AI-ENABLED GREEN MARKETING: OPPORTUNITIES AND CHALLENGES

Dr. Mukta Katyal
Assistant Professor, DSPSR
Ms. Tanya Singhal
Student, DSPSR

ABSTRACT

Purpose: The paper examines the role of Artificial Intelligence (AI) in green marketing and discusses the main opportunities and challenges of adopting it.

Design/Methodology/Approach: The study is a review based on secondary literature.

Findings: AI can help organisations understand consumer behaviour, personalise green messages, reduce waste, improve resource management and optimise supply chains. However, adoption faces challenges such as data privacy concerns, high implementation costs, skill shortages, algorithmic bias, cybersecurity risks, and the energy and resource consumption of AI systems themselves. AI-generated content can also speed up the spread of unsupported or exaggerated environmental claims, which increases the risk of greenwashing.

Research Limitations: Being based only on secondary literature, the findings have not been tested empirically.

Managerial Implications: Marketers should adopt AI ethically and transparently, and ensure that green claims are supported by genuine environmental performance.

Originality/Value: The paper brings together the opportunities, challenges and greenwashing risks of AI-enabled green marketing, and shows how it can support sustainable development when implemented responsibly.

Keywords: Artificial Intelligence, Green Marketing, Greenwashing, Sustainability, Sustainable Development

1. Introduction

Environmental sustainability has become a major concern for governments, businesses, consumers and other stakeholders around the world. Climate change, pollution, resource depletion and waste generation have raised awareness of sustainable living and responsible consumption. Consumers are increasingly interested in products and services with lower environmental impacts, while businesses face growing pressure to integrate sustainability into their strategies and operations.

Green marketing is an important approach through which organisations communicate environmental benefits and build sustainability into their products, services, processes and promotion. Peattie (1995) argued that green marketing should not be restricted to promotional communication but should involve environmental considerations across all areas of business activity. Ottman (2011) similarly stressed transparency, consumer value, responsible consumption and genuine environmental commitment as conditions for successful green marketing.

AI is also transforming business operations and marketing practice. AI refers to technologies that enable computer systems to perform tasks associated with human intelligence, such as learning, prediction, problem-solving, language processing, pattern recognition and decision-making. Machine learning, natural language processing, predictive analytics, recommendation systems and computer vision are increasingly applied in marketing (Chaffey & Ellis-Chadwick, 2022). In green marketing, AI can analyse large volumes of customer and operational data, identify consumer preferences, predict demand, optimise campaigns, personalise communication and support resource management.

AI adoption nevertheless creates challenges. Businesses must consider privacy and security, implementation costs, skill requirements, algorithmic bias, transparency and the environmental footprint of AI systems themselves. The International Energy Agency (2025) has highlighted the growing links between AI, data-centre electricity consumption, energy systems, emissions and energy efficiency. AI cannot therefore be treated as sustainable merely because it is digital or efficient, and its overall environmental impact must also be assessed.

The purpose of this paper is to examine how AI supports green marketing, to identify the main opportunities and challenges of AI-enabled green marketing, and to offer

recommendations for businesses that wish to adopt AI-driven sustainable marketing practices.

2. Objectives of the Study

The objectives of the study are:

- To understand the concept of AI-enabled green marketing.
- To examine how AI can support environmentally responsible marketing practices.
- To identify the major opportunities that AI creates in green marketing.
- To examine the challenges of implementing AI in green marketing.
- To analyse the potential impact of AI-enabled green marketing on consumer engagement and consumer behaviour.
- To assess its potential contribution to organisational sustainability.

3. Research Methodology

The study is based on secondary research. Information was gathered from academic books, peer-reviewed journals, systematic literature reviews, preprints, institutional and industry reports, and other reliable online sources on AI, digital marketing, green marketing, consumer behaviour, sustainability and responsible technology. Sources were selected for their relevance, credibility, academic quality and contribution to the research objectives, with particular attention to recent studies on AI in marketing and in environmentally responsible business practice. The sources used are listed in the References.

