ORIGINAL PAPER

DOI: 10.26794/2308-944X-2024-12-4-6-28
UDC 339.138(045)
JEL I23, L86, D83, O33, C78

# A Systematic Literature Review on Sustainability Integration and Marketing Intelligence in the Era of Artificial Intelligence

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**ABSTRACT**

**The purpose** of the study is to explore Artificial intelligence (AI) integration into sustainable marketing techniques highlights a transformational potential, combining modern technology with the urgent needs of sustainability. This article thoroughly examines how AI plays a crucial role in improving marketing intelligence by enabling more efficient and socially responsible marketing tactics that support sustainability goals. **Method:** The study examines how AI-driven insights and analytics enhance decision-making processes, improve customer engagement, and increase the impact of marketing campaigns on environmental and social outcomes by reviewing existing literature and practices. The conversation delves into the difficulties and moral aspects involved in using AI in marketing, such as issues related to data privacy, algorithmic bias, and the importance of a strategic framework that focuses on sustainable development goals. **Results:** The investigation shows a promising yet intricate marketing intelligence environment, where AI is seen as a crucial tool for balancing economic goals with the need for environmental sustainability and social responsibility. The research stresses the importance of continuous research, multidisciplinary teamwork, and policy creation to maximize the impact of AI on shaping sustainable practices in marketing intelligence. This study provides **valuable contributions** to the scholarly discussion around sustainable marketing and artificial intelligence, while also offering practical guidance for professionals operating in this dynamic commercial sector.
***Keywords:*** sustainable marketing; artificial intelligence; marketing intelligence; sustainability integration; consumer behavior; environmental impact; ethical marketing

***For citation:*** **Emon M.M.H., Khan T. A Systematic Literature Review on Sustainability Integration and Marketing Intelligence in the Era of Artificial Intelligence.** ***Review of Business and Economics Studies*****. 2024;12(4):6-28. DOI: 10.26794/2308-944X-2024-12-4-6-28**

ОРИГИНАЛЬНАЯ СТАТЬЯ

# Систематический обзор литературы по интеграции устойчивого развития и маркетинговой разведки в эпоху искусственного интеллекта

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**АННОТАЦИЯ**

**Целью** статьи является рассмотрение проблем интеграции искусственного интеллекта (ИИ) в методы устойчивого маркетинга с выделением трансформационного потенциала, объединяющего современные технологии с насущными потребностями устойчивого развития. В статье подробно рассматривается,

как ИИ играет решающую роль в улучшении маркетинговой разведки (аналитики), обеспечивая более эффективную и социально ответственную маркетинговую тактику, способствующую достижению целей устойчивого развития. **Методы:** в исследовании на основе анализа существующей литературы и практики рассматривается, как основанные на ИИ идеи и аналитика улучшают процессы принятия решений, взаимодействие с клиентами и увеличивают влияние маркетинговых кампаний на экологические и социальные результаты. Рассматриваются трудности и моральные аспекты, связанные с использованием ИИ в маркетинге, такие как вопросы, связанные с конфиденциальностью данных, алгоритмической предвзятостью и важностью стратегической структуры, ориентированной на цели устойчивого развития. **Результаты:** исследование показывает многообещающую, но сложную среду маркетинговой разведки, где ИИ рассматривается как важнейший инструмент для балансирования экономических целей с необходимостью экологической устойчивости и социальной ответственности. В статье подчеркивается важность непрерывных исследований, междисциплинарной командной работы и разработки политики для максимального увеличения влияния ИИ на формирование устойчивых практик в маркетинговой разведке. Исследование вносит ценный **научный вклад** в дискуссию об устойчивом маркетинге и искусственном интеллекте, а также предлагает практические рекомендации для специалистов, работающих в этом динамично развивающемся коммерческом секторе.

***Ключевые слова:*** устойчивый маркетинг; искусственный интеллект; маркетинговая разведка; интеграция устойчивого развития; поведение потребителей; воздействие на окружающую среду; этичный маркетинг

***Для цитирования:*** **Emon M.M.H., Khan T. A Systematic Literature Review on Sustainability Integration and Marketing Intelligence in the Era of Artificial Intelligence. *Review of Business and Economics Studies*. 2024;12(4):6-28. DOI: 10.26794/2308-944X-2024-12-4-6-28**

## Introduction

In today's rapidly changing business environment, the combination of technical advancements and changing customer tastes has brought about a new age of significant changes. A noticeable trend in this dynamic environment is the growing incorporation of sustainability ideas into marketing tactics [1]. The growing impact of artificial intelligence (AI) has significantly influenced several aspects of corporate operations, particularly marketing strategies. This introduction provides a starting point for a thorough examination of how sustainable integration, marketing intelligence, and the pervasive influence of AI interact [2]. This narrative establishes the framework for a systematic literature analysis by extensively outlining the paper's goals, offering information on sustainability in marketing, and highlighting the significant role of AI in these interrelated worlds.

Prominent organizations have utilized AI-based technologies to transform their marketing channels and communicate with customers more efficiently [3]. Industry giants like Amazon, Google, and Microsoft have utilized advanced AI algorithms to examine customer behavior, tailor marketing material, and enhance advertising tactics [3]. These organizations are good examples of how AI is more than just a technology tool; it is a strategic facilitator that is transforming the marketing intelligence field. The integration of AI into marketing strategies is now highly important, as shown by the substantial expenditures and strategic actions done by these companies [2, 3]. Although the industry is moving forward, academic marketing research has not yet offered thorough guidance on efficiently using AI's benefits for powerful marketing tactics. This study tries to fill this essential gap. With AI projected to become a $ 126 billion sector by 2025, firms must grasp its impact on sustainable marketing techniques in order to navigate this evolving terrain effectively [4].

## Aim of the paper

In today's business environment, the incorporation of sustainability into marketing strategies has become a crucial priority due to increased environmental awareness, social responsibility expectations, and fast technological progress. This research delves into the complex interaction between sustainability principles and marketing intelligence in the context of artificial intelligence (AI). The main goal is to provide a thorough literature review to analyze the changing dynamics where sustainability, marketing intelligence, and artificial intelligence interact. This study aims to provide significant insights from current work on integrating sustainability

and marketing intelligence within the realm of artificial intelligence. The study aims to analyze existing research in detail to outline main topics, uncover new trends, and highlight areas where information is lacking. This literature review provides a thorough overview of the current studies on sustainability, marketing intelligence, and artificial intelligence. The study aims to offer practical insights for firms dealing with the intricate relationship between sustainability objectives and marketing strategies in the AI era by analyzing current research. Key stakeholders will benefit from the information provided to match business activities with sustainability principles, meeting consumer expectations and regulatory needs. Policymakers aiming to influence rules on sustainable business practices will gain insight from a thorough comprehension of the obstacles and advantages associated with incorporating AI in sustainable marketing [5]. Researchers investigating the intersection of sustainability, marketing intelligence, and AI will find this literature review helpful in pinpointing areas for further research. Identifying important themes and trends will direct future research efforts, while recognizing current gaps in the literature encourages researchers to participate in the developing discussion. This study intends to provide guidance in the ever-changing field of sustainable marketing intelligence in the age of artificial intelligence. This systematic literature review aims to shed light on the current state and set the stage for the future. This future envisions businesses operating with skill, policymakers implementing well-informed regulations, and researchers pushing the boundaries of knowledge in the areas of sustainability, marketing intelligence, and AI. To increase the attractiveness for further reading, the repetition of phrases and groupings of words has been reduced.

