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Exploring impact of new emerging technology and green marketing strategies on corporate sustainability goals

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Abstract

Purpose - The study tries to explore the impact of new emerging technology and green marketing strategies on corporate sustainability goals. Through this study, the author aims to determine the factors affecting new emerging technology and green marketing strategies on corporate sustainability goals.

Design/ Methodology/ approach – The authors applied the survey method to collect the data to validate the conceptual model related to the research objectives. The authors collected 239 responses using a structured questionnaire; after data cleaning, 220 responses were used for data analysis. Structured equation modelling (SEM) was performed using Smart PLS to test proposed hypotheses.

Findings – The results established emerging technologies like Augmented Reality, Computer Vision, Chatbots, Recommendation engines, avatars, social media and Data Analytics along with green marketing strategies affect corporate sustainability goals.

Originality/ Value - This study has incorporated the concept of green marketing strategies into New emerging technologies towards sustainability goals.

Keywords: Green Marketing, New Emerging Technologies, Strategic green marketing, corporate sustainability, Technology adoption.

Introduction

In recent years, businesses have increasingly recognised the importance of incorporating sustainability into their operations and marketing strategies. One of the key takeaways, businesses can demonstrate their commitment to sustainability is through green marketing strategies (Arifah, 2020). The intense evolution of global markets raises a demand to involve the pillars of sustainability (environment, society, and economy) in marketing decisions when aiming to satisfy the needs of the digitally empowered customer (Amoako, G.K et al, 2020; Chung, K.C, 2020). New emerging technologies has undoubtedly transformed many areas of marketing, but its influence on green marketing hasn't received much attention. Similarly, its impact on corporate sustainable gaols, has been linked to higher consumer trust and brand loyalty, and sometimes a willingness to pay more for products or services. Businesses have been encouraged to incorporate sustainability into their marketing strategy, encouraging

consumers to make eco-friendly choices. Agustini et al. (2020) posit that the increase in environmental issues awareness has strengthened the position of green marketing as a tool for sustainability both from the business, customer, and environmental perspectives. (Vilkaite-Vaitone and Skackauskiene, 2019) who allude that green marketing is also known as sustainable marketing, organic marketing, eco-friendly marketing, environmental marketing, and ecological marketing. (Papadas et al., 2017) views green marketing as an organisation's engagement in strategic, tactical and internal activities and processes that have a holistic aim to create, communicate and deliver products with the minimal environmental impact. This definition covers all facets of the marketing mix and is comprehensive. New Technologies impact marketing by supporting new forms of interaction among consumers and firms, anthropomorphized chatbots can influence consumer response in consumer-initiated service interactions (Crolic et al. 2022) like AI, a powerful engine in replacing human representatives of the firm with machine agents, facilitating firm–consumer interactions via recommendation engines (Longoni and Cian2022). Augmented reality (AR) is used in retailing to facilitate firm–consumer interactions, which, as a "try before you buy" technology, is especially effective when consumers are uncertain about products (Tan, Chandukala, and Reddy 2022). Computer vision and facial recognition methods present new tools for marketers that can be used to enhance the effectiveness of livestream personal selling (Bharadwaj et al. 2022). Existing studies in New emerging technologies have often been effectively deployed to improve firm–consumer interactions by providing new marketing tools. Although the broad objective of the study is to determine new emerging technologies and green marketing to achieve sustainability goals provide a better presentation of the work, we have arrived at some specific objectives of the study. These objectives are as follows:

1. Investigate the impact of new emerging technologies on corporate sustainability goals
2. To examine the influence of green marketing strategies on corporate sustainability goals
3. The investigation of combined effects of green marketing strategies and new emerging technologies on corporate sustainability goals.

The study's objectives motivated us to develop a conceptual model based on existing theories, literature and logical arguments. Three research hypotheses have been developed to study the research objectives. Primary data were collected using a structured questionnaire to validate the proposed conceptual model. Existing scales were adapted for the development of the questionnaire. The proposed hypotheses were tested using a structured equation modelling (SEM). The data were analysed through Smart PLS.