The study adopts a descriptive and analytical approach. The descriptive element explains the concept of AI-enabled green marketing, its applications and emerging trends. The analytical element examines the opportunities, limitations, challenges and implications of using AI in green marketing. The literature was compared and interpreted around the following themes: consumer analysis and segmentation, personalisation of green messages, demand forecasting, resource and energy optimisation, sustainable supply chain management, environmental communication, consumer engagement and organisational sustainability. The associated risks were also considered, namely greenwashing, data privacy, algorithmic bias, lack of transparency, ethical issues, over-dependence on technology, and the environmental footprint of AI systems and data centres.

The study also considers the relationship between green marketing and consumer behaviour. Systematic reviews indicate that green marketing can influence consumer attitudes, purchase intentions and purchasing decisions (Skackauskiene & Vilkaite-Vaitone, 2023; Sharma et al., 2023). The literature also points to a gap between consumers' environmental attitudes and intentions and their actual purchasing behaviour, commonly called the attitude–behaviour gap (Sharma, 2021). The study therefore considers how AI could help organisations understand consumer preferences, identify environmentally conscious segments, personalise sustainability communication and encourage more responsible purchasing.

The study has limitations. It is a narrative review rather than a protocol-based systematic review, it relies on secondary sources, and it does not test its propositions empirically. Because AI-enabled green marketing is a fast-moving field, some applications discussed here are described in the literature as potential rather than established outcomes.

4. Literature Review

4.1 Marketing foundations

Kotler and Keller (2016) emphasised that effective marketing is centred on understanding customer needs, creating customer value and building long-term customer relationships. Their principles of segmentation, targeting, positioning, customer relationship management and data-driven decision-making provide a theoretical foundation for AI-enabled green marketing. AI allows organisations to collect, process and analyse large volumes of consumer data, which helps marketers identify customer segments and understand preferences more efficiently. In green marketing, AI can be used to identify environmentally conscious consumer groups, analyse their purchasing preferences and develop personalised sustainability-oriented communication. Predictive analytics and machine learning can also help organisations forecast demand and detect changing preferences for environmentally friendly products. AI can thus be seen as an enabling technology through which traditional marketing principles are applied more efficiently in a sustainability-oriented business environment.

4.2 Green marketing

Peattie (1995) argued that green marketing should not be limited to promoting environmentally friendly products. It should incorporate environmental considerations into

product design, production, packaging, distribution, pricing and communication. Although this work predates the widespread use of AI, its principles remain relevant for understanding how technology can support environmental objectives across the value chain. AI can assist organisations in analysing consumer preferences, forecasting demand, optimising inventory, reducing material and resource wastage, and improving operational efficiency. Its integration into marketing and business processes can therefore help organisations move beyond promotional claims and build environmental considerations into wider business decisions.

Ottman (2011) observed that green marketing had moved from a niche activity to a component of mainstream marketing strategy, and that consumers increasingly expect organisations to demonstrate genuine environmental and social responsibility while still delivering value. Transparency, credibility, responsible consumption and effective environmental communication are therefore central to success. These ideas are especially relevant to AI-enabled green marketing, because AI can analyse preferences, identify environmentally conscious segments, personalise messages and improve digital engagement, but only authentic environmental practice can give those messages substance. Organisations should use AI to communicate verified sustainability performance rather than to create exaggerated or misleading claims, since inaccurate communication reduces consumer trust and contributes to greenwashing.

4.3 Digital marketing and AI

Chaffey and Ellis-Chadwick (2022) highlighted the growing importance of AI, machine learning, digital analytics, automation, personalisation and data-driven decision-making in contemporary marketing. Digital technologies allow organisations to understand customer behaviour, forecast demand, optimise campaigns, automate communication and improve customer experience. These capabilities are relevant to green marketing because AI-powered digital marketing can reach audiences more efficiently according to their interests and behaviour. More precise targeting may also reduce unnecessary marketing communication and make better use of marketing resources, and AI-supported analytics can show which sustainability messages and products matter most to particular consumer groups. The combination of AI and digital marketing can therefore improve marketing effectiveness while supporting some environmental objectives.

