

Green Marketing Practices and Sustainability Performance of Manufacturing Firms: Evidence from Emerging Markets

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Key Words	Green marketing, Green strategy, Green internal marketing, Financial performance, Environmental performance, Social performance
DOI	https://doi.org/10.46488/NEPT.2024.v24i01.D1673 (DOI will be active only after the final publication of the paper)
Citation of the Paper	Derrick Nukunu Akude, John Kwame Akuma, Emmanuel Addai Kwaning and Kojo Agyekum Asiama, 2025. Green marketing practices and sustainability performance of manufacturing firms: Evidence from emerging markets. <i>Nature Environment and Pollution Technology</i> , 24(1), D1673. https://doi.org/10.46488/NEPT.2024.v24i01.D1673

ABSTRACT

This study investigates the relationship between green marketing practices and the sustainability performance of manufacturing firms in emerging markets. A self-administered questionnaire was used to collect data from 270 respondents, and the analysis was conducted using Smart PLS-SEM (version 4). The results demonstrate a significant positive relationship between green internal marketing and the overall sustainability performance of the firms. Specifically, green marketing communication was found to positively influence both environmental and social performance, although it did not have a significant effect on financial performance. Likewise, the adoption of green products substantially improved environmental performance but did not significantly impact financial or social performance. Additionally, the study supports a positive association between green strategy implementation and sustainability performance. These findings underscore the critical role of integrating green marketing practices into sustainability initiatives. The research provides valuable insights for managers and policymakers, emphasizing the need for a holistic approach to green marketing to enhance environmental and social outcomes, even if financial benefits are not immediately apparent. This study contributes to the growing body of knowledge on sustainable business practices and offers practical implications for achieving long-term sustainability in manufacturing firms.

INTRODUCTION

According to Akuma et al. (2024), the implementation of relevant management practices helps to enhance the performance of manufacturing firms. Such practices include green marketing practices (GMP). The adoption of green marketing strategies has emerged as a significant global issue, compelling businesses, consumers, and governments to acknowledge the environmental impacts of their actions across various sectors (Gupta & Gupta 2020, Szabo & Webster 2021), including the manufacturing industry (Muisyo et al. 2022). The detrimental effects of overproduction, carbon emissions, and hazardous waste generated by organizations, particularly within the manufacturing sector, have led stakeholders to pressure companies into adopting, implementing, and monitoring environmentally sustainable practices (Baah et al. 2021, Dai et al. 2022). Consequently, industrial firms are required to adopt sustainable practices that balance environmental, financial, and social performance metrics (Shabbir & Wisdom 2020). Notably, green marketing practices (GMP) not only help protect the environment but also enhance company reputation (Bahta et al. 2021), attract environmentally conscious entrants (Umrani et al. 2022), foster customer loyalty (Justavino-Castillo et al. 2022), reduce costs, ultimately leading to increased profits and improved firm performance (Ren & Hussain 2022). Furthermore, green marketing practices are essential for companies aiming to achieve sustainable business operations (Szabo & Webster 2021).

The interrelationship between certain dimensions of GMP and sustainability performance (SsP) is accentuated in prose, where scholars indicated the vital role of GMP in achieving sustainability performance (Chung 2020, Mele et al. 2019, Shabbir & Wisdom 2020). This implies that GMP can drive operating efficacy as well as cost savings through resource optimization and waste decrease initiatives (Mishra et al. 2020). For instance, green products (Hossain & Khan 2018) and green marketing communication (Mahmoud et al. 2017) were established to have significant positive affiliations with economic performance. However, the consequence of green strategy (GS) as well as green internal marketing (GIM) practices on sustainability performance (SsP) has not been sighted in the literature. Meanwhile, Vilkaite-Vaitone et al. (2022) recommend that these aspects of green marketing practices should be considered by scholars. This is because while GS ensures that a firm regularly engages its stakeholders on appropriate green practices, GIM encourages firms to constantly explain their green practices in their annual reports as well as at workshops. These will, in turn, boost the sustainability performance of firms (Vilkaite-Vaitone et al. 2022)

It must be noted that since scholars have focused on limited areas of green marketing practices and sustainability performance, this has led to a limited understanding of the concepts (Ren & Hussain 2022). Consequently, Mehraj & Qureshi (2020) explained that the majority of the studies on GMP have mainly scrutinized the consequence of green marketing (GM) on green consumer behavior, green manufacturing initiatives, as well as organizational performance (Shabbir & Wisdom 2020).