Theoretical background

Green marketing has resulted in environmentally friendly products and services and the adoption of sustainable business practices to appeal to consumers who are increasingly conscious of the environmental impact of their purchasing decisions (Sharma, 2021). In a different view (Alamsyah et al., 2020) looks at green marketing form a promotional view which included green advertising, green brand image, green awareness and green purchase intentions. This view is an all-inclusive nature of green marketing where everything an organisation dose to market its products should embed green marketing concepts. (Ahmadzadeh et al., 2017) defines green marketing as strategic effort to present organization's eco-friendly products to customers. New technologies also give rise to new data and spawn new analytic methods, (Chandrasekaran, Tellis, and James 2022) offer an approach for firms to assess the potential of new technologies to make informed product launch and product retirement

decisions. Further, (Daviet, Nave, and Wind, 2022) portray a future in which consumers may consent to the use of their genetic data to improve customer targeting and new product development. These studies show that by altering consumer-to-consumer and consumer-to-firm interactions, new technologies produce new forms of data. In turn, these new forms often require the development of new methods or the adaptation of existing ones to process or analyze these data. (Wichmann, Wiegand, and Reinartz, 2022) conceptualize digital platforms as places for consumer crowdsourcing and crowd sending of products and services. (Miao et al. 2022) propose a typology of avatars that guides marketers in their decisions about how to design and deploy avatars. (Daviet, Nave, and Wind, 2022) propose a framework that integrates the impact of genetics into consumer behaviour theory and use that framework to provide an overview of marketing uses of genetic data. These articles show the value of new strategic frameworks in understanding the impact of new technologies on the marketing domain. They also provide guidance for how to formulate the most relevant research questions. There is potential for developing more user-friendly technologies and services, such as ethical nudging tools for direct marketing and consumer shopping experience, information tools (e.g., social media, apps), gamification approaches, co-design and so forth (Mondejar et al., 2021). Big data analytics can benefit from smart technologies to improve sustainability in the product design process (Zhang et al., 2018; Dubey et al., 2019c). (Singh et al. 2018) developed a new decision-aid system capable of measuring greenhouse gas emissions and carbon footprints in the process of selecting suppliers by combining BDA, cloud computing technology, and methods used in operational research (AHP, DEMATEL, and TOPSIS). The study also examined the considerable influence of environmental performance on environmental convergence and green supply chain cooperation. The outcomes propose the moderating function of green student technologies in connections between large scale data mining and artificial intelligence and green supply chain cooperation (A. N Doss et al, 2022). (Reza et al 2022) studies several methods and tools have been used in order to minimise and reduce the sustainability risk and one of these methods is using the Artificial Intelligence (AI) (Neil J. Rowan 2022), Such data generation in supply chain networks is the result of advanced networking technologies, including embedded sensors, tags, tracks, barcodes, Internet of Things (IOTs), radio-frequency identification (RFID) tags, and several smart devices that capture such data (Gunasekaran et al. 2017).

Conceptual framework and hypotheses development

1. **Green marketing strategies and Corporate Sustainability Goals**

Oyewole, P. (2001) in their paper, presented the conceptual relationship between green marketing, environmental justice, and industrial ecology. It argues for a greater understanding of environmental justice in green marketing practice. The research agenda is ultimate to ensure consumer awareness of environmental justice and their willingness to bear its costs. Their study of the environment by Sanjay K. Jain and Gurmeet Kaur (2004) quickly emerged as a global phenomenon that has become a topic of discussion, with businesses also reaching out to the context and addressing environmental challenges through the practice of green marketing strategies. Based on the data collected through the field survey, the paper assesses the range of environmental awareness, attitudes, and behaviours prevalent among consumers in India. Sustainability is becoming a central issue for the practice of strategic management globally (Ioannou & Hawn, 2019). A growing number of companies voluntarily undertake a wide range of sustainability actions to address growing stakeholder expectations across the environmental, social, and governance (ESG) domains and to build a differentiation advantage by integrating sustainability into