4.4 Consumer behaviour and the attitude–behaviour gap

Consumer behaviour is a critical component of green marketing. In a systematic review of green purchase behaviour, Sharma et al. (2023) identified factors that influence consumers' intentions and decisions to buy environmentally preferable products, including attitudes, environmental awareness, perceived benefits and social influences. Yusoff et al. (2023), reviewing the drivers of green purchasing behaviour, likewise organised the literature into several themes of influencing factors. These findings matter for AI-enabled green marketing because AI can analyse large amounts of consumer data to identify patterns in environmental preferences and purchasing. Machine learning, predictive analytics and segmentation can help organisations develop more relevant sustainability-oriented strategies.

The literature also shows that positive environmental attitudes and intentions do not necessarily result in green purchasing (Sharma, 2021). A systematic review by Skackauskiene and Vilkaite-Vaitone (2023) found that green marketing can influence consumers at the purchase and post-purchase stages, while the relationship between marketing activity and actual behaviour remains complex. This creates an opportunity for AI. By analysing customer interactions, online behaviour, purchase histories and responses to sustainability messages, organisations may better understand the gap between intention and behaviour and design more targeted communication. AI-enabled marketing should not focus only on consumers who express environmental concern, but should also consider the economic, social, psychological and situational factors that shape purchasing decisions. Organisations must also ensure that personalisation does not become manipulative and that consumer data is handled responsibly.

4.5 Greenwashing

Greenwashing is a major threat to the credibility of green marketing. Delmas and Burbano (2011) explained that it occurs when organisations mislead consumers about the environmental performance of their products, services or overall business, and they identified organisational, market, institutional and individual factors that contribute to it. The issue becomes more pressing with generative AI, because organisations can produce large volumes of marketing content quickly and cheaply. This can improve communication efficiency, but it also creates the possibility of unsupported, exaggerated or misleading claims. AI-generated sustainability content should therefore be supported by reliable evidence, organisational verification and human oversight. Researchers are also developing natural language

processing methods to detect potentially misleading climate-related corporate communication, although the field is still fragmented (Calamai et al., 2025). Responsible AI governance is essential if AI is to improve transparency rather than facilitate greenwashing.

4.6 Environmental footprint of AI

A growing body of work examines the environmental cost of AI itself. Wu et al. (2022) analysed the environmental implications of AI across the lifecycle of AI systems, including data, model development, infrastructure and hardware manufacturing. In a systematic review of 1,291 studies, Carmeno et al. (2026) reported that most studies of AI's environmental impacts portray them as positive, and recommended that assessments should cover water, material and biodiversity impacts and apply a full life-cycle perspective. The United Nations Environment Programme (2024) and the International Energy Agency (2025) similarly stress that AI's environmental effects must be assessed alongside its potential benefits.

4.7 Summary and research gap

The reviewed literature shows that AI-enabled green marketing is an emerging area that combines traditional marketing principles, environmental responsibility, digital technology and consumer behaviour analysis. AI offers opportunities for segmentation, personalisation, demand forecasting, resource optimisation, sustainability communication and engagement. The literature also identifies challenges, including greenwashing, data privacy, algorithmic bias, transparency, ethical concerns and the environmental footprint of AI, and it indicates that environmental attitudes do not always lead to green purchasing. Future research should therefore examine how AI can be used responsibly to bridge the attitude–behaviour gap while ensuring that technological innovation contributes meaningfully to environmental sustainability.

5. Understanding Green Marketing

Green marketing refers to the planning, development, pricing, promotion and distribution of products and services in ways that consider their environmental impacts (Peattie, 1995). It involves not only communicating environmental benefits to consumers but also building sustainability into business operations and value creation.

Green marketing can include environmentally responsible product design, sustainable packaging, energy-efficient production, recycling and waste-reduction initiatives,

environmental awareness campaigns, responsible resource use and sustainable distribution. Its fundamental purpose is to satisfy consumer needs while reducing negative environmental impacts and encouraging more responsible consumption.

Growing awareness of climate change and environmental issues has increased consumer interest in sustainable products and responsible brands. Effective green marketing, however, requires more than attractive environmental messages. Organisations must support their environmental claims with evidence and reflect sustainability in their actual practices (Ottman, 2011).

6. Artificial Intelligence in Marketing

AI has significantly changed how businesses understand and interact with customers. AI technologies can process large quantities of structured and unstructured data and identify patterns that conventional methods may not detect (Chaffey & Ellis-Chadwick, 2022).

