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Artificial intelligence-assisted sustainable marketing: Contribution and agenda for research

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Artificial intelligence-assisted sustainable marketing: Contribution and agenda for research

Abstract

This study employed a systematic literature review to provide a holistic and structured understanding of the research on AI-assisted sustainable marketing. *First*, we classified the extant studies on AI-assisted sustainable marketing into the levels of weak (or pragmatic) sustainability and strong (or radical) sustainability and into the categories of auxiliary, reformative and transformative sustainability marketing. The level of sustainability and categories of sustainability marketing allow for a critical evaluation of the extent to which AI contributes to sustainable marketing. *Second*, we assessed the merits and risks AI-assisted sustainable marketing contributes to sustainable development via the Sustainable Development Goals. *Third*, we identified underdeveloped and thus promising areas for future research in AI-assisted sustainable marketing.

Keywords: Sustainable marketing, Artificial intelligence, Sustainable Development Goals

Track: Social Responsibility Ethics

1. Introduction

Marketing is increasingly applying new data technology to address sustainability. Applications such as artificial intelligence (AI) have extended marketers' efforts to facilitate sustainable marketing practices and sustainable consumption patterns (Hermann, 2021). For instance, AI has been used to automate environmental sustainability evaluations of products and countries (Nilashi et al., 2019) and optimise energy consumption (Nižetić et al., 2019). The potential of AI has been reported in enabling the accomplishment of 134 targets across all the United Nations (UN) Sustainable Development Goals (SDGs) (Vinuesa et al., 2020), including responsible consumption and production (Di Vaio et al., 2020). This is prominent as the intimate and everyday nature of AI applications is assisting people in their daily needs and making choices (Hermann, 2021).

Despite the pivotal role of AI in assisting marketing and sustainability (Frank, 2021), we do not have a structured understanding of how AI would contribute to sustainable marketing practices or sustainable development. This leaves an important research gap amidst the rapid emergence of both AI and sustainable marketing. To fill this gap, we conducted a systematic review of the existing literature on AI-assisted sustainable marketing to chart what practices of sustainable marketing are addressed with AI, and explore how AI contributes to the sustainable marketing categories across the sustainability levels. We then investigated how AI-assisted sustainable marketing responds to the achievement of the UN SDGs.

2. Conceptual Background

2.1 Sustainable marketing

Sustainable marketing emphasises that marketing should be ecologically sustainable, socially just and economically enduring (Martin, 2013). We operationalise Martin's (2013) definition of sustainable marketing because it is compact and inclusive for gathering the subconcepts of both marketing (creating, communicating and delivering value to customers) and sustainability (preserves and enhances both natural and human capital). It identifies the two key objectives of sustainable marketing (environmental and social sustainability) while addressing the key role of customers; this matches our aim of conducting a literature review inclusive of all these elements.

Sustainable marketing can be described by its categories and contributions across the sustainability levels. In categorising sustainability marketing, we drew on Kemper and

Ballantine's (2019) typology for analysis due to its ability to systematically cover the various sustainability views implemented in companies. The typology organises for implementing and interpreting the three types of sustainability marketing: auxiliary, reformative, and transformative. *Auxiliary sustainability marketing* focuses on the production of sustainable products, adjustments to business activities and the associated responsibilities. *Reformative sustainability marketing* extends the auxiliary approach through the promotion of sustainable lifestyles and behavioural changes and the modification of some key premises of business/marketing practices. Lastly, *transformative sustainability marketing* further extends the auxiliary and reformative approaches by seeking to reshape current institutions and norms through critical reflection (Kemper and Ballantine, 2019).

In assessing the level of sustainability in marketing, we utilised the well-established approaches of weak (also called pragmatic) and strong (also called radical) sustainability (Hediger, 1999). While weak or pragmatic sustainability refers to the implementation of incremental changes in certain business functions to minimise some of the harms their businesses are linked to (Reinecke and Ansari, 2016), strong or radical sustainability implies novel ways in which marketing unlocks existing systems of production and consumption so that they can scale up new market offerings (Farla et al., 2012).