Moreover, several sources have explored the consequence of aspects of green marketing practices such as product, price, and promotion as well as place on various aspects of sustainability performance, including environmental, economic, and social performance (Qalati et al. 2023). However, the influence of green strategy, green internal marketing, green product as well as green marketing communication from an integrated perspective on sustainability performance remains inconclusive. The influence of Green strategy and green internal marketing practices in particular, on sustainability performance has not been sighted in the literature. Meanwhile, Vilkaite-Vaitone et al. (2022) recommend that these aspects of green marketing practices should be considered at the strategic, tactical as well as operational levels of a firm.

Moreover, there is an international demand for research examining the impact of green marketing within the manufacturing sector, given its significant role in waste production, greenhouse gas emissions, and the enhancement of firms' overall sustainability performance (Baah et al. 2021).

Furthermore, the manufacturing industry is recognized as one of the most polluting sectors in both developed and developing nations (Javeed et al. 2020). Consequently, green marketing has garnered significant attention in developed countries (Papadas et al. 2019, Han et al. 2019, Mehraj & Qureshi 2020). However, only a small number of manufacturing firms in developing countries focus on green practices due to the limited presence of corporate green strategies (Hassan & Jaaron 2021). According to Javeed et al. (2020), there is an urgent need for manufacturing firms in developing countries to invest in adopting green policies and green marketing practices to reduce their environmental footprint and meet rising consumer expectations. It is clear that organizational strategies are ineffective without the involvement of employees, as they are essential to strategy implementation (Li et al. 2022, Mahmood et al. 2021, Ren & Hussain 2022).

While research has extensively explored the relationship between green marketing practices (GMP) as well as economic performance (Jones et al. 2021, Lee & Wang 2019), there is a noticeable gap concerning the association between GMP and financial performance. It's important to distinguish between economic performance, which focuses on how these practices contribute to improving GDP and the welfare of individuals, and financial performance, which assesses their impact on boosting the sales and profits of firms (Le et al. 2024). Understanding the financial implications of GMP is crucial for firms seeking to justify investments in sustainability initiatives and demonstrate their business value to stakeholders. By aligning green marketing efforts with financial objectives, firms can leverage sustainability as a driver of competitive advantage as well as profitability in the marketplace (Ofori 2021).

This investigation aims to address the aforementioned gaps by investigating the interplay among green marketing practices, as well as the sustainability performance of manufacturing firms within the setting of emerging nations. By scrutinizing how green marketing practices influence the overall sustainability performance among firms, this research seeks to provide insights into the underlying processes driving green marketing practices to achieve overall performance. Ultimately, the findings of this investigation have the potential to inform how green marketing practices enhance firm performance and contribute to the theoretical understanding of green marketing practices as well as sustainability performance. Explicitly, the objectives of this investigation are:

- To assess the relationship between green strategy and sustainability performance.
- To examine the association between green internal marketing and sustainability performance.
- To evaluate the link between green products and sustainability performance.
- To examine the affiliation among green marketing communication as well as sustainability performance.

Subsequent sections of the paper will include literature summaries on green marketing practices, as well as firm performance, followed by the presentation of the investigation's methodology. Analysis and results will be provided in subsequent sections, with the paper concluding by discussing the findings and their theoretical and practical implications.

LITERATURE REVIEW

Theoretical Foundation and Hypotheses

Green marketing practices and sustainability performance constitute a complex interplay within the domain of manufacturing industries. This literature review aims to synthesize existing theoretical frameworks and literature to elucidate the relationships between these constructs.