## Background of AI in marketing

### The integration of sustainability principles in marketing

Businesses are realizing the need to incorporate sustainability ideas into their marketing strategy due to changes in customer behavior. Sustainability is now seen as a competitive differentiation rather than just a business obligation or compliance necessity [6]. Organizations are recognizing that sustainable practices may improve brand reputation, increase consumer loyalty, and lead to long-term financial success, in addition to benefiting society and the environment. A recent study indicates a significant change in consumer behavior, showing a growing desire for ethically produced and sustainable products [7]. Changing customer opinion is a key factor motivating organizations to include sustainability into their marketing strategies. Modern customers are well-informed, socially aware, and selective when making purchases, preferring businesses that share their values and support larger social and environmental objectives [8]. Integrating sustainability into marketing tactics is a response to the changing demands of ecologically and socially concerned consumers, rather than just a strategic decision. Sustainability integration in marketing involves several aspects of a company's operations. Businesses are moving beyond greenwashing and embracing a comprehensive approach that integrates sustainability throughout their whole value chain. Companies are investing more in eco-friendly product design by using sustainable materials and production procedures to reduce environmental effects [9]. Product-level sustainability that matches customer preferences may provide a compelling story for marketing initiatives. Sustainability integration also focuses on responsible supply chain management, where businesses carefully examine their supply chains to guarantee ethical sourcing, fair labor practices, and reduced environmental effect. This dedication to responsible sourcing satisfies customers' ethical standards and offers marketing teams genuine and engaging narratives to share with the public. Recent research highlights the significance of clear communication regarding sustainable supply chain policies, as it builds confidence and enhances the brand-consumer connection [10]. Sustainability is being included in packaging methods, focusing more on environmentally friendly packaging options. Businesses are investigating sustainable materials, reducing packaging waste, and implementing circular economy ideas. Green packaging not only supports sustainability objectives but also acts as a concrete and visible symbol of a brand's dedication to environmental accountability. Marketing strategies focused on eco-friendly packaging

appeal to environmentally aware consumers, enhancing the brand's reputation as a socially responsible organization. Marketing is essential for communicating sustainability objectives to customers and is a key element in brand communication [11]. Companies are increasingly including ethical marketing campaigns, narratives focused on sustainable practices, and clear communication as vital elements of their marketing strategies. Businesses are using several platforms, such as social media, to communicate their sustainability progress, disclose internal stories, and interact with customers on an individual basis. Clear communication is essential since customers now prioritize authenticity and can easily distinguish between real environmental initiatives and greenwashing tactics.

## The rise of artificial intelligence

The incorporation of sustainability concepts in marketing is occurring simultaneously with the emergence of artificial intelligence (AI), which is significantly changing how organizations function and interact with their stakeholders. AI technologies, including machine learning and natural language processing, have become strong tools that enable enterprises to handle large volumes of data rapidly and extract useful insights. Recent developments in AI have led to its extensive use in several sectors, causing significant changes in how firms make decisions, communicate with customers, and improve operational effectiveness. The use of AI in marketing has significantly changed how firms comprehend and engage with their target customers. AI-driven analytics, predictive modeling, and customization algorithms are crucial elements of contemporary marketing tactics, improving the accuracy and efficiency of campaigns [12]. Recent research highlights the beneficial effects of AI on many marketing performance indicators, emphasizing its function as a driver for better customer interaction, greater targeting precision, and a higher return on investment. AI's primary impact on marketing lies in its utilization of sophisticated analytics. AI algorithms can swiftly examine extensive information, revealing patterns, trends, and correlations that traditional analytical methods may not detect [13]. AI's capacity to extract significant insights from intricate data sets empowers marketers to make well-informed judgments, enhance tactics, and quickly adjust to shifting market dynamics. This analytical skill is especially beneficial in the realm of sustainability, as data-driven insights may guide the creation and improvement of ecologically and socially conscious marketing strategies [3]. AI's influence on marketing includes predictive modeling, in which algorithms anticipate future trends, behaviors, and results using past data. Marketers find predictive power useful for foreseeing customer preferences, recognizing developing market trends, and adjusting strategy proactively. Predictive modeling may help organizations anticipate the impact of their sustainability actions to match changing customer expectations and market dynamics in sustainability integration. AI's capacity to evaluate extensive information also enables the creation of extremely tailored marketing campaigns. Personalization algorithms use individual consumer data to customize content, recommendations, and interactions according to specific interests and behaviors [12]. This degree of customization improves the client experience and enables more efficient and focused communication. Personalization algorithms in sustainability marketing can be used to tailor communications to specific customer categories, addressing their unique beliefs and concerns regarding sustainability. Recent studies offer actual proof of the beneficial influence of AI on crucial marketing performance indicators. Improved customer engagement, facilitated by individualized interactions and targeted initiatives, enhances brand-consumer connections [14]. Enhanced targeting precision guarantees that marketing endeavors reach the most pertinent audience segments, optimizing the efficiency of campaigns. The enhanced return on investment shown in AI-driven marketing initiatives demonstrates the financial feasibility and effectiveness of using AI into the marketing toolset.

## The confluence of sustainability and artificial intelligence

In the context of a changing corporate environment characterized by increased environmental awareness and the advancement of artificial intelligence (AI), the intersection of sustainability principles and AI technology has become a fascinating and creative field of study. Businesses are

seeing the benefits of using AI to improve marketing tactics and integrate sustainability into their operations [3]. Current research highlights an increasing focus on exploring and utilizing the interactions between AI and sustainability to support influential marketing campaigns that are in line with overall business sustainability objectives. Incorporating AI into sustainability efforts marks a significant change in how firms address the balance between financial gain and social responsibility. This approach aims to utilize AI's revolutionary powers to provide real environmental and social benefits, rather than just using sustainability as a cosmetic marketing strategy. Businesses are increasingly using AI to analyze sustainability concerns and make educated decisions that benefit both their economic performance and society [15]. The intersection of sustainability and AI offers the opportunity for intelligent systems to assess intricate environmental and social data. AI's ability to analyze extensive datasets allows businesses to obtain detailed insights on the environmental impact of their operations, the social consequences of their supply chains, and the overall sustainability of their products and services. Recent developments in AI, namely in machine learning algorithms, enable companies to move above conventional data analysis and derive practical insights from complex and multidimensional sustainability data. The main connection between sustainability and AI is the capability of intelligent systems to recognize patterns in extensive datasets about environmental and social factors. AI may identify patterns, connections, and possible causal links that traditional analytical methods may not detect. This capacity to recognize patterns is crucial for guiding decision-making processes about sustainability solutions [16]. Businesses may use AI analysis to pinpoint areas needing development, evaluate the effects of various efforts, and enhance their sustainability objectives through data-driven insights. Businesses are increasingly using AI in sustainability-focused marketing strategies to achieve economic success and beneficial societal impact. AI's analytical accuracy enables firms to improve resource allocation, minimize waste, and discover novel strategies to lessen their environmental footprint. AI may improve the impact of marketing initiatives focused on sustainability by making sure communications connect with target audiences and reflect their values, thereby building brand loyalty and good customer impressions. In the future, the combination of sustainability and AI shows potential for influencing the future of sustainability practices in business. Businesses may leverage AI technology with a strong commitment to corporate social responsibility to make data-driven decisions that improve their environmental and social impact and help achieve sustainability objectives. The convergence of AI and sustainability is positioned to function as a driving force for creativity, adaptability, and ethical corporate behaviors in the pursuit of a more sustainable and fair future [17].

