accepted
H4	AIT*GAISM → Green brand trust	0.182	6.388	0.000	Accepted
H5	GAISM → Green brand equity	0.377	7.311	0.000	Accepted

Table 7. Moderation Effect of AI Transparency (Simple Slope Analysis)

Condition	Simple Slope (β)	T Value	P Value
Low AI Transparency (-1 SD)	0.439	11.203	0.000
Mean AI Transparency	0.621	20.344	0.000
High AI Transparency ($+1$ SD)	0.803	15.877	0.000
Interaction term (AIT $\times$ GAISM → GBT)	0.182	6.388	0.000

The effect size of the interaction term was $f^2 = 0.064$, indicating a small-to-moderate moderating effect according to Cohen's (1988) guidelines. As shown in Table 7, the positive relationship between generative AI-enabled sustainable marketing and green brand trust becomes progressively stronger as AI transparency increases: the simple slope nearly doubles when moving from low ($\beta = 0.439$) to high ($\beta = 0.803$) AI transparency. This pattern is consistent with H4 and confirms that AI transparency functions as a positive boundary condition strengthening the GAISM → GBT relationship.

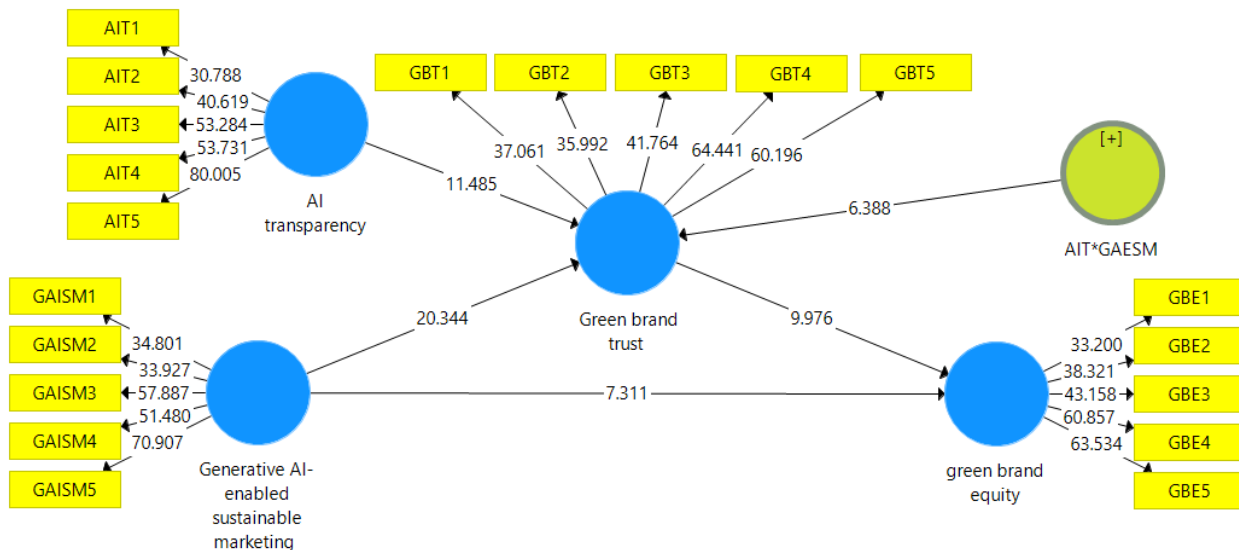


Figure 2. Structural Model with Moderation Effect

Conclusion

This study set out to examine how Generative AI-Enabled Sustainable Marketing (GAISM) shapes Green Brand Equity (GBE), and to clarify the psychological and contextual conditions under which this influence occurs. Drawing on signaling theory, brand equity theory, and the stimulus-organism-response framework, five hypotheses were proposed and tested using PLS-SEM on survey data collected from consumers with direct experience of AI-assisted digital platforms and sustainability-related marketing communication.