In marketing, AI supports customer segmentation by identifying groups of consumers with similar preferences and behaviour, and it provides personalised recommendations by analysing previous purchases, browsing behaviour and interactions. Chatbots and virtual assistants can automate customer communication, while predictive analytics helps organisations forecast demand and anticipate customer needs. AI can also support content generation, social media monitoring, sentiment analysis, campaign optimisation and customer relationship management (Kotler & Keller, 2016; Chaffey & Ellis-Chadwick, 2022).

These applications allow organisations to make better-informed marketing decisions and give customers more relevant experiences. When combined with sustainability objectives, they can also support environmentally responsible marketing strategies.

7. AI-Enabled Green Marketing

AI-enabled green marketing refers to the application of AI technologies to marketing activities that support environmental responsibility, sustainable consumption and broader sustainability objectives.

AI can help organisations understand environmentally conscious consumers, optimise resource use, reduce unnecessary marketing activity, improve campaign effectiveness, support sustainable supply chains, monitor environmental performance and communicate

sustainability initiatives more effectively. It therefore offers a way to connect technological innovation with environmental responsibility.

The sustainability value of AI-enabled green marketing nevertheless depends on how the technology is designed, implemented, powered and governed. The environmental costs of computing infrastructure should be considered alongside the potential sustainability benefits (International Energy Agency, 2025; United Nations Environment Programme, 2024).

8. Opportunities of AI-Enabled Green Marketing

8.1 Better understanding of consumer behavior

AI can analyse large volumes of customer information from websites, social media, surveys, purchase records and customer-service interactions. This analysis can help businesses understand consumer attitudes towards environmental issues and identify patterns in green purchasing (Sharma et al., 2023). For example, an AI system may show that a customer segment places greater importance on recyclable packaging. A company could use this to improve its packaging strategy and to communicate verified information about its recyclable materials to that segment, aligning its products and messages with genuine consumer preferences.

8.2 Personalised green marketing campaigns

AI enables organisations to personalise marketing messages according to consumer interests, behaviour, location, purchase history and engagement (Chaffey & Ellis-Chadwick, 2022). Instead of presenting the same sustainability message to every consumer, organisations can offer environmental information that is relevant to particular groups. Personalisation can improve engagement and satisfaction while potentially reducing unnecessary advertising, since targeting relevant audiences rather than communicating indiscriminately may also use marketing resources more efficiently.

8.3 Reduction of marketing waste

Traditional marketing may involve substantial printed promotional material, physical distribution and other resource-intensive activity. AI-supported digital marketing can reduce reliance on some of these through targeted digital communication. AI can also optimise advertising placement and audience selection, reducing the repeated delivery of irrelevant

advertisements. Digital marketing is not free of environmental impact, but more efficient targeting can reduce certain forms of marketing waste and improve resource use.

8.4 Improved supply chain sustainability

AI can improve demand forecasting, inventory management, logistics planning and transport optimisation. More accurate forecasting can reduce overproduction and excess inventory, and better logistics planning can reduce unnecessary transport and the resources it consumes. AI can also help organisations identify inefficiencies in procurement, production, warehousing and distribution, contributing to both operational efficiency and environmental performance.

8.5 Energy efficiency and resource optimisation

AI can monitor energy consumption and identify where resources are wasted. In manufacturing and commercial operations, AI systems can analyse energy-use patterns and support more efficient allocation of electricity and other resources, and they can be used in energy management systems to forecast demand and optimise operations. The environmental benefits of such applications should, however, be weighed against the energy and computing resources needed to run the AI systems themselves. The International Energy Agency (2025) notes that AI has both energy-demand implications and potential applications for improving efficiency in the energy sector.

8.6 Enhanced product development

AI can support sustainable product development by analysing customer feedback, market trends, product reviews and environmental preferences. Organisations can use these insights to identify opportunities for eco-friendly designs, recyclable materials, energy-efficient products and sustainable packaging. AI-based simulation and predictive tools may also reduce the need for some physical experimentation and improve development decisions, helping businesses respond to changing consumer expectations on sustainability.