## The rise of marketing intelligence

Recent research has revealed convincing evidence of the impactful uses of AI in marketing. AI has advanced from being only a technology tool to being a fundamental element of contemporary marketing strategy, providing several uses such as customized consumer experiences, focused advertising, and data-informed decision-making [18]. AI plays a key role in enabling customized consumer experiences in marketing. Machine learning algorithms, a component of artificial intelligence, enable firms to analyze extensive datasets that include patterns of customer behavior. The algorithms can identify subtle preferences, predict specific requirements, and provide customized information or suggestions with exceptional accuracy [19]. Personalization improves consumer engagement, promotes brand loyalty, and leads to more fulfilling and pertinent interactions between businesses and their customers [16]. AI has a significant impact on targeted advertising. AI algorithms can enhance ad targeting accuracy by evaluating previous consumer data and real-time behaviors more effectively than traditional approaches. This improves the efficiency of advertising efforts and guarantees that marketing messages are strategically targeted to the most relevant audience segments. The outcome is an enhanced return on investment and a more effective distribution of marketing resources [20, 21]. AI enables organizations to make educated decisions based on data by deriving actionable insights from the large volume of data available

to them. AI's analytical skills enable a thorough comprehension of customer preferences, market trends, and competitive environments. As a result, this helps marketers develop strategies that are not just reactive to current market trends but also proactive and flexible to changes. Utilizing AI-driven decision-making processes is crucial for staying competitive in the ever-changing modern corporate environment. Within sustainability, AI offers several chances to enhance the environmental efficiency of marketing efforts. AI-powered supply chain optimization is a remarkable application that may greatly help in lowering carbon footprints [22]. Smart algorithms may assess and enhance supply chain operations by pinpointing opportunities for efficiency enhancements, resource allocation, and waste minimization. This is in line with sustainability objectives and improves the overall environmental efficiency of the whole value chain. AI plays a crucial role in assessing and analyzing the effectiveness of sustainability-oriented marketing strategies [3]. Intelligent analytics may evaluate the effects of these activities by examining data on customer reactions, engagement rates, and overall campaign effectiveness. Businesses may use this data-driven method to assess the effectiveness of their sustainability messaging, pinpoint areas needing development, and enhance their strategy for optimal results. Recent case studies demonstrate how top organizations are using AI to improve the sustainability of their marketing efforts. The use of AI in marketing highlights a wider trend towards responsible and data-driven corporate strategies. As firms prioritize sustainability, using AI may improve marketing efficacy and help link these initiatives with overall company sustainability objectives. The convergence of AI and sustainability in marketing indicates a strategic shift towards responsible and forward-thinking strategies that emphasize both environmental conservation and corporate prosperity [23].

## Emerging trends and innovations in sustainable marketing intelligence

The ongoing advancements and new trends in sustainability, marketing intelligence, and artificial intelligence (AI) are shaping modern business operations. Recent studies emphasize new trends that show how this junction is changing, providing insights into the possible uses and future paths of sustainable marketing intelligence. An emerging trend is the incorporation of AI-powered chatbots to communicate environmental initiatives. AI-driven chatbots equipped with natural language processing may act as virtual assistants that interact with consumers instantly. Businesses are using chatbots to share information about their sustainable practices, projects, and product features in the realm of sustainability. This enables direct and interactive engagement with customers, facilitating the sharing of specific information and promoting openness in sustainability initiatives. AI-powered chatbots improve communication and help establish customer knowledge and confidence in a brand's dedication to sustainability [24]. Another significant development is the use of blockchain technology to track the sustainability credentials of items along the supply chain. Blockchain is a decentralized and transparent system that records and verifies every transaction or operation securely and in an unchangeable way [25]. This technology is used in sustainability to generate unchangeable records of a product's whole process, starting from raw material acquisition to manufacture, distribution, and finally reaching the end user. This guarantees openness and accountability, enabling customers to authenticate the validity of sustainability claims and certifications. Consumers are seeking traceability and authenticity, and blockchain is seen as an effective instrument to enhance confidence in the sustainability policies of firms. Using AI in predictive modeling to evaluate the future effects of sustainability projects is an emerging trend. Predictive modeling uses AI algorithms to predict the future results and effects of sustainability efforts over long periods. Businesses may acquire insights into the expected environmental, social, and economic outcomes of their sustainability initiatives by examining past data and projecting future scenarios [26, 27]. This proactive strategy facilitates strategic decision-making, empowering organizations to enhance and maximize their sustainability efforts for the greatest positive effect. The increasing focus on long-term sustainability objectives highlights the need for incorporating AI into predictive modeling as a beneficial tool for making in-

formed decisions with a future-oriented approach [28]. It is essential for businesses to comprehend these developing trends in order to remain ahead of the curve and effectively adapt to changing customer expectations and regulatory environments. Integrating AI-powered chatbots for clear communication, adopting blockchain for traceability, and using AI for predictive modeling are strategic decisions that are in line with current trends in responsible and sustainable business practices. Adopting these trends boosts a company's reputation and establishes it as a proactive and forward-thinking participant in the changing fields of sustainability, marketing intelligence, and AI [29].

## Method

The methodological approach employed for this systematic literature review involved a meticulous process to capture and analyze relevant research articles at the intersection of sustainability integration, marketing intelligence, and artificial intelligence (AI). The timeframe for inclusion spanned from 2018 to 2023, ensuring the incorporation of recent studies that reflect the contemporary dynamics of the field.

### Selection of bibliometric databases

Four significant bibliometric databases were strategically selected to perform a comprehensive literature evaluation. Google Scholar, known for its wide range of scholarly sources, offered a thorough beginning point. IEEE Xplore is a storehouse of advanced research in technology and engineering that provides specialized insights. Elsevier's ScienceDirect, a library of scientific and technological knowledge, facilitated a thorough examination of multidisciplinary viewpoints. Additional databases such as PubMed, ACM Digital Library, and SpringerLink were used to improve the comprehensiveness of the search [30–32]. The multi-database strategy aims to encompass a wide range of scholarly contributions to enhance understanding of the complex link between sustainable integration, marketing intelligence, and artificial intelligence. Incorporating a variety of databases was essential to have a thorough understanding of the study field and to guarantee the inclusion of pertinent papers from different academic perspectives.