Stakeholder theory (ST): The Stakeholder Theory (ST) posits that firms are accountable to various stakeholders, including customers, employees, and communities, and must consider their interests in decision-making processes (Freeman 2010). From this perspective, adopting green marketing practices serves to meet the expectations of environmentally conscious stakeholders, thereby enhancing the firm reputation, legitimacy, and, ultimately, sustainability performance (Lee & Park 2019). Cogdill et al. (2017) have recently revised the theory, asserting that companies should not solely concentrate on enhancing their stock price without also taking into account the diverse groups and individuals impacted by the company's operations. These individuals might eventually become clients or might be willing to assume some of the organization's risks (Cogdill et al. 2017). Recent advancements in stakeholder theory underscore the dynamic and interconnected nature of stakeholder relationships, emphasizing the significance of dialogue, engagement, and collaboration between organizations as well as their stakeholders (Bansal & Roth 2020).

Stakeholder theory has diverse applications across various domains, including corporate governance, strategic management, and sustainability. Organizations that adopt a stakeholder-oriented approach tend to focus on enduring value creation, balancing the interests of multiple stakeholders to enhance organizational resilience and legitimacy (Fassin & Van Rossem 2022). Moreover, stakeholder theory provides a framework for addressing emerging challenges such as climate change, social inequality, and technological disruption, encouraging organizations to adopt proactive and inclusive strategies for sustainable development (Crane et al. 2023).

Resource-based view theory (RBV): The RBV proposes that sustainable competitive advantage can be derived from valuable, rare, as well as non-substitutable resources (Barney 1991). Green marketing capabilities, such as eco-design and green supply chain management, can be viewed as strategic resources that contribute to superior sustainability performance (Chen et al. 2023). Topical advancement within RBV highlights the importance of resource orchestration, path dependence, and the role of context in shaping resource-based strategies (Eisenhardt & Martin 2021).

RBV theory has significant implications for strategic management practices, informing decisions related to resource allocation, diversification, and innovation. Organizations that leverage their unique resources and capabilities can achieve superior performance and resilience in dynamic markets (Arend & Bromiley 2022)

Triple Bottom Line framework (TBL): The TBL framework emphasizes the interconnectedness of economic, social, as well as environmental outcomes (Elkington, 1997). Green marketing practices contribute to the environmental dimension of the Triple Bottom Line, which, in turn, can

positively influence financial performance. Initially focused on expanding the scope of organizational performance measurement beyond financial metrics, TBL has evolved to encompass broader notions of sustainability, corporate citizenship, and stakeholder engagement (Bansal & DesJardine 2020). Recent progress within TBL indicates the importance of integrated reporting, materiality assessment, and the role of technology in advancing sustainability practices (Lozano et al. 2023).

However, debates persist regarding the trade-offs between economic growth and sustainability, as well as the challenges of measuring and valuing non-financial impacts (Savitz & Weber 2021). Scholars also discuss the role of governance structures, incentives, and accountability mechanisms in driving TBL implementation and effectiveness (Moneva et al. 2022). It is worthy of note that the TBL provides a roadmap for integrating sustainability into strategic decision-making processes, product development, and supply chain management, fostering resilience as well as innovation (Eccles & Serafeim 2024).

Green marketing practices are intricately linked within the context of sustainability performance. Theoretical frameworks such as stakeholder theory, resource-based theory, as well as the triple bottom line framework, offer valuable insights into the underlying mechanisms driving green marketing practices to the sustainability performance of firms. By understanding these relationships, manufacturing firms can design and implement effective green marketing strategies to enhance sustainability performance outcomes.

Green Marketing Practices and Sustainability Performance

Empirical evidence indicates a complex relationship between green marketing practices and sustainability performance. Numerous studies have demonstrated the positive effects of green marketing initiatives on various sustainability performance dimensions, encompassing environmental, social, and economic aspects (Lai & Cheng 2020, Sarkar & Rajendran 2022). Nevertheless, there are limited studies that examine the relationship between green marketing initiatives and the broader dimensions of sustainability performance, including environmental, social, and financial aspects, from a comprehensive perspective.

Green marketing practices have been shown to positively impact the sustainability performance of manufacturing firms (Qalati et al. 2023, Braik et al. 2023). These practices, encompassing the use of eco-friendly materials, production methods, packaging, pricing, distribution channels, and promotion, can enhance a firm's brand image and fortify its market position (Hamali & Micael 2022).