8.7 Real-time environmental monitoring

AI technologies can support continuous monitoring of environmental performance. Organisations can use AI-enabled systems to analyse data on carbon emissions, energy consumption, water use, waste generation and other sustainability indicators. Real-time monitoring helps managers identify deviations from environmental targets and act sooner,

and it can support more transparent sustainability reporting when the underlying data are reliable, measurable and independently verifiable.

8.8 Strengthening brand image

Consumers increasingly expect companies to demonstrate environmental and social responsibility (Ottman, 2011). AI can help organisations communicate legitimate sustainability initiatives through personalised content, digital storytelling, social media engagement, automated customer support and data-driven communication. A strong environmental reputation can build consumer trust and loyalty, but brand-building must rest on genuine environmental performance rather than on promotional claims alone. The credibility of green communication is essential for long-term brand value.

9. Challenges of AI-Enabled Green Marketing

9.1 Data privacy and security

AI systems depend heavily on data about consumer preferences, purchasing behaviour, browsing patterns and interactions. Collecting and processing such data raises concerns about privacy, misuse, unauthorised access and cybersecurity. Organisations should establish clear policies on data collection, storage, processing and use, and should tell consumers how their data are used.

9.2 High implementation costs

Implementing AI can require substantial investment in software, computing infrastructure, data management systems, cybersecurity, employee training, system integration and maintenance. These costs may be a particular burden for small and medium-sized enterprises. Organisations should evaluate the expected environmental and commercial benefits before adopting AI at scale and should consider cost-effective, scalable solutions.

9.3 Lack of technical skills

Effective use of AI requires employees with technical, analytical, managerial and sustainability knowledge, and a shortage of skilled personnel can prevent organisations from using AI well. Businesses should invest in training and interdisciplinary capability. Marketing professionals increasingly need to understand data analytics, AI governance, privacy and sustainability as well as customer behaviour and communication.

9.4 Algorithmic bias

AI systems can produce biased results when the data used to train them are incomplete, unrepresentative or biased. In green marketing, this could lead to inaccurate segmentation, inappropriate targeting, or unequal access to sustainability-related products and information. Human oversight, regular testing, diverse datasets and transparent decision-making are needed to reduce bias and improve fairness.

9.5 Environmental impact of AI systems

AI has an environmental footprint of its own. AI systems require computing infrastructure, data centres, electricity, cooling, hardware and other resources. The United Nations Environment Programme (2024) has emphasised the need to assess the environmental impacts of AI across its full lifecycle rather than concentrating on a single aspect such as electricity use. The impact therefore includes not only operational energy consumption but also the resources needed to manufacture and operate computing hardware and infrastructure (Wu et al., 2022). Recent research further indicates that AI's footprint can involve carbon, water and land impacts (United Nations University Institute for Water, Environment and Health [UNU-INWEH], 2026), and a large systematic review recommends that assessments cover water, material and biodiversity impacts within a life-cycle perspective (Carmeno et al., 2026).

Organisations should consequently consider energy-efficient models, efficient computing infrastructure, renewable electricity, responsible hardware management and lifecycle assessment when using AI for sustainability-related purposes.

9.6 Greenwashing risks

Greenwashing occurs when organisations exaggerate, misrepresent or provide misleading information about their environmental performance or the environmental benefits of their products. It is a significant challenge because misleading environmental communication can weaken the confidence of consumers and investors in genuinely sustainable products and organisations (Delmas & Burbano, 2011).

AI can increase this risk because automated systems can generate large quantities of marketing content very quickly. If AI-generated sustainability claims are not carefully verified, organisations may unintentionally publish inaccurate information. Businesses should

ensure that environmental claims are supported by measurable evidence and reviewed by qualified human experts before publication.

10. Impact on Consumer Behaviour

AI-enabled green marketing can influence consumer behaviour by improving the relevance, timing and personalisation of sustainability communication. Consumers increasingly seek information about product origins, packaging, environmental impacts, ethical sourcing and corporate sustainability initiatives. AI can help organisations identify individual interests and provide more relevant information, and personalised communication may raise awareness of and engagement with environmentally friendly products. Reviews of green consumer behaviour indicate that purchasing decisions are shaped by a combination of individual factors, product characteristics, marketing activity and social influences (Yusoff et al., 2023; Sharma et al., 2023). Recent bibliometric and systematic reviews continue to treat green purchase intention as a central outcome of green marketing practice (Eyasu et al., 2026).