### Search strategy

The search strategy for this systematic literature review was carefully crafted to identify pertinent research at the convergence of sustainable integration, marketing intelligence, and artificial intelligence. Precisely picked keywords and Boolean operators were used to create search strings customized for the specific features of each chosen database [33]. The objective was to guarantee a precise and concentrated search for papers related to the study topic. An example is the creation of a search query in Google Scholar by combining important phrases like "sustainability integration," "marketing intelligence," and "artificial intelligence." This strategy focused on generating a series of studies that specifically examined the relationship between sustainability, marketing intelligence, and artificial intelligence, therefore improving the precision and significance of the literature analyzed. Utilizing precise search terms consistently across databases allowed for a thorough and systematic investigation of the study field within the specified parameters.

### Inclusion and exclusion criteria

Clear and precise inclusion criteria were established to uphold the relevance and quality of the articles chosen for this systematic literature review [34]. The chronological scope was limited to works published from 2018 to 2023 to emphasize current contributions and contemporary viewpoints in the subject. Peer-reviewed publications published in reputable journals and conference proceedings were prioritized to maintain methodological rigor. This criterion attempted to favor works that have been thoroughly evaluated and scrutinized by the academic community. Non-English articles were eliminated to ensure uniformity and avoid potential translation issues. The literature review used specific criteria to carefully select studies that met high standards of quality and relevance in investigating sustainability integration, marketing intelligence, and artificial intelligence.

### Methodological quality assessment

A thorough methodological quality evaluation was performed on the chosen publications to determine their reliability and validity for this systematic literature review. Every paper was

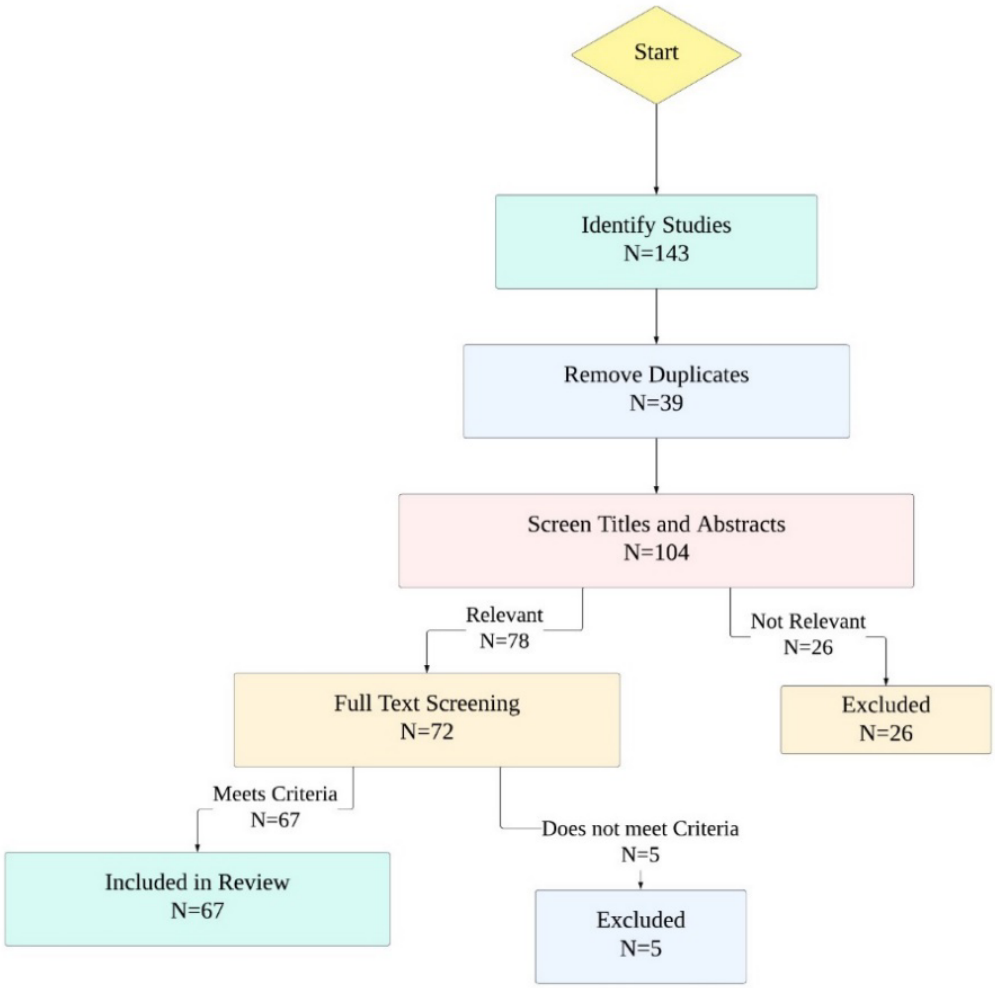


*Fig. 1.* **Search strategy, outlining the subsequent identification and screening of appropriate sources**

*Source:* Developed by the authors.

thoroughly assessed, taking into account important factors such research design, methodology, sample size, and statistical analysis [35]. This thorough procedure was crucial for selecting papers with strong methodology and reliable conclusions. The methodological quality evaluation aims to guarantee that the selected papers fulfilled high criteria of scientific rigor, boosting the overall quality and credibility of the literature review. By systematically examining the methodological robustness of each publication, a strong basis was established for summarizing the important thoughts and conclusions in a way that demonstrates the credibility and validity of the study.

## Selection of studies

A total of 143 publications were found through a comprehensive search of the relevant databases *(Fig.1)*. A thorough screening procedure was used to guarantee that only research satisfying particular criteria for relevance and quality was included. Each manuscript was carefully examined based on titles, abstracts, and keywords, following specific inclusion and exclusion criteria. The primary purpose of this initial screening was to exclude papers that did not meet the criteria and standards established for this systematic literature review. 67 papers were found to fulfill the strict requirements for relevance and quality. This pick is a subset of the articles initially collected, representing a selected collection that best contributes to exploring sustainable integration, marketing intelligence, and artificial intelligence within the given scope and criteria of the review [36].

## Data extraction and analysis

A thorough data extraction method was carried out on the chosen publications to sys-

tematically gather essential information for a complete study. The retrieved data included important elements including publication information (authors, publication year, country), methodology used in each study, significant discoveries, and contributions to the field. The methodical structuring of extracted data was intended to provide a structured dataset for efficient analysis and synthesis. The data extraction technique systematically collected pertinent information from each study, establishing a foundation for a comprehensive analysis of trends, patterns, and insights in the literature. The structured dataset (*Table*) was used to analyze common themes, research gaps, and overall trends in the relationship between sustainable integration, marketing intelligence, and artificial intelligence in the chosen studies [37].