2.2 Contributions of artificial intelligence to sustainable marketing

We integrated the sustainability marketing categories (Kemper and Ballatine, 2019) and sustainability levels (Dyllick and Muff, 2016; Farla et al., 2012; Hediger, 1999; Reinecke and Ansari, 2016) into a framework, which we used in our literature review. The framework reflects the position of each reviewed paper on sustainable marketing and allows for critically evaluating the contributions of AI to sustainable marketing (see Figure 2). While radical changes are desired to address issues at a strong sustainability level, engaging businesses in sustainability efforts may require incremental steps first. Unfortunately, the latter approach lowers the bar for what sustainability means and could mean for business (Luke, 2013).

2.3 Contributions to the accomplishment of United Nations Sustainable Development Goals

We investigated the merits and risks of AI-assisted sustainable marketing in relation to sustainable development using the UN SDGs as a proxy. Based on Vinuesa et al.'s (2020) and Di Vaio's (2020) speculations on the role of AI in enabling the accomplishment of the UN SDGs, we determined the relevance of AI-assisted sustainable marketing to the

accomplishment of the SDGs. Thus, we assessed the impacts (merits and risk) of AI-assisted sustainable marketing on the UN SDGs for managers' and researchers' guidance.

3. Methods

To synthesise and assess how AI has assisted sustainable marketing and development thus far, we conducted a systematic literature review. We utilised five leading digital databases (Business Source Elite, ABI/INFORM Complete, Scopus, Emerald Insight Journals and Web of Science) to systematically review all relevant papers published from 2009 to 2021. Our review was conducted in three steps: searching, screening/assessing and extracting/synthesising (Tranfield et al., 2003). The title words that were searched included artificial intelligence, sustainab* (words starting with *sustainab*), corporate environmental responsibility, corporate social responsibility, and marketing. The initial search produced 139 articles of which abstracts and content were carefully read arriving 30 articles most relevant to AI-assisted sustainable marketing for the review. The analysis focused on four issues: (1) AI-assisted sustainable marketing practices; (2) the AI applications used; (3) the contributions of AI applications to the different categories and levels of sustainable marketing and (4) the contributions of AI-assisted sustainable marketing to the achievement of the SDGs. Two authors coded and organised the data under descriptive and thematic categories accordingly.

4. Results

4.1 Artificial intelligence in sustainable marketing practices

The studies on AI-assisted sustainable marketing covered a variety of topics, ranging from countering the effect of the COVID-19 pandemic on marketing with AI (Jiang and Wen, 2020) to predicting consumer behaviour (Ishigaki et al., 2011) and increasing the perceived environmental sustainability of a product and consumers' purchase intention (Frank, 2021). From its early uses, AI marketing has evolved for use in environmental assessment (Muñoz et al., 2013), and increasing the perceived environmental benefits of certain products to promote sustainable purchase (Frank, 2021). This shows versatile business approaches to more acute sustainability problems. Figure 1 synthesises that 'environmental', 'system', 'sustainable', 'social', and 'media' are most frequently mentioned in the abstracts. Environmental issues are the most discussed in the abstracts, followed by 'green', 'new', 'performance', 'consumers', 'consumption', 'service', and 'energy'. The results show that marketing practices with an environmentally sustainable approach were the dominant theme across the reviewed papers.

Fig. 1. Word cloud of the reviewed papers based on word frequency among abstracts

4.2 Contributions of artificial intelligence to sustainable marketing

Auxiliary sustainability marketing received ample attention from papers on AI-assisted sustainable marketing (with 10 out of 30 papers focused on it). The topics include product conceptualisation, patents for design and eco-efficiency regarding product life cycle. Yet, AI was also studied as a source of risk and ethical issues in the consumer market. AI biases and ethical design risk compromise the use of AI in auxiliary sustainability marketing. AI products that are low on multifunctionality (i.e., recommendation system, robo-advisor) are prone to partial, one-dimensional data input, and biased about users, thus inclined in AI algorithms and inadequate integration of ethical values in AI systems (Du and Xie, 2021).