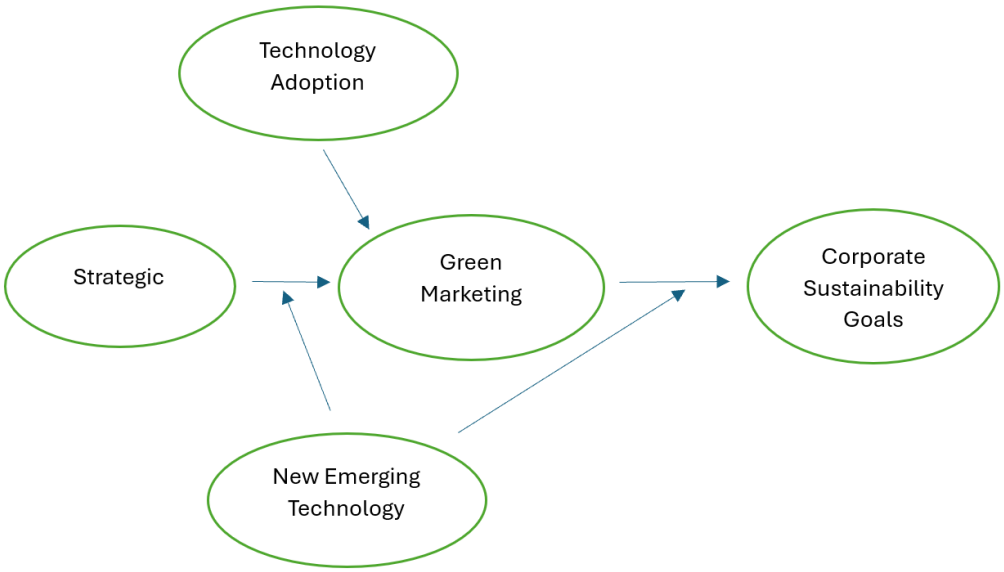
their strategy, and their organizational processes and structures (Eccles, Ioannou, & Serafeim, 2014; Khan, Serafeim, & Yoon, 2016).

H1: There is significant and positive relationship between green marketing strategies and Corporate Sustainability Goals

2. New Emerging technologies, Technology adoption and Corporate Sustainability Goals

The initial objective of this research is to understand the pivotal role of technology adoption particularly of AI and the metaverse, in the development and manifestation of green marketing strategies. The intertwining of green marketing and sustainability with AI's capabilities in the metaverse could lead to the development of innovative marketing strategies, enhance brand identity and loyalty, and even nurture more sustainable consumption behaviours. Explorations could lead to a further understanding of how new emerging technologies could be leveraged to push for sustainable business practices and consumer behaviour in the digital transformation and an infinitely expanding digitalisation. Green marketing is no longer just about promoting eco-friendly products, but about weaving in sustainable practices across all marketing activities. This includes transparency in supply chains, reducing digital carbon footprints, and using AI and Big Data to optimize resource utility in marketing strategies.

H2: There is negative relationship between new Emerging technologies and corporate Sustainability Goals.



Source(s): Author's own work

Fig.1. Conceptual framework

3. New emerging technologies, Green Marketing strategies and Corporate Sustainability Goals

In the early 2000s green marketing continued to evolve as companies recognized the need for more comprehensive sustainability strategies as customer appreciation of sustainability issues increased (Sharma, 2021). During this period, business started to integrate sustainability into their core values and introduced practices such as waste

reduction, energy conservation and supply chain transparency (Kisieliauskas & Jančaitis, 2022). Increased access to information due to the rise of social media and digital marketing was another step in the positive direction towards green marketing. Nguyen-Viet (2023) announces that green marketing has become an integral part of marketing strategies, and this has seen many companies adopting sustainable practices not only to meet customer expectations but to align themselves with sustainable development goals. The current green marketing trends are encompassing transparency, accountability, product innovation, corporate social responsibility and stakeholder engagement. Embracing green marketing strategies demands holistic business transformation of business model as it demands engagement of multiple stakeholders without compromising expectations of consumers (Trivedi et al., 2018). (Ramos-Hidalgo et al., 2022) acknowledges that green marketing can improve how organisations relate to the environment and their stakeholders. In turn, this strategy can help organisations increase brand loyalty, improve employee satisfaction, achieve compliance with regulations and increase profits. In the marketing and promotional campaigns the organisations communicated the environmental benefits and sustain ability features of your products or services. Organisations should concentrate on attributes of the at tributes such as energy efficiency, use of renewable materials, recyclability, reduced carbon footprint, or eco-friendly production processes (Aulina & Yuliati, 2017). (Wojnarowska et al., 2021) posits that eco-labelling is a system that informs a consumer of the environmental impact of products throughout their life cycle. (Nguyen-Viet, 2023) postulates that eco-labels are characteristic of a pre-set graphic form and constitute proof of compliance with specific norms on the part of a producer. Eco-labels are not obligatory, but they may be used only if they comply with the norms in force for a specific label and this affirms unwavering and unforced commitment to sustainability (So, H.W. & Lafortezza, 2022). The communication should be done through both formal and formal channel to increase reach. (Kapitan, 2022) indicate that reports should be clear and transparent about your environmental impact, as well as your efforts to mitigate it. (Pieroni et al., 2019) hints that there is need for businesses to motivation and restructure operations to take care of sustainability issues.