Consequently, Qalati et al. (2023) determined that environmentally sustainable practices have a direct impact on green employee integration, environmental sustainability, and overall firm performance. In a similar vein, Demessie & Shukla (2023) found that a green marketing strategy enhances firm performance by providing a competitive advantage. Additionally, Braik et al. (2022) reported that the adoption of green marketing practices, such as green products and green placement, improves environmental performance, while green promotion boosts economic performance. Likewise, Li et al. (2020), in their study of Chinese manufacturing firms, noted that proactive green marketing initiatives were linked to better environmental management practices and enhanced overall sustainability performance.

Moreover, Wang et al. (2021) focused on the influence of green product design on the sustainability performance of the electronics industry. Their findings revealed that integrating environmental considerations into product design not only enhanced market competitiveness but also contributed to reduced environmental impacts throughout the product life cycle. This underscores the significance of proactive environmental stewardship in achieving sustainable manufacturing practices.

However, the effectiveness of green marketing practices in driving sustainability performance is contingent upon several factors, such as green strategy, green internal marketing, green product as well as green marketing communication (Vilkaite -Vaitone et al. 2022).

Green Strategy Implementation and Sustainability Performance

Recent studies have highlighted the optimistic relationship between green strategy implementation and sustainability performance across various industries and organizational contexts (Feng et al. 2023, Jabbour et al. 2021). Green strategies encompass a range of practices, including eco-friendly product design, resource efficiency measures, renewable energy adoption, and supply chain sustainability initiatives. Organizations that prioritize green strategies often experience reduced environmental footprint, enhanced brand reputation, and improved stakeholder relationships, ultimately contributing to long-term financial viability and resilience (Sarkis et al. 2022).

Enhanced resource efficiency, cost savings through waste reduction and energy conservation, regulatory compliance, access to green markets, and innovation-driven competitive advantage are the mechanisms that underpin the relationship between green strategy and sustainability performance (Bocken et al. 2020, Lai et al. 2024). Furthermore, organizational factors such as leadership commitment, employee engagement, organizational culture, and stakeholder pressure play vital roles in shaping the effectiveness of green strategy implementation as well as its impact on sustainability performance (Dangelico & Pujari 2023).

Despite the potential benefits, organizations encounter various challenges in implementing green strategies and translating them into tangible sustainability performance improvements. These challenges include high initial investment costs, lack of expertise and resources, resistance to change, complexity of supply chain management, and the trade-offs between environmental objectives and short-term financial goals (Lu et al. 2021, Zhu et al. 2024). Consequently, the following hypotheses have been proposed,

H₁: There is a statistically significant relationship between green strategy as well as sustainability performance.

H_{1a}: There is a statistically significant relationship between green strategy as well as financial performance.

H_{1b}: There is a statistically significant relationship between green strategy as well as environmental performance.

H_{1c}: There is a statistically significant relationship between green strategy as well as social performance.

Green Internal Marketing Practices and Sustainability Performance

Research has demonstrated the optimistic relationship between green internal marketing practices as well as various dimensions of sustainability performance (Huang et al. 2021, Xie et al. 2023). Green internal marketing encompasses activities such as employee training, communication of sustainability goals and values, recognition of eco-friendly behaviors, and participation in green teams or committees. Organizations that effectively implement green internal marketing strategies tend to experience improved employee engagement, morale, and commitment to sustainability objectives, leading to enhanced environmental performance, cost savings, and innovation (Chen et al. 2022, Liu et al. 2024).

Green internal marketing initiatives create a sense of organizational identity and shared purpose around sustainability goals, fostering a culture of environmental responsibility as well as innovation (Zhang et al. 2020). Moreover, by providing employees with the necessary knowledge, skills, and resources to adopt sustainable behaviors both at work and in their personal lives, green internal marketing contributes to the diffusion of pro-environmental attitudes and practices throughout the organization (Chen et al. 2021). Leadership support, employee involvement, communication effectiveness, and organizational climate for sustainability are critical drivers that influence the effectiveness of green internal marketing efforts and their impact on sustainability performance outcomes (Li et al. 2023).