Reformative sustainability marketing received a remarkable focus in the examined papers. Figure 2 illustrates the attention paid to promoting sustainable lifestyles and behavioural changes (with 16 out of 30 papers). A considerable number of publications have identified consumer behaviour- and business-related issues and have suggested ways to address these. This is critical in the efficient operation of businesses in industries i.e., apparel, tourism and power. Nevertheless, the use of AI in the consumer market comes with the ethical risks of compromised consumer privacy and cybersecurity (Due and Xie, 2021). Thus, the variety of business issues addressed in the studies is a promising development but requires a prudent

contingent approach (Due and Xie, 2021), where coordination of multiple stakeholders is warranted for the ethical use of AI.

Transformative sustainability marketing shows an extended discussion of the need for change in institutions and norms regarding sustainability marketing from a broader approach. In our sample, only 4 out of 30 papers addressed this issue. This shows a lack of examination of the use of AI in transformative sustainability marketing and of its impact on addressing issues at a strong sustainability level. The AI-related ethical issues at the societal and institutional levels include the risks of compromised individual autonomy and well-being and unemployment caused by AI. These issues challenge the company, consumer and society to cooperate with each other in addressing them, with a contingent view of AI-related CSR (Du and Xie, 2021). The challenges are also raised in rulemaking, where the issues in consumer protection legislation and greenwashing are evident (Kindylidi and Cabral, 2021).

Figure 2 shows that the emphasis of AI-assisted sustainable marketing is on incrementally sustainable actions and that few marketing practitioners incorporate sustainability into their strategic decisions, aiming at significant changes (McDonagh and Prothero, 2014).