H3: There is significant and positive relationship between Strategic Green Marketing and Corporate Sustainability Goals

4. Methodology

Context and data collection

To achieve our research objectives, we chose to conduct a survey. Our survey specifically targeted individuals with a basic understanding of New emerging technologies. This ensured that our respondents possessed the necessary knowledge to provide meaningful insights through our questionnaire. We have used a convenience sampling technique due to our limited resource availability. We have developed a questionnaire by adapting existing scales (see Appendix) from the literature. The scale for the new emerging technologies construct was adapted from (Bharadwaj et al, 2022; Chandrasekaran, Tellis, and James, 2022; Daviet, Nave, and Wind 2022). The scale for the green marketing orientation measure construct was adapted by (Papadas et al, 2017). We have circulated the questionnaire specifically to marketing managers from private firms to check the wording and connotations and whether the prospective respondents will be able to understand the context in which the words are phrased. After a few alterations based on the initial respondents' feedback, we circulated the questionnaire to

the prospective respondents. Data collection occurred in North India from September 2024 to November 2024; on average, respondents took approximately seven to eight minutes to complete the questionnaire. The participants were marketing managers of micro, small and medium enterprises across varied sectors. To reach the intended audience, we utilized social media platforms and, leveraging our connections and engaging in various groups on platform such as LinkedIn. The reliability of our data was confirmed using Cronbach's alpha values, indicating a high degree of consistency. In total, we received 239 responses, and after thorough data cleaning, we retained 220 usable responses for our subsequent analysis. This study follows a cross-sectional and descriptive research approach. Using Microsoft Excel, descriptive analysis is performed to get demographic information on participants awareness in new emerging technologies and involvement in green marketing. Additionally, we employed SEM to assess the data when adopting strategies for green marketing, a well-established and statistically reliable method across various disciplines (Hair et al., 2012). There are two robust methodologies for conducting SEM: partial least squares (PLS-SEM) and covariance-based SEM (CB-SEM). Research by Reinartz et al. (2009) and Wetzels et al. (2009) suggests that PLS-SEM may offer greater statistical power than CB-SEM. To examine the adoption of technology and green marketing, we utilized the PLS SEM approach with the help of SMART-PLS4.0, following the methodology outlined by (Hair et al., 2019). To address potential common method bias (CMB), we applied attention retention questions as suggested by (Podsakoff et al., 2003). These questions helped filter out incorrect responses to the data. Our study's sample comprised 80% male and 20% female respondents. Most participants fall into two age categories of 25–35 and 36–45 years, i.e. 45% and 35%, respectively, followed by 45 above and 25 below age groups, i.e. 10 each respectively. Furthermore, a significant number of respondents held Masters' degrees as their highest educational qualification, i.e. 47%, followed by graduates 31%, Ph.D. less than 5% and under graduates and intermediate 17%, respectively. For a concise overview of the demographic characteristics of respondents, refer to Table 1.

5. Analyses and results

Assessment of measurement model

We adhered to the guidelines (Hair et al., 2019) outlined for assessing the quality of our measurements. This involved evaluating the construct's reliability, convergent validity and discriminant validity. This includes both Cronbach's alpha and composite reliability values, signifying strong construct reliability. However, the effects of age, size of the firm, position in the firm and educational qualification were found to be insignificant.

Table A1. Questionnaire items

Items	Questions
CSG 1	Green marketing targets eco-conscious consumers, sets brands apart, and promotes positive environmental and social impacts.
CSG 2	Green marketing promotes products and services with a focus on environmental sustainability and social responsibility
CSG 3	Green marketing promotes products with environmental features.