## Identification of research gaps and future research directions

After systematically reviewing the chosen literature, a critical analysis was conducted to pinpoint research gaps and suggest prospective routes for future study. This procedure entailed analyzing important discoveries from the chosen articles and identifying areas that require more investigation to enhance comprehension of the complex interaction between sustainable integration, marketing intelligence, and artificial intelligence [102, 103]. The main databases, Google Scholar, IEEE Xplore, and Elsevier's ScienceDirect were crucial for finding relevant papers. Additional databases, including PubMed, ACM Digital Library, and SpringerLink were also used to expand the search. This comprehensive strategy is intended to encompass a wide range of research contributions from many disciplines, guaranteeing a detailed grasp of the intricate relationship between sustainability, marketing intelligence, and artificial intelligence. By doing the systematic literature review in the past tense, it enabled a retrospective study of the research environment from 2018 to 2023. The methodological approach described in earlier sections established a strong foundation for selecting and analyzing relevant research. By combining a focused search strategy with strict inclusion criteria and a systematic quality evaluation, this technique enhances the overall rigor and trustworthiness of the literature review. Identifying research gaps is a helpful contribution to the current knowledge based on the findings. Future research in this field could explore specific areas like the efficacy of AI-based sustainability communication strategies, the impact of blockchain on improving traceability for sustainability, and the incorporation of AI in predictive modeling for long-term sustainability impact evaluation. These possible paths provide opportunities for scholars and professionals to delve further into and enhance the developing field of sustainable integration, marketing intelligence, and artificial intelligence.

## Results

*Fig. 2* illustrates the geographical distribution of the studies across continents. The majority of studies (43.28%) are conducted in Asia, indicating a significant focus on this region, possibly due to its large and diverse population, economic significance, or unique environmental challenges that prompt research. North America and Latin America each contribute significantly as well, with 16.42% of studies conducted in these regions, reflecting a balanced interest in both developed and developing country contexts within these areas. Europe, despite its economic and political influence, accounts for 13.43% of the studies, suggesting a lesser focus compared to Asia and the Americas. Oceania, with only 1.49% of the studies, appears to be underrepresented in this review, which might indicate a gap in research focus or availability of studies from this continent.

*Fig. 3* provides an overview of the distribution of studies over time, from 2018 to 2023. There is a clear upward trend in the number of studies conducted each year, with a notable jump to 46.27% of the studies being conducted in 2023. This trend could indicate an increasing interest and investment in the research area over time, possibly in response to emerging challenges or technological advancements that necessitate new studies. The progression from 2.99% of studies in 2018 to 19.40% in 2022 before the leap in 2023 suggests a growing recognition of the importance of this research field, potentially driven by policy changes, funding availability, or heightened public interest.

Table
*Characteristics of the studies included in the review*

| Sl. | Authors / Year | Methodology | Country / Continent | Findings |
|---|---|---|---|---|
| 1 | [38] | Survey and Interviews | USA / North America | Identified consumer perceptions of sustainability in AI-driven marketing |
| 2 | [39] | Experimental Design | China / Asia | Explored the impact of AI-driven marketing on sustainable consumer behavior |
| 3 | [3] | Case Study | UK / Europe | Investigated the integration of sustainability into marketing AI platforms |
| 4 | [40] | Content Analysis | South Korea / Asia | Examined the portrayal of sustainability in AI-generated marketing content |
| 5 | [41] | SLR | Spain / Europe | Explored challenges faced by companies in aligning AI-driven marketing with sustainability goals |
| 6 | [42] | Quantitative Survey | Taiwan / Asia | Investigated the adoption rate of AI in sustainable marketing strategies |
| 7 | [43] | Meta-Analysis | Canada / North America | Synthesized findings on the effectiveness of AI-driven sustainability campaigns |
| 8 | [44] | Comparative Study | Mexico / Latin America | Compared sustainability integration in AI marketing across different industries |
| 9 | [45] | Longitudinal Study | India / Asia | Explored the evolution of sustainability practices in AI-enhanced marketing over time |
| 10 | [46] | Observational Study | Australia / Oceania | Observed consumer responses to sustainability cues in AI-generated advertisements |
| 11 | [47] | Network Analysis | China / Asia | Analyzed the interconnectedness of AI, sustainability, and marketing in online networks |
| 12 | [48] | Case-Control Study | South Korea / Asia | Assessed the impact of sustainability-focused AI campaigns on brand reputation |
| 13 | [49] | Ethnographic Study | Brazil / Latin America | Examined cultural variations in consumer perceptions of AI-driven sustainable marketing |
| 14 | [50] | Experimental Design | Singapore / Asia | Investigated the effectiveness of AI-personalized sustainability messages in e-commerce |
| 15 | [51] | Qualitative Analysis | USA / North America | Explored ethical considerations in the use of AI for sustainable marketing |
| 16 | [52] | Cross-Sectional Study | Japan / Asia | Examined the role of AI in shaping corporate sustainability reporting practices |
| 17 | [53] | Case Study | South Korea / Asia | Explored the implementation challenges of AI-driven sustainability initiatives in small businesses |
| 18 | [54] | Survey and Interviews | China / Asia | Investigated consumer preferences for sustainable AI-driven marketing in the retail sector |
| 19 | [55] | Longitudinal Study | USA / North America | Tracked changes in AI technologies supporting sustainability in marketing strategies |
| 20 | [56] | Content Analysis | Vietnam / Asia | Analyzed the representation of sustainability issues in AI-generated marketing content |

Table (continued)

| Sl. | Authors / Year | Methodology | Country / Continent | Findings |
|---|---|---|---|---|
| 21 | [57] | Experimental Design | South Korea / Asia | Investigated the impact of AI-generated sustainability messages on consumer behavior |
| 22 | [58] | Comparative Analysis | Mexico / Latin America | Compared the integration of sustainability principles in AI-based marketing across industries |
| 23 | [59] | Case-Control Study | China / Asia | Assessed the effectiveness of sustainability-focused AI campaigns in enhancing brand loyalty |
| 24 | [60] | Network Analysis | USA / North America | Analyzed the network dynamics of AI-driven sustainability initiatives in social media |
| 25 | [61] | Content Analysis | Japan / Asia | Examined the representation of sustainable practices in AI-generated marketing content in the automotive industry |
| 26 | [62] | Longitudinal Study | Vietnam / Asia | Investigated changes in consumer attitudes towards AI-driven sustainable marketing over time |
| 27 | [63] | Qualitative Analysis | India / Asia | Explored the role of AI in promoting sustainability in small and medium enterprises (SMEs) |
| 28 | [64] | Cross-Sectional Study | Spain / Europe | Examined the alignment of AI-driven marketing strategies with the United Nations Sustainable Development Goals (SDGs) |
| 29 | [65] | Observational Study | China / Asia | Observed the impact of AI-generated sustainability messages on consumer purchasing decisions |
| 30 | [66] | Case Study | South Korea / Asia | Investigated the implementation challenges of AI-enhanced sustainability initiatives in the fashion industry |
| 31 | [67] | Ethnographic Study | USA / North America | Explored cultural variations in consumer perceptions of sustainability in AI-driven marketing across different demographic groups |
| 32 | [68] | Survey and Interviews | Taiwan / Asia | Investigated the awareness and attitudes of businesses towards AI-driven sustainability in marketing strategies |
| 33 | [69] | Experimental Design | Mexico / Latin America | Explored the psychological impact of AI-generated sustainability messages on consumer behavior |
| 34 | [70] | Content Analysis | South Korea / Asia | Analyzed the portrayal of sustainability practices in AI-generated marketing content in the food industry |
| 35 | [71] | Case-Control Study | Vietnam / Asia | Assessed the effectiveness of sustainability-focused AI campaigns in influencing consumer perceptions in the technology sector |
| 36 | [72] | Cross-Sectional Study | Brazil / Latin America | Examined the adoption rate of AI technologies supporting sustainability in marketing practices |