Consumer trust nevertheless remains critical. Consumers may become sceptical if sustainability communication appears exaggerated, inconsistent or overly automated, so organisations should be transparent about both their environmental performance and the role of AI in customer communication.

The relationship between positive environmental attitudes and actual green purchasing also requires careful treatment. Systematic reviews have identified a gap between consumers' stated environmental intentions and their purchasing behaviour (Sharma, 2021; Skackauskiene & Vilkaite-Vaitone, 2023). AI-enabled marketing should therefore aim not only to raise environmental awareness but also to understand practical barriers such as price, availability, convenience, product quality and consumer trust.

11. Recommendations

Adopt responsible AI policies. Organisations should set clear principles for data collection, privacy, security, transparency, fairness and the ethical use of AI, and integrate them with the organisation's sustainability strategy rather than treating them as separate initiatives.

Invest in training. Marketing teams, managers, data professionals and sustainability personnel should understand both AI technologies and environmental objectives. Interdisciplinary

training can help organisations use AI more effectively while reducing ethical and operational risks.

Manage the environmental footprint of AI. Organisations should consider renewable energy for AI-related computing wherever feasible and should build energy efficiency into the selection and deployment of AI systems. The footprint of AI should be evaluated across its lifecycle, including computing, infrastructure, hardware, energy and resource use. The lifecycle-oriented approach of the United Nations Environment Programme (2024) offers useful guidance.

Keep sustainability communication transparent. Organisations should give consumers clear and understandable information about environmental claims and disclose relevant evidence where appropriate. AI-generated content should not be accepted without verification, particularly when it concerns environmental performance.

Prevent greenwashing. Sustainability claims should be measurable, evidence-based and consistent with recognised standards and reporting practice, and human experts should review important environmental claims before they reach customers (Delmas & Burbano, 2011).

Maintain human oversight. AI systems should be monitored regularly for bias, inaccurate predictions, privacy risks and unintended consequences, and human decision-makers should remain responsible for important ethical and sustainability decisions.

Focus on long-term sustainability. AI-enabled green marketing should be linked to measurable improvements in products, operations, resource use, supply chains and environmental performance. Marketing communication should reflect actual sustainability achievements rather than create an appearance of environmental responsibility.

12. Future Scope

Advances in AI create new opportunities for businesses to understand consumers, monitor environmental performance, optimise resources and communicate sustainability initiatives. Emerging technologies such as advanced machine learning, the Internet of Things (IoT), blockchain, predictive analytics, computer vision and generative AI may further strengthen sustainable marketing. Integrating AI with IoT devices, for example, could give organisations real-time information on energy consumption, waste, transport and product use.

Future applications may include more accurate carbon tracking, automated sustainability reporting, intelligent eco-labelling, AI-supported circular-economy platforms and highly personalised green consumer experiences. AI may also support automated monitoring of sustainability claims and help identify misleading environmental communication, although current detection research is still developing (Calamai et al., 2025).

Future research should go beyond the benefits of AI and investigate its full environmental and social footprint. The United Nations Environment Programme (2024) recommends comprehensive lifecycle assessment of AI's environmental effects, and the International Energy Agency (2025) stresses the importance of understanding both the energy requirements of AI and its potential to improve energy-sector efficiency. Carmeno et al. (2026) likewise call for assessments that integrate environmental and social dimensions.

Empirical studies can also examine how AI-enabled green marketing affects actual purchasing behaviour, brand trust, willingness to pay, customer loyalty and long-term sustainability outcomes. Comparative studies across industries and countries would show how it can be implemented under different economic, technological and regulatory conditions.

13. Conclusion

AI is transforming green marketing by helping businesses improve sustainability efforts and marketing performance at the same time. It enables organisations to understand consumer behaviour, personalise communication, reduce certain forms of marketing waste, optimise resources, improve demand forecasting and strengthen supply chains. These capabilities create significant opportunities for organisations that wish to combine technological innovation with environmental responsibility.