The results provide strong empirical support for the proposed model. Consistent with H1, generative AI-enabled sustainable marketing was found to be a significant positive predictor of green brand trust ($\beta = 0.621$, $t = 20.344$, $p < 0.001$), confirming that when AI-generated sustainability content is relevant, consistent, and specific, it meaningfully strengthens consumers' confidence in a brand's environmental credibility. In line with H2, green brand trust in turn exerted a strong positive influence on green brand equity ($\beta = 0.505$, $t = 9.976$, $p < 0.001$), reaffirming trust's long-established role as a relational asset that underpins brand value in the green marketing literature (Chen, 2010).

The mediation analysis supported H3: green brand trust significantly transmitted the effect of GAISM on GBE (indirect effect $\beta = 0.314$, $t = 8.745$, $p < 0.001$). Because the direct path from GAISM to GBE also remained significant (H5: $\beta = 0.377$, $t = 7.311$, $p < 0.001$), the mediation is best characterized as complementary partial mediation – GAISM builds green brand equity both directly, by creating distinctive and relevant environmental brand experiences, and indirectly, by first earning consumers' trust. This dual pathway underscores that trust is an important but not the sole mechanism linking AI-enabled sustainability communication to brand value.

Finally, H4 was supported: AI transparency positively moderated the GAISM $\rightarrow$ GBT relationship (interaction $\beta = 0.182$, $t = 6.388$, $p < 0.001$). The simple slope analysis showed that the positive effect of GAISM on green brand trust was considerably stronger when AI transparency was high ($\beta = 0.803$) than when it was low ($\beta = 0.439$). This finding indicates that consumers do not evaluate AI-generated sustainability content in isolation; rather, their trust response depends heavily on whether the brand is open about its use of AI and willing to explain how AI-generated claims are produced and verified.

Collectively, the model explained a substantial proportion of variance in both endogenous constructs ($R^2_{GBT} = 0.674$; $R^2_{GBE} = 0.676$), and all measurement model criteria – indicator loadings, Cronbach's alpha, composite reliability, rho_A, AVE, Fornell-Larcker criterion, and HTMT – met or exceeded the recommended thresholds (Hair et al., 2022), supporting the reliability and validity of the constructs. Together, these findings confirm that generative AI, when deployed transparently and responsibly within sustainable marketing, can be a genuine driver of consumer trust and green brand equity rather than merely a source of skepticism or perceived greenwashing.

As with any single cross-sectional survey study, these findings should be interpreted alongside certain limitations. The data reflect consumers' perceptions at one point in time, which restricts causal inference; the purposive, digitally-engaged sample

may limit generalizability to consumers with less exposure to AI-assisted platforms; and self-reported Likert-scale measures may be subject to common method bias and social desirability effects, notwithstanding the procedural and statistical remedies applied during data collection and model fit assessment (SRMR = 0.046).

Recommendations

Based on the empirical findings, the following recommendations are proposed for organizations seeking to integrate generative AI into their sustainable marketing strategies:

- Prioritize accuracy and verifiability over volume. Because green brand trust is the strongest lever connecting GAISM to brand equity, organizations should ensure that AI-generated sustainability claims are backed by verifiable data, certifications, or third-party audits rather than optimizing purely for content output or personalization scale.
- Disclose AI involvement clearly and consistently. Given the strong positive moderating effect of AI transparency, brands should adopt clear, consistent labeling of AI-generated or AI-assisted sustainability content across websites, social media, chatbots, and advertising, rather than treating disclosure as optional or inconsistent across channels.
- Explain the 'why', not just the 'that'. Simple disclosure that AI was used is less effective than transparency that also explains the purpose of AI use, the data behind personalized claims, and the extent of human review – consistent with the distinction between generic AI labels and meaningful, explainable transparency highlighted in the literature (Li et al., 2026).
- Maintain human oversight of AI-generated environmental claims. To avoid the authenticity risks associated with generative AI (Brüns & Meißner, 2024), organizations should implement human review processes before AI-generated sustainability content is published, particularly for claims related to environmental performance.
- Personalize responsibly. AI-driven personalization of sustainability messaging should be used to increase relevance for different consumer segments (e.g., environmentally knowledgeable vs. less-informed consumers) without exaggerating claims or tailoring messages in ways that could be perceived as manipulative.
- Invest jointly in trust-building and equity-building activities. Because the direct GAISM → GBE path remained significant alongside the mediated path, brands should not treat trust-building as a replacement for other equity-building activities (e.g., distinctive green brand associations, interactive AI experiences) but should pursue both simultaneously.