Table (continued)

| Sl. | Authors / Year | Methodology | Country / Continent | Findings |
|---|---|---|---|---|
| 37 | [73] | Qualitative Analysis | Singapore / Asia | Explored the ethical considerations of utilizing AI for sustainability in marketing and consumer privacy |
| 38 | [74] | Longitudinal Study | India / Asia | Investigated the long-term effects of sustainability-focused AI campaigns on brand reputation |
| 39 | [75] | Observational Study | Canada / North America | Observed consumer responses to AI-generated sustainability messages in e-commerce platforms |
| 40 | [76] | Network Analysis | South Korea / Asia | Analyzed the interconnectedness of AI, sustainability, and marketing in the online social networks of businesses |
| 41 | [77] | Comparative Analysis | Spain / Europe | Compared the sustainability performance of companies using AI-driven marketing strategies |
| 42 | [78] | Case-Control Study | Taiwan / Asia | Assessed the impact of AI-generated sustainability campaigns on consumer trust |
| 43 | [79] | Content Analysis | Vietnam / Asia | Analyzed the representation of sustainable practices in AI-generated marketing content in the hospitality industry |
| 44 | [80] | Experimental Design | China / Asia | Investigated the influence of AI-driven sustainability messages on consumer decision-making |
| 45 | [81] | Longitudinal Study | Japan / Asia | Explored the evolution of AI technologies supporting sustainability in marketing strategies |
| 46 | [82] | Ethnographic Study | India / Asia | Examined cultural nuances in the perception of AI-driven sustainability in marketing among different demographic groups |
| 47 | [83] | Cross-Sectional Study | Mexico / Latin America | Assessed the readiness of businesses to adopt AI for sustainability in marketing |
| 48 | [84] | Qualitative Analysis | South Korea / Asia | Explored consumer perceptions of AI-generated sustainability messages in the beauty and cosmetics industry |
| 49 | [2] | Survey and Interviews | USA / North America | Investigated the challenges faced by companies in implementing AI-driven sustainability initiatives |
| 50 | [85] | Observational Study | South Korea / Asia | Observed the integration of AI in sustainability reporting practices of corporations |
| 51 | [86] | Case-Control Study | Vietnam / Asia | Assessed the impact of AI-driven sustainability campaigns on consumer brand loyalty |
| 52 | [87] | Network Analysis | Brazil / Latin America | Analyzed the collaborative networks formed among businesses in implementing AI-driven sustainability initiatives |
| 53 | [88] | Qualitative Analysis | Singapore / Asia | Explored the ethical implications of AI applications in sustainability communication |

Table (continued)

| Sl. | Authors / Year | Methodology | Country / Continent | Findings |
|---|---|---|---|---|
| 54 | [89] | Experimental Design | India / Asia | Investigated the cognitive impact of AI-generated sustainability messages on consumer behavior |
| 55 | [90] | Content Analysis | Canada / North America | Examined the portrayal of sustainability practices in AI-generated marketing content in the healthcare industry |
| 56 | [91] | Case Study | South Korea / Asia | Explored the organizational challenges in adopting AI for sustainability in marketing within multinational corporations |
| 57 | [92] | Cross-Sectional Study | Spain / Europe | Assessed the level of awareness and understanding of AI-driven sustainability among marketing professionals |
| 58 | [93] | Observational Study | Taiwan / Asia | Observed the impact of AI-driven sustainability messages on consumer perceptions in the tourism sector |
| 59 | [94] | Survey and Interviews | Vietnam / Asia | Investigated the factors influencing businesses' decisions to adopt AI for sustainability in marketing |
| 60 | [95] | Network Analysis | China / Asia | Analyzed the co-authorship networks in scholarly publications related to AI, sustainability, and marketing |
| 61 | [96] | Qualitative Analysis | Japan / Asia | Explored consumer attitudes and perceptions of AI-driven sustainability in marketing in the automotive industry |
| 62 | [97] | Content Analysis | India / Asia | Analyzed the representation of sustainability initiatives in AI-generated marketing content in the textile industry |
| 63 | [20] | Case-Control Study | USA / North America | Assessed the impact of AI-driven sustainability campaigns on consumer trust and loyalty |
| 64 | [98] | Observational Study | South Korea / Asia | Observed the integration of AI in sustainability reporting practices of small and medium enterprises (SMEs) |
| 65 | [99] | Network Analysis | Vietnam / Asia | Analyzed the co-citation networks of scholarly articles related to AI, sustainability, and marketing |
| 66 | [100] | Experimental Design | Brazil / Latin America | Investigated the cognitive and emotional impact of AI-generated sustainability messages on consumer behavior |
| 67 | [101] | Longitudinal Study | Singapore / Asia | Explored the long-term effects of AI-driven sustainability initiatives on brand reputation |

*Fig. 4* breaks down the methodologies employed in the studies, highlighting a diverse range of research approaches. Experimental design is the most common methodology, used in 16.42% of the studies, indicating a strong preference for controlled environments to test hypotheses. This is followed closely by survey and interviews, content analysis, and longitudinal study, each accounting for around 10.45% of the studies. These methodologies suggest a balanced mix between quantitative and qualitative research approaches, allowing for a comprehensive understanding of the subjects under study. The lower representation of methods like meta-analysis (1.49%) and comparative