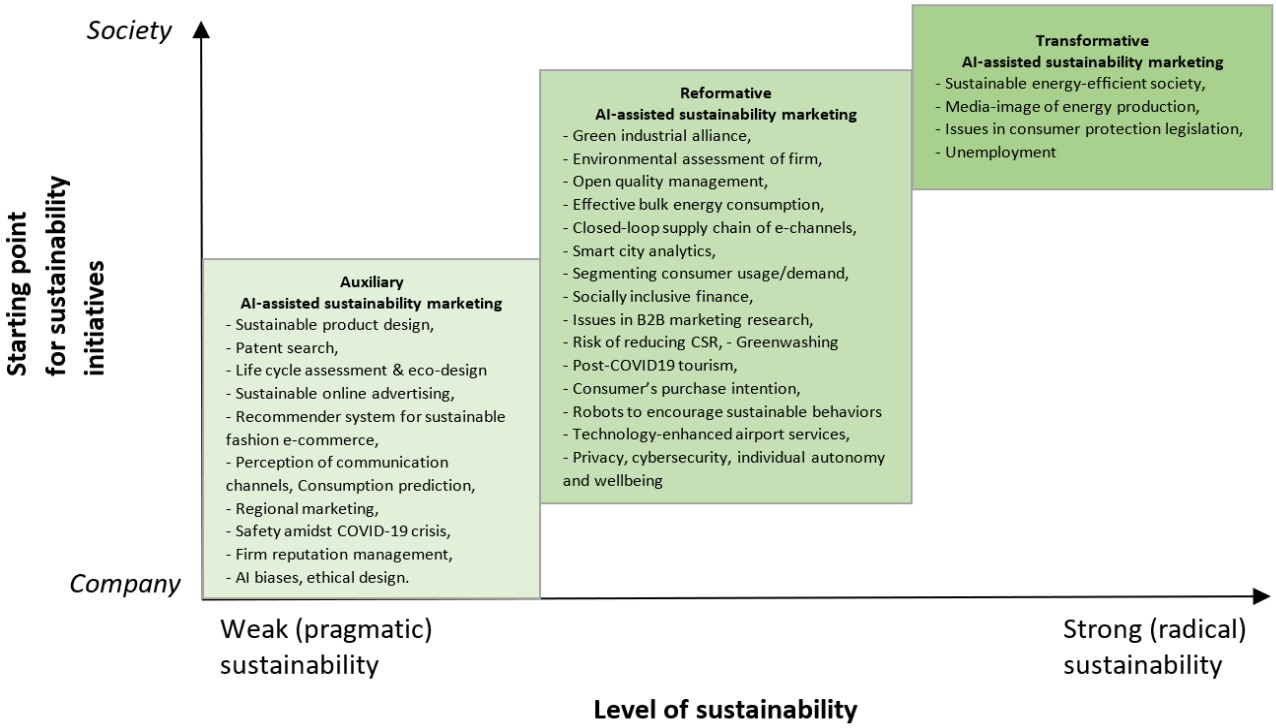

Fig. 2. Contributions of artificial intelligence-assisted sustainability marketing to the sustainability levels (adapted from Dyllick and Muff, 2016; Farla et al., 2012; Hediger, 1999; Kemper and Ballantine, 2019; Reinecke and Ansari, 2016)

4.3 Contributions of AI-assisted sustainable marketing to sustainable development

AI-assisted sustainable marketing both enables and inhibits the achievement of nine SDGs within the society, environment and economy groups (see Figure 3). While environmental sustainability is put forward with the best intentions, AI-assisted sustainable marketing has thus far contributed significantly more to social and economic sustainability than to environmental sustainability.

The AI applications studied enable the achievement of *social SDGs* 1, 3, 7 and 11. These show how AI-assisted sustainable marketing helps preserve human capital, as set out in the definition of sustainable marketing (Martin, 2013, p. 18). While these enablements are carried out in the auxiliary and reformative categories of sustainability marketing, AI-assisted sustainable marketing also inhibits the achievement of SGDs 1 and 3 with the risks of unemployment and compromised individual autonomy and well-being, respectively, which correspond to the transformative category of sustainability marketing. This means that these risks pose major challenges to addressing issues at the strong sustainability level.

In the *environmental SDG* group, particularly in SGD 13 (*Climate action*), AI-assisted sustainable marketing contributes via environmental performance assessments of enterprises, sustainability performance in a firm's reputation, green IT systems and creating an energy-efficient society. These illuminate the contributions of AI-assisted sustainable marketing to the preservation of natural capital (Martin, 2013). Thus, all three categories of AI-assisted sustainable marketing can help achieve environmental SDG 13. Nevertheless, it also inhibits the achievement of this SDG, with the risk of reduced CSR from automated entrepreneurial activities. The risk involves reformative categories of sustainability marketing and thus restrains the promotion of sustainable lifestyles and behaviours.

In the *economic SDG* group, AI-assisted sustainable marketing enables the achievement of SDG 8 but also inhibits this achievement with the risk of distraction from contemporary issues in B2B marketing. It also enables the achievement of SDGs 9, 12 and 17. All these enablements entail sustainability marketing of the auxiliary and reformative categories (at weak to medium sustainability levels, respectively). In relation to SDGs 8 and 12, the use of AI may impose risks of AI biases, unethical technology product design and consumer privacy and cybersecurity (Du and Xie, 2021) and may give rise to issues in consumer protection legislation (Kindylidi and Cabral, 2021). These risks entail all three categories of sustainability marketing,

which means that they will inhibit the achievement not only of the said SDGs but also of sustainability across the weak to strong levels.

The results show how AI-assisted sustainable marketing started with a focus on solving environment-related problems, but its actual contribution to the environmental SDGs remains humble compared to the social and economic SDGs. This implies an inconsistency in research and an underdevelopment of AI-assisted sustainable marketing for preserving the natural environment or a deficiency in AI-assisted sustainable marketing's contribution to achieving environmental SDGs. Furthermore, the most favourable contributions of AI-assisted sustainable marketing to the achievement of the SDGs are those made via the auxiliary and reformative categories of sustainability marketing, thus addressing issues at the weak and medium sustainability levels. However, the risks are posed via the transformative category of sustainability marketing, thus inhibiting the achievement of strong sustainability.