Future Research Recommendations

While this study offers meaningful theoretical and empirical contributions, several avenues remain open for future research:

- Longitudinal and experimental designs. Future studies should employ longitudinal or experimental designs to establish stronger causal inference regarding the effects of GAISM on green brand trust and equity over time, complementing the cross-sectional evidence presented here.
- Boundary conditions of transparency. Given prior evidence of a 'transparency dilemma' in which excessive or poorly designed AI disclosure can reduce perceived authenticity (Kirkby et al., 2023; Brüns & Meißner, 2024), future research should examine curvilinear effects of AI transparency and identify the point at which disclosure shifts from trust-building to trust-eroding.
- Additional moderators and mediators. Future studies could examine consumer-level moderators such as AI literacy, general attitude toward AI, environmental involvement, or green skepticism, and explore alternative mediating mechanisms such as perceived authenticity, perceived greenwashing risk, or perceived personalization value.
- Cross-cultural and cross-industry replication. Because the sample was drawn from digitally engaged consumers in a single context, future research should replicate the model across different cultural settings, income levels, and product categories (e.g., fast-moving consumer goods vs. durable or technology products) to test the generalizability of the findings.

- Qualitative and mixed-methods approaches. Complementary qualitative research (e.g., interviews or focus groups) could provide deeper insight into how consumers interpret AI disclosure statements and what specific transparency cues they find most credible.
- Comparative studies of AI vs. human-generated content. Future studies could directly compare consumer responses to AI-generated versus human-generated sustainability communication to isolate the unique effects attributable to generative AI itself.

Managerial Implications

The findings offer several practical implications for marketing managers, brand strategists, and sustainability officers:

- Position AI transparency as a strategic asset, not a compliance burden. Because AI transparency significantly amplifies the trust-building effect of GAISM ($f^2 = 0.064$), managers should view transparent AI disclosure policies as a competitive differentiator and a core component of brand governance, rather than a regulatory obligation to be minimized.
- Embed AI governance within sustainability communication strategy. Organizations should establish formal internal guidelines specifying when and how AI-generated sustainability content must be disclosed, reviewed, and validated, ensuring consistency between marketing, sustainability, and legal/compliance functions.
- Use green brand trust as a diagnostic KPI. Given its strong path to green brand equity ($\beta = 0.505$) and its role as the key mediating mechanism, managers should track green brand trust as a leading indicator of marketing effectiveness, alongside traditional metrics such as awareness and purchase intention.
- Allocate resources to explainable AI tools. Marketing technology investment should prioritize generative AI systems capable of producing explainable outputs (e.g., citing the data or certifications behind a sustainability claim), since explain ability directly supports the transparency mechanism shown to strengthen consumer trust.
- Train marketing and content teams on responsible AI use. Because the benefits of GAISM depend on responsible implementation, managers should invest in training for marketing teams on avoiding greenwashing risk, verifying AI-generated environmental claims, and communicating AI involvement in ways that reinforce rather than undermine authenticity.
- Balance automation with human accountability. While generative AI can scale personalized sustainability communication efficiently, managers should retain meaningful human review and accountability for AI-generated environmental claims, particularly for high-stakes or highly scrutinized sustainability topics.

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