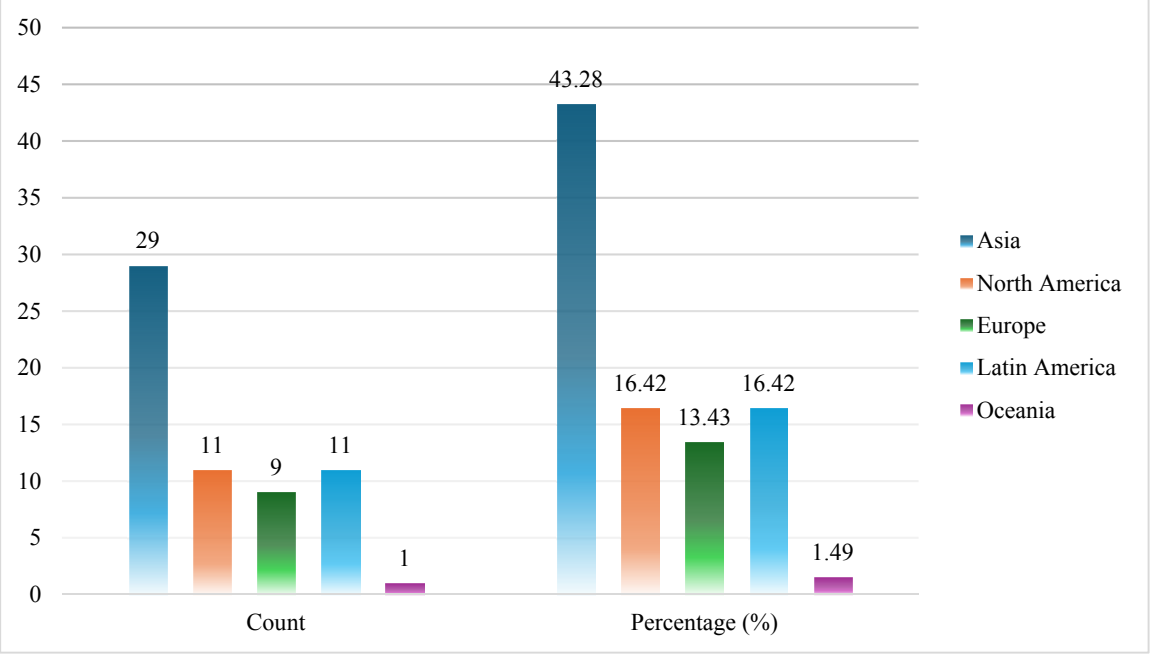


*Fig. 2.* **Distribution of studies by location**

*Source:* Developed by the authors.

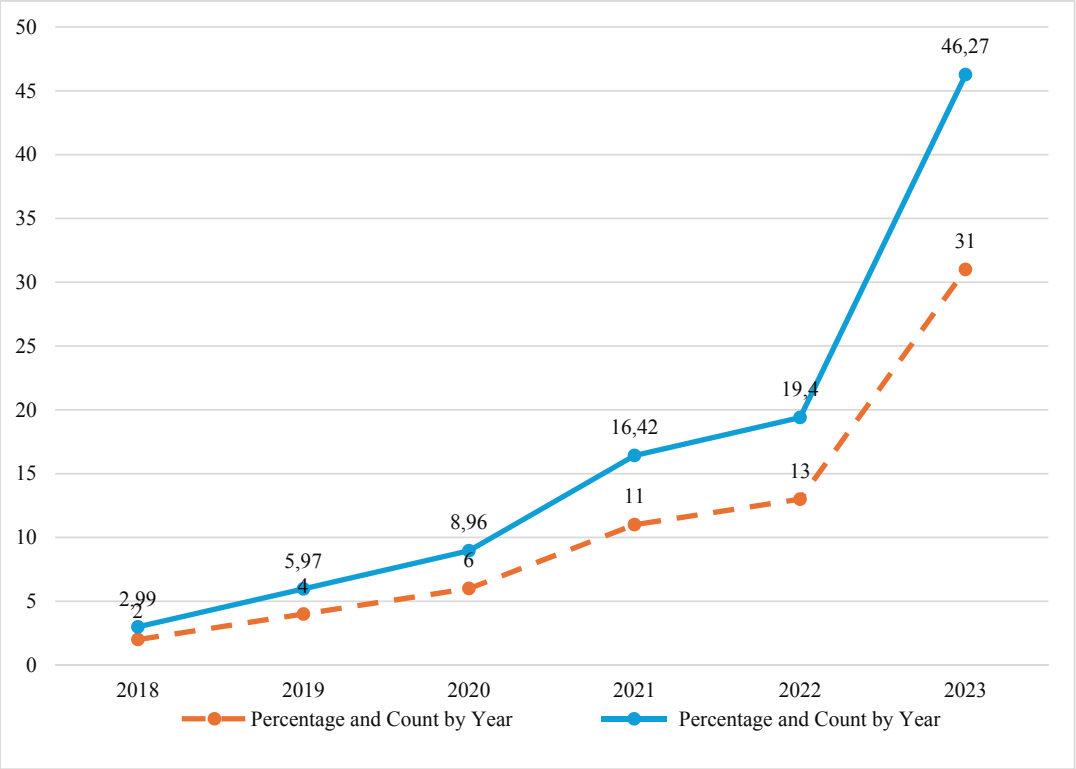


*Fig. 3.* **Percentage and count by year**

*Source:* Developed by the authors.

study (4.48%) may point to the specific nature of the research topics, which possibly require more direct, hands-on approaches to data collection and analysis. The variety in methodology underscores the complexity of the research area, necessitating multiple perspectives to address its various aspects.

## Leveraging AI for marketing intelligence in sustainable practices

Artificial intelligence (AI) has become a crucial factor in improving marketing intelligence within sustainable marketing, as evidenced by a thorough study of 143 research studies, with

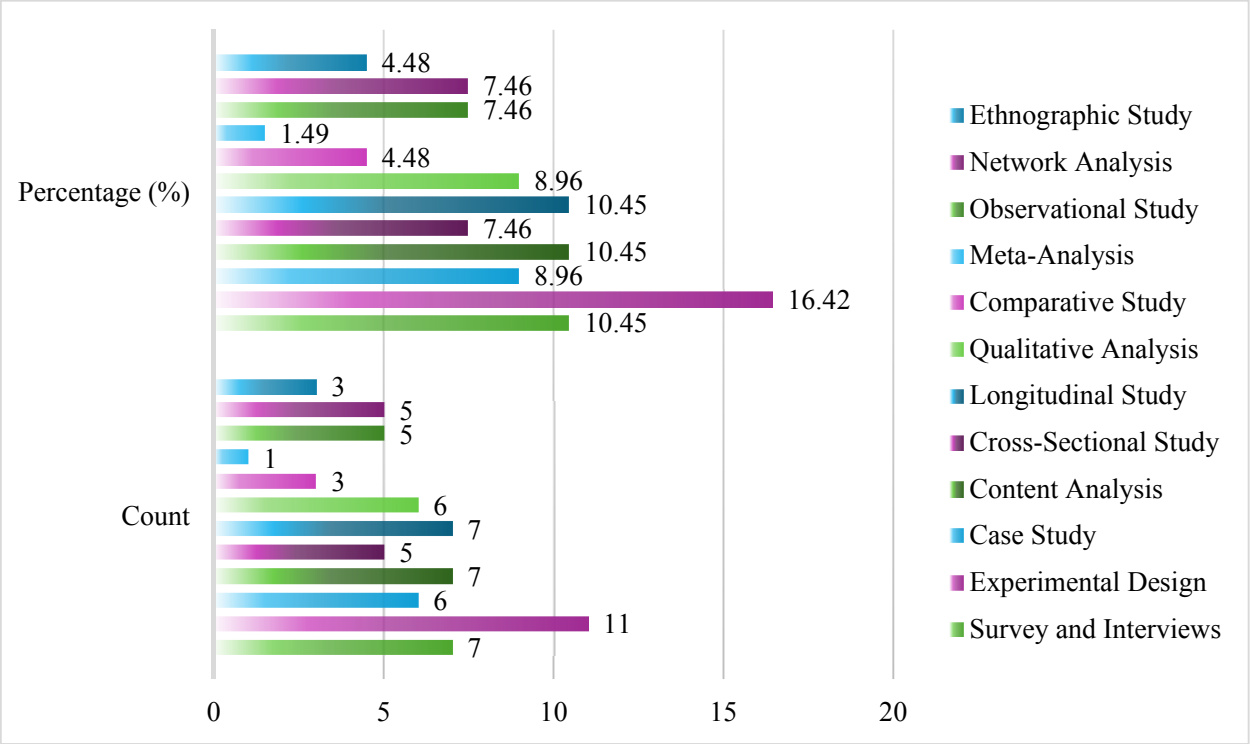


*Fig. 4.* **Distribution of studies by methodology used**

*Source:* Developed by the authors.