5. Discussion

First, the study reveals the contributions of AI to sustainable marketing organised by sustainable marketing category and sustainability level. This positions the reviewed papers in the big picture of sustainable marketing while precisely reflecting the detailed AI applications. *Second*, the contributions and risks in relation to the UN SDGs within the society, environment and economy groups were evaluated (see Figure 3). The review findings not only extend the previous discussion (Di Vaio et al., 2020; Vinuesa et al., 2020) but also add depth to the topic by going into the detailed categories of sustainability marketing and specific AI applications. *Third*, the results add new perspectives by also considering the flip side (risks) of using AI for sustainable marketing. We also specifically report evidence that AI applications thus far focus mainly on issues at the weak to medium sustainability levels.

Applied AI quickly evolved from a novelty into an emerging element in sustainable marketing dynamics. It is a new strategic connection that could potentially boost sustainability to above the operational level. For future research, we propose a shift towards integrative research to evaluate the systematic fit of AI in organisational structures and the impact of AI on sustainability as AI systems develop. While ecosystem-related topics are of central importance in sustainable AI marketing, there remains a deficiency in sustainable AI marketing contributions to the achievement of the environmental group SDGs. By addressing the contributions of sustainable AI marketing to the achievement of the SDGs, the article helps future research revisit and keep track of the progress of such contributions.

Society	Merit	Risk
1 NO POVERTY	Financial inclusion to reduce poverty (*reformative*)	Unemployment because of artificial intelligence (AI) (*transformative*)
3 GOOD HEALTH AND WELL-BEING	Safety and cleanliness amidst the COVID-19 pandemic (*auxiliary*) Human–machine interactive technologies with AI applications for post-COVID-19-pandemic revival (*reformative*)	Compromised individual autonomy and well-being (*transformative*)
7 AFFORDABLE AND CLEAN ENERGY	Bulk renewable energy consumption management (*reformative*) Public sentiment towards renewable power production technologies (*transformative*)	
11 SUSTAINABLE CITIES AND COMMUNITIES	City-scale natural gas consumption prediction (*auxiliary*) Big data analytics for market drivers in smart cities (*reformative*)	

Environment	Merit	Risk
13 CLIMATE ACTION	Sustainability performance in company reputation (*auxiliary*) Environmental performance assessment of enterprises (*reformative*) Business analytics with a data-driven approach to sustainability (*reformative*) Human–robot interaction for pro-environmental behavioural changes in humans (*reformative*) Creating a sustainable and energy-efficient society (*transformative*)	Reduced corporate social responsibility from automated entrepreneurial activities (*reformative*)

Economy	Merit	Risk
8 DECENT WORK AND ECONOMIC GROWTH	Sustainable online advertising (*auxiliary*) Determining differences in customers' perceptions of communication channels (*auxiliary*) Regional marketing space and economic clusters (*auxiliary*)	Distraction from issues in business-to-business marketing (*reformative*)
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	Intelligent recommendation method for sustainable marketing via patent search (*auxiliary*) A new culture for quality management in the era of the Fourth Industrial Revolution (*reformative*)	
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	Eco-design based on life cycle assessment (*auxiliary*) AI use to boost the environmental sustainability of products, increasing prospective sales (*auxiliary*) Recommender system for sustainable digital marketing (*auxiliary*) Dynamic pricing, segmenting and targeting consumers, AI-powered devices for sustainability (*reformative*) Environmentally conscious consumer behaviours of Generation Z and millennials (*reformative*) Consumer protection, sustainable and environmentally conscious AI (*reformative*)	AI biases, unethical technology product design, consumer privacy and cybersecurity (*transformative*) Issues in consumer protection legislation (*transformative*)
17 PARTNERSHIPS FOR THE GOALS	Green strategic alliances and support system (*reformative*) Closed-loop supply chain network of e-channels to improve resource use and environmental protection (*reformative*)	

Fig. 3. Assessment of the impacts of artificial intelligence-assisted sustainable marketing on the United Nations Sustainable Development Goals within the society, environment, and economy groups (adapted from Vinuesa et al., 2020). (The content of this figure has not been reviewed by the United Nations and does not reflect its views. The sustainability marketing categories are listed in brackets.)

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