GM 1	Green marketing uses market research to identify environmental needs, translating consumer data into insights for better marketing and consumer outcomes.
GM 2	Green marketing includes activities like product modifications, changes in production processes, packaging adjustments, and advertising edits.
GM 3	Green marketing empowers consumers by offering environmentally preferable solutions, helping them understand business impacts and benefits of green technology, materials, and designs.
GM 4	Green promotion adapts advertising, marketing materials, and digital content with a focus on people, planet, and profits.
STR 1	Green marketing practices help marketers grasp the full scope of new consumer technologies.
STR 2	Green products balance quality, convenience, affordability, and minimal environmental impact throughout their lifecycle.
STR 3	Green marketing involves companies and suppliers cooperating to improve environmentally sustainable practices across product life cycles
TA 1	Firms adopt new marketing tech to boost market data quality and quantity for innovative marketing strategies
TA 2	Tech-driven interactions allow marketers to observe how consumers engage differently with green products, brands, retail stores, firms, and each other.
TA 3	Human-like chatbots can influence consumer responses in service interactions.
TA 4	Data analytics provide insights for faster, better decision-making by consumers and firms alike.
TA 5	Firms favor digital communication and e-commerce to promote green products due to their eco-friendliness.
NET 1	Augmented Reality (AR) enhances consumer interactions with 'try before you buy' technology, improving decision-making on green products and services
NET 2	Computer vision and facial recognition improve livestream personal selling effectiveness.
NET 3	Chatbots offer real-time interactions providing insights and information to enhance consumer satisfaction, evaluations, and purchase intentions.
NET 4	AI-driven recommendations replace human representatives, using machine agents to facilitate firm-consumer interactions through automated messaging
NET 5	Avatars help firms gain momentum in influencer and brand endorsement strategies.
NET 6	Digital platforms promote and facilitate meaningful community interactions.

Note(s): Items dropped due to its loadings

Sources(s): Authors' own work

Table 1. Demographic Profile

Demographic Variable	Responses	Percentage (%)
Organisation Type	Private	93.8
	Public	6.2
Organisation Size	Less than 100 employees	17
	Beween 100- 500 employees	55
	More than 500 employees	28
Gender	Female	80
	Male	20
Age	Below 25	10
	26-35	35
	36-45	45
	46 and above	10
Educational Qualification	High School	9.7
	Undergraduate	8.2
	Graduate	30.8
	Masters	47.3
	Phd. and above	4.7
Sector Type	Construction	3.8
	Transportation	13.8
	Health	0.5
	Tourism	0.5
	Communcation	12.1
	Others	69.2
No. of years in Current organisation	Below 1 year	8.5
	1 - 5 years	40.8
	6-10 years	25.1
	11 year s and above	25.1
Position in the organisation	Lower Management	22.1
	Middle Management	44.6
	Top Management	33.3

Sources (s): Authors' own work

6. Discussion and conclusion

As discussed in the previous sections, tried to explain the firm's adoption of technology using TOE theory. We have developed three hypotheses to fulfil the research objective of this study. All the hypotheses were supported after the analysis of the collected data. The relationship between green marketing and new emerging technologies was significant, consistent with the outcome of (Papadas K, 2017). He has studied the effects green marketing orientation measure in the context of internal, tactical and strategic. An attempt has been made to explain the technology adoption process with TOE. We have conceptualized influence of new emerging technology and green marketing strategies on corporate sustainability goals which is a critical contribution of this research. As

mentioned earlier in the previous sections, green marketing strategies has emerged as an essential factor for sustainability and focus on environmental issues.

6.2 Managerial implications

Marketers can infer from this research by focusing on the factors that enable and inhibit the technology adoption and green marketing on sustainability gaols. With the advent of new emerging technologies, there are cost implications and pressure on product managers, product manufacturer and vendors that need to focus on promoting sustainability. They need to ensure that customer expectations are met with the product design and features. Marketing managers need to communicate about the functional benefits of sustainable products. At the same time, marketers must ensure that technology continue to provide insights from the data collected through social media platforms. Internal communication within the organisation, a robust communication system will reduce the gap between sustainable products.

6.3 Limitations and future research opportunities

We would like to point out some limitations of the study so that future researchers consider costs and benefits aspects of production and of new emerging technologies, we missed some important factors like skilled technical resource and anthropomorphism could play a significant role in explaining technology adoption of new emerging technologies.

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