67 specifically chosen for further review. The research covers different geographies and uses various methods, enhancing our knowledge of how AI may provide marketers with the insight needed to handle the challenges of sustainability. Kopalle et al. (2022) performed surveys and interviews in North America to investigate customer opinions regarding sustainability [38]. Their research showed an increased consumer preference for marketing strategies that are both smart and sustainable. In Qin and Jiang's (2019) study in Asia, experimental designs showed that AI effectively encourages sustainable consumer behavior, leading to a notable change in consumption patterns due to smart marketing methods [39]. Stone et al. (2020) conducted research across Europe focusing on the obstacles and potential of integrating AI into marketing platforms. The study emphasizes the strategic significance of aligning AI capabilities with sustainability objectives to improve marketing intelligence [3]. Sohn et al. (2020) conducted a study in Asia on how sustainability is shown in AI-generated marketing material [40]. They proposed that AI has the potential to effectively promote sustainability themes through sophisticated content generation. Di Vaio et al. (2020) identified challenges that firms have in connecting AI-driven marketing strategies with sustainability goals, revealing a significant opportunity to use marketing intelligence for sustainable results [41]. Research from Latin America, Oceania, Asia, and Europe contributes unique insights to the worldwide understanding of the relationship between AI and sustainable marketing. Torres et al. (2022) conducted a study in Mexico that examined how sustainability is included in AI marketing in various businesses [44]. The research identified sector-specific obstacles and prospects for improving marketing intelligence. Campbell et al. (2022) conducted a study in Australia that examined how consumers react to sustainability signals in AI-generated ads, emphasizing AI's ability to successfully involve consumers in sustainability matters through clever marketing strategies [46]. The variety of approaches used, such as experimental designs, case studies, content analysis, and qualitative and quantitative surveys, enriches the investigation of AI's impact on sustainable marketing. Vasist and Krishnan (2023) conducted a case-control study to evaluate the influence of sustainability-focused AI campaigns on brand reputation in South Korea [48]. Meanwhile, Pigola et al. (2021) in Brazil utilized an ethnographic study to investigate cultural differences in con-

sumer attitudes towards AI-driven sustainable marketing, highlighting the importance of marketing intelligence in comprehending and addressing various cultural and demographic settings [49]. These studies emphasize the crucial significance of AI in enhancing marketing intelligence in the realm of sustainable practices. They emphasize that AI may improve customer engagement, change consumption habits, and help organizations match their marketing strategies with sustainability aims. Yet, they also illuminate the intricacies, moral dilemmas, and obstacles to execution that arise when incorporating AI into sustainable marketing plans.

## Discussion

The synthesis of findings from the extensive literature review illuminates the theoretical implications of integrating AI into sustainable marketing practices. The introduction of AI introduces complexity, necessitating an expanded theoretical framework that encompasses its nuanced influence on consumer behavior, market dynamics, and sustainability outcomes. The studies reviewed advocate for an interdisciplinary approach, marrying marketing theories with insights from information technology, environmental science, and behavioral psychology [60]. This reevaluation challenges traditional marketing mix elements, paving the way for a more comprehensive understanding of marketing intelligence in the digital age.

Practically, the findings mandate marketers to strategically leverage AI not only for efficiency and personalization but as a tool for promoting sustainability. AI's analytical prowess in deciphering extensive datasets enables tailored strategies that resonate with consumer sustainability preferences. However, this calls for marketers to navigate ethical considerations, data privacy concerns, and potential consumer distrust in AI-driven initiatives. Transparency, consumer education, and ethical AI use emerge as critical factors in successfully implementing sustainable marketing strategies. Moreover, the global scope of the studies emphasizes the need for a localized approach, acknowledging regional variations in attitudes, regulations, and technological readiness [104, 105].

Despite the promising potential, the literature reveals challenges and barriers, including technological limitations, a lack of expertise, and high implementation costs. Bridging the gap between AI capabilities and organizational sustainability goals necessitates targeted investments, training, and strategic frameworks. Future research directions point towards empirical studies measuring the direct impact of AI-driven marketing on sustainability outcomes. Ethical dimensions, particularly concerning data privacy and consumer autonomy, warrant further exploration. Practitioners are urged to develop cross-functional teams integrating AI, marketing, and sustainability expertise for innovative and effective sustainable marketing strategies. The integration of AI into sustainable marketing practices signifies an opportunity to enhance marketing intelligence. By addressing challenges and drawing insights from the literature, marketers can harness AI's full potential to drive sustainable consumer behavior and contribute to broader environmental and social goals.

The current study significantly contributes to the existing literature by synthesizing insights from AI, marketing intelligence, and sustainability-related papers. It builds on prior research by offering a nuanced exploration of the implications, challenges, and opportunities arising from the integration of AI into sustainable marketing practices. This discussion provides a valuable extension to the literature, highlighting the distinctive theoretical and practical dimensions that contribute to advancing knowledge in this interdisciplinary domain.

## Conclusion

Exploring artificial intelligence (AI) in sustainable marketing reveals a difficult but exciting intersection where technology and sustainability may reshape the future of marketing. This exploration of AI's incorporation into sustainable marketing strategies, emphasized by the crucial function of marketing intelligence, has shown the significant opportunities and difficulties of this connection. The conversation has shown how AI can play a crucial role in promoting sustainability objectives by utilizing its exceptional capabilities for data analysis, generating consumer insights, and optimizing marketing tactics to support environmental and social ideals. The analysis emphasizes the need to reconsider existing marketing frameworks in response to

the dynamic relationships between technology, customer behavior, and sustainability in a growing area. Incorporating AI into marketing is not only a functional or tactical improvement, but a crucial strategic necessity that may provide lasting benefit for both enterprises and society. The road is filled with obstacles, including technological, ethical, strategic, and operational issues. These problems highlight the importance of collaboration among academics, practitioners, and politicians to develop an environment that promotes the ethical application of AI in marketing, emphasizes customer trust and privacy, and supports sustainability as a fundamental business approach. The future of AI in sustainable marketing has great potential for innovation and research. To move forward, we need thorough empirical study to confirm the effects of AI-driven marketing tactics on sustainability results, as well as investigations into the ethical, social, and economic aspects of AI in marketing. Practitioners must adopt a mindset focused on continual learning and adaptation, utilizing AI as both a tool for market research and interaction and as a strategic ally in pursuing a sustainable future.

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*Conflicts of Interest Statement: The authors have no conflicts of interest to declare.*
*The article was submitted on 06.11.2024; revised on 18.12.2024 and accepted for publication on 20.12.2024.*
*The authors read and approved the final version of the manuscript.*