Nonetheless, organizations encounter challenges in implementing effective green internal marketing strategies. These include resistance to change, lack of employee awareness or motivation, communication barriers, and the need for continuous reinforcement and evaluation of green initiatives (Chen & Huang 2022). Consequently, the following hypotheses have been proposed,

H₂: There is a statistically significant relationship between green internal marketing as well as sustainability performance.

H_{2a}: There is a statistically significant relationship between green internal marketing as well as financial performance.

H_{2b}: There is a statistically significant relationship between green internal marketing as well as environmental performance.

H_{2c}: There is a statistically significant relationship between green internal marketing as well as social performance.

Green Products and Sustainability Performance

There exists a positive relationship between the adoption of green products and various dimensions of sustainability performance (Chen et al. 2021, Hsu et al. 2023). Green products encompass a range of offerings, including eco-friendly goods, energy-efficient appliances, organic foods, and sustainable packaging materials. Organizations that invest in developing and marketing green products often experience enhanced brand reputation, customer loyalty, and market competitiveness, leading to improved environmental outcomes, resource efficiency, and financial performance (Wu et al. 2024).

Green products help mitigate environmental impacts by reducing resource consumption, minimizing pollution, and promoting circular economy principles (Zhang et al. 2021). Moreover, green products contribute to sustainable consumption patterns by raising consumer awareness, shifting preferences towards eco-friendly alternatives, and fostering pro-environmental behaviors (Chang et al. 2022). Organizational factors such as innovation capabilities, supply chain management practices, and stakeholder engagement also play crucial roles in driving the adoption and diffusion of green products and their impact on sustainability performance outcomes (Tong & Zhao 2020).

However, organizations face challenges in developing and marketing green products effectively. These challenges include high development costs, limited consumer demand or willingness to pay premium prices, regulatory uncertainties, and the need for supply chain transparency and certification (Lin et al. 2023). By addressing these challenges and leveraging opportunities for collaboration, innovation, and market differentiation, organizations can capitalize on the growing demand for sustainable products and drive positive environmental and social impacts (Huang et al. 2024). Consequently, the following hypotheses have been proposed,

H₃: There is a statistically significant relationship between green products and sustainability performance.

H_{3a}: There is a statistically significant relationship between green products as well as financial performance.

H_{3b}: There is a statistically significant relationship between green products as well as environmental performance.

H_{3c}: There is a statistically significant relationship between green products as well as social performance.

Green Marketing Communication and Sustainability Performance

The positive relationship between green marketing communication strategies, as well as various dimensions of sustainability performance, is grounded in extant literature (Chen et al. 2021, Lai et al. 2023). Green marketing communication encompasses a range of activities, including advertising, public relations, social media engagement, and corporate sustainability reporting. Organizations that adopt transparent, authentic, and credible green marketing communication strategies often experience improved brand reputation, customer loyalty, and market share, leading to enhanced environmental performance, stakeholder trust, and financial resilience (Zhang et al. 2022, Wang et al. 2024).

Effective green marketing communication helps raise awareness about environmental issues, educate consumers about sustainable choices, and shape attitudes and behaviors toward more eco-friendly alternatives (Luo et al. 2020). Moreover, by providing transparent information about sustainability practices, certifications, and product attributes, green marketing communication enhances consumer trust, reduces perceived risk, and strengthens brand loyalty (Lin et al. 2021). Organizational factors such as leadership commitment, employee engagement, and stakeholder collaboration also play critical roles in driving the effectiveness of green marketing

communication efforts and their impact on sustainability performance outcomes (Chang et al. 2023).

However, there is the challenge of greenwashing, where organizations exaggerate their environmental commitments, as well as consumer skepticism, information overload, and the need for consistent messaging across different channels (Wang & Chen 2024). By addressing these challenges and leveraging opportunities for storytelling, co-creation, and digital engagement, organizations can build trust, credibility, and authenticity in their green marketing communication efforts, driving positive environmental and social impacts (Hsu et al. 2022). Consequently, the following hypotheses have been proposed,

H₄: There is a statistically significant relationship between green marketing communication as well as sustainability performance.

H_{4a}: There is a statistically significant relationship between green marketing communication as well as financial performance.

H_{4b}: There is a statistically significant relationship between green marketing communication as well as environmental performance.

H_{4c}: There is a statistically significant relationship between green marketing communication as well as social performance.

Fig. 1 shows the relationship of green marketing practices and sustainable performance through the proposed hypotheses.

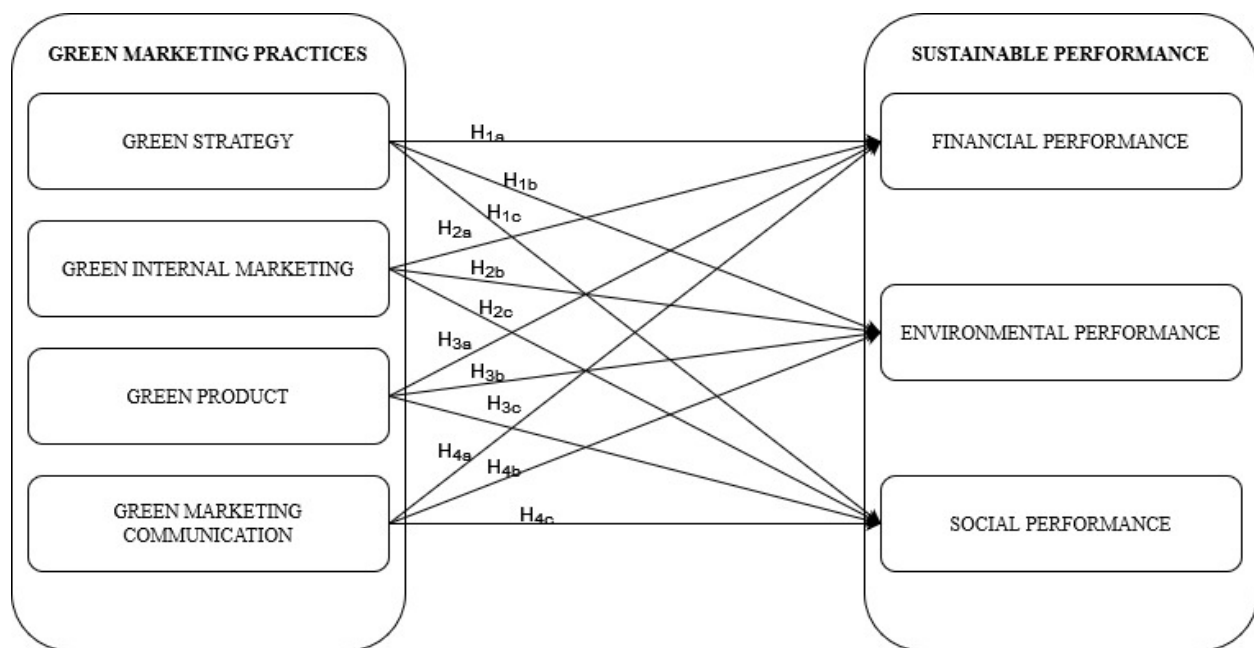


Fig. 1: Authors’ own construct (2024).

MATERIALS AND METHODS

Survey Instrument

The survey instrument was created by selecting a questionnaire from the literature to assess the research model's constituent parts. Using information from a survey sample, the study assessed the validity as well as reliability of the instrument and tested the proposed relations. The question types used to assess green marketing practices have been modified (Mahmoud et al. 2017, Hossain & Khan 2018, Vilkaite-Vaitone et al. 2022). Additionally, the questions used for sustainability performance were modified (Hasan & Ali 2017). For the investigation, a 5-point Likert scale was used. It is worthy of note, that two academic faculties (marketing and finance) assessed the content validity of the initial survey.

Sampling and Data Collection

This cross-sectional survey design targeted 634 manufacturing firms registered with the Association of Ghana Industries (AGI) as of 2024. These firms were categorized based on their respective products. The study relied on the Krejcie & Morgan (1970) formula below to determine the minimum sample size.

$$S = \frac{X^2NP(1 - P)}{d^2(N - 1) + X^2P(1 - P)}$$

Where:

S = the required sample size.

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841)

N = the population size

P = the population proportion assumed to be 0.5 since this would provide a maximum sample size

d = the degree of accuracy expressed as a proportion (0.05)

According to the sample size determination formula by Krejcie & Morgan (1970), with a target population of 634 registered manufacturing firms, the minimum sample size required for this survey at a 95% confidence level and a 0.05 margin of error is 242. To achieve this target, 282 questionnaires were distributed via Google Forms, using stratified and simple random sampling techniques. A total of 270 questionnaires were retrieved, yielding a response rate of 95.7%. Each questionnaire was completed by a manager from the respective firms. The manufacturing firms in the study are well-known both domestically and abroad for their visibility and adoption of sustainable practices. Participants received a cover letter outlining the study's objectives and eligibility before the commencement of the survey. Participants were asked informally by researchers about whether they were interested in taking part in the study. After expressing interest, those who requested to fill out the questionnaire were asked to do so voluntarily.

Profile of Respondents

In total, 270 valid responses were collected and used for statistical analysis. Of these, 64.5% (n=174) were males, and 35.5% (n=96) were females, indicating a higher number of male respondents compared to females. The study employed the age classifications recommended by Yarlagadda et al. (2015), namely young adults (<31 years), middle-aged adults (31 to 50 years), and senior adults (>50 years) (Table 1).

Table 1: Profile of respondents.

Details	Classes	Frequency	Percentage
Gender	Male	174	64.5%
	Female	96	35.5%
Age	< 30 years	104	39%
	31 and 50 years	142	53%
	> 50 years	24	8%
Highest qualification	Degree	174	64.5%
	Masters	35	12.9%
	Pre-Secondary	23	8.7%
	Diploma	29	10.7%
	Secondary	9	3.2%
Position	Chief Executive Officer	45	16.7%
	Senior Manager	158	58.7%
	Board Member	34	12.5%
	Middle-level Manager	33	12.1%

Source: Field Survey (2024)

The study reveals that 39% (n=104) of the respondents were young adults, 53% (n=142) were middle-aged adults, and 8% (n=24) were senior adults, indicating that middle-aged managers comprised the majority of respondents. This suggests that the respondents are mature and experienced, making them well-positioned to provide insights into the management accounting practices of manufacturing firms.

Regarding the positions held by the respondents, 16.7% (n=45) were Chief Executive Officers (CEOs) or General Managers, 58.7% (n=158) were senior managers, 12.5% (n=34) were board members, and 12.1% (n=33) were middle-level managers. This indicates that senior managers and CEOs together constituted 75.4% (n=203) of the respondents. These top-level employees, with their extensive experience, are thus capable of providing high-quality responses regarding their green marketing practices.

Data Analysis

The statistical analysis was carried out using Smart PLS (version 4.0) software in an attempt to compare the interrelationship between green marketing practices and sustainability performance outcomes (Ringle et al. 2022). PLS-SEM was used because it is more flexible in handling various modeling challenges than the difficult and strict assumptions relating to the use of multivariate statistics (Boonlertvanich 2019).

Hair et al. (2019) suggested that pointers assessing a concept in the structural model ought to be 0.70 for an investigation that utilizes validated concepts to guarantee the dependability of the research items. This is due to the indication explaining more than 50% of the variance of the indicator. Because this investigation utilized validated constructs from prior research, a reliability test was conducted utilizing the indicators, employing a minimal reliability criterion of 0.70.

Evaluation of Measurement Model

We appraised the measurement model using PLS-SEM (version 4) (Fig. 2). Seven components made up the conceptual outline of this investigation, namely, environmental performance, financial performance, green internal marketing, green marketing communication, green product, green strategy, and social performance.

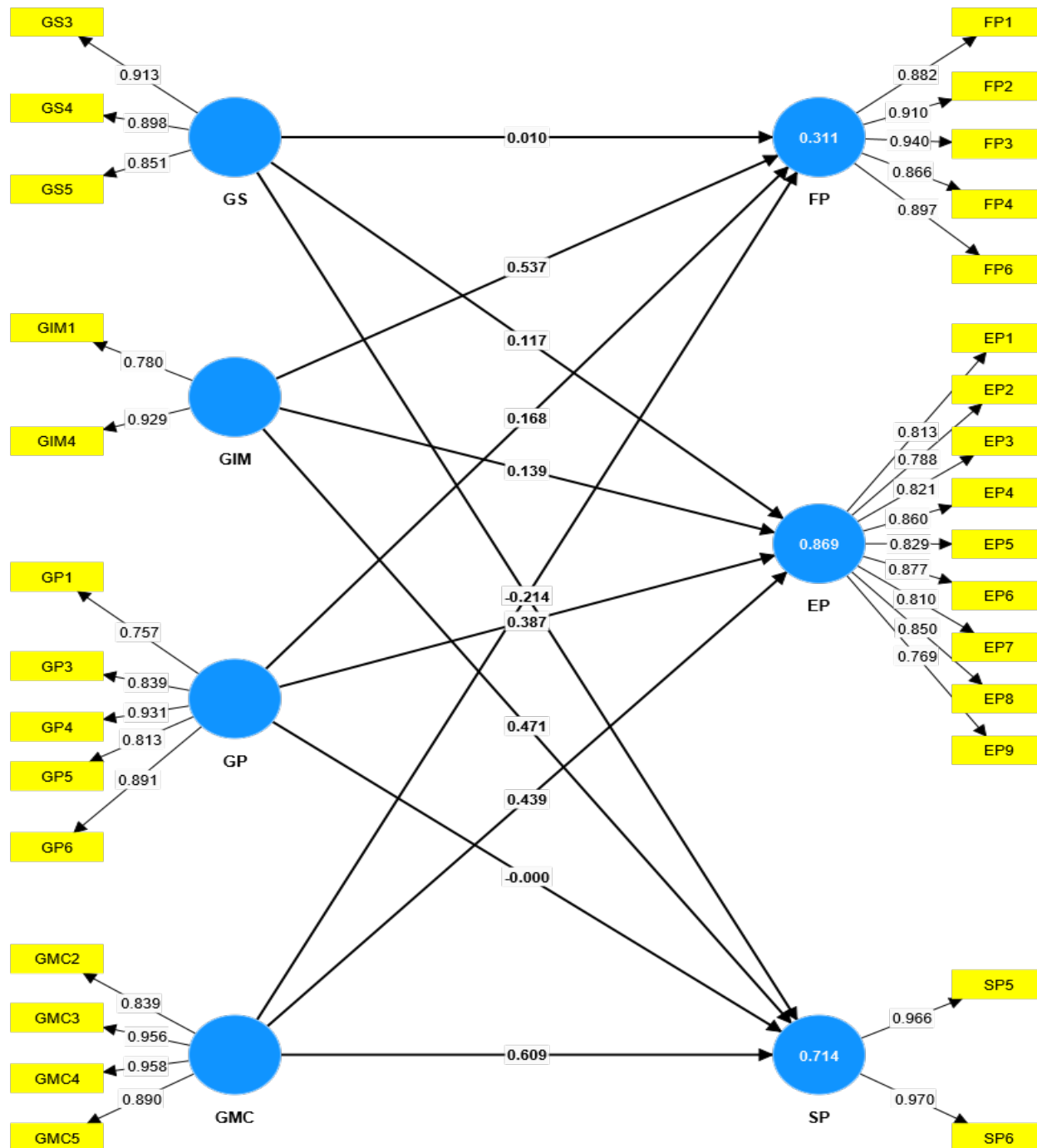


Fig. 2: Measurement model.

RESULTS AND DISCUSSION

To assess the measurement model, the construct reliability, convergent validity, and discriminant validity of the seven constructs were evaluated (Hair et al. 2019, Hanafiah 2020). Reliability is established if Cronbach’s alpha, composite reliability (rho_a), and composite reliability (rho_c) are all above 0.7 (Table 2). Additionally, to establish convergent validity, the average variance extracted (AVE) must exceed 0.5 (Ringle et al. 2022).

Table 2: Cronbach alpha, Composite Reliability Rho_a, and Composite Reliability rho_c.

	Cronbach's alpha	Composite reliability (rho a)	Composite reliability (rho c)	Average variance extracted (AVE)
EP	0.914