AI adoption also presents challenges: data privacy concerns, implementation costs, skill gaps, algorithmic bias, cybersecurity risks, energy consumption and greenwashing. Because AI systems themselves require energy, computing infrastructure, hardware and other resources, their sustainability benefits should be assessed against their wider environmental footprint rather than assumed.

Organisations must address these challenges through responsible governance, transparency, employee training, human oversight, evidence-based environmental claims and sustainable

technology management. AI should support genuine improvements in environmental performance rather than simply make sustainability communication more sophisticated.

The success of AI-enabled green marketing ultimately depends on balancing technological innovation with environmental responsibility and consumer trust. Businesses that combine AI capabilities with authentic sustainability initiatives can create long-term value for consumers, organisations, society and the environment, and AI-enabled green marketing can become an important pathway towards more data-driven, efficient, transparent and sustainable marketing in the digital era.

References

Calamai, T., Balalau, O., Le Guenedal, T., & Suchanek, F. M. (2025). *Corporate greenwashing detection in text: A survey* (arXiv:2502.07541). arXiv. https://doi.org/10.48550/arXiv.2502.07541

Carmeno, N. L., Domingos, T., & O'Neill, D. W. (2026). *The impacts of artificial intelligence on environmental sustainability and human well-being* (arXiv:2602.24091). arXiv. https://arxiv.org/abs/2602.24091

Chaffey, D., & Ellis-Chadwick, F. (2022). *Digital marketing: Strategy, implementation and practice* (8th ed.). Pearson.

Delmas, M. A., & Burbano, V. C. (2011). The drivers of greenwashing. *California Management Review, 54*(1), 64–87. https://doi.org/10.1525/cmr.2011.54.1.64

Eyasu, A., Negash, M., & Tilahun, G. (2026). Green marketing practice and green purchase intention: A bibliometric analysis and systematic literature review. *Future Business Journal, 12*, 168. https://doi.org/10.1186/s43093-026-00872-z

International Energy Agency. (2025). *Energy and AI*. IEA. https://www.iea.org/reports/energy-and-ai

Kotler, P., & Keller, K. L. (2016). *Marketing management* (15th ed.). Pearson.

Ottman, J. A. (2011). *The new rules of green marketing: Strategies, tools, and inspiration for sustainable branding*. Berrett-Koehler Publishers.

Peattie, K. (1995). *Environmental marketing management: Meeting the green challenge*. Pitman Publishing.

Sharma, A. P. (2021). Consumers' purchase behaviour and green marketing: A synthesis, review and agenda. *International Journal of Consumer Studies, 45*(6), 1217–1238. https://doi.org/10.1111/ijcs.12722

Sharma, K., Aswal, C., & Paul, J. (2023). Factors affecting green purchase behavior: A systematic literature review. *Business Strategy and the Environment, 32*(4), 2078–2092. https://doi.org/10.1002/bse.3237

Skackauskiene, I., & Vilkaite-Vaitone, N. (2023). Green marketing and customers' purchasing behavior: A systematic literature review for future research agenda. *Energies, 16*(1), 456. https://doi.org/10.3390/en16010456

United Nations Environment Programme. (2024). *Artificial intelligence (AI) end-to-end: The environmental impact of the full AI lifecycle needs to be comprehensively assessed*. UNEP. https://www.unep.org/resources/report/artificial-intelligence-ai-end-end-environmental-impact-full-ai-lifecycle-needs-be

United Nations University Institute for Water, Environment and Health. (2026). *Environmental cost of AI's energy use: Carbon, water and land footprints*. UNU-INWEH. https://doi.org/10.53328/INR26RMA002

Wu, C.-J., Raghavendra, R., Gupta, U., Acun, B., Ardalani, N., Maeng, K., … Hazelwood, K. (2022). Sustainable AI: Environmental implications, challenges and opportunities. *Proceedings of Machine Learning and Systems, 4*.

Yusoff, N., Alias, M., & Ismail, N. (2023). Drivers of green purchasing behaviour: A systematic review and a research agenda. *F1000Research, 12*, 1286. https://doi.org/10.12688/f1000research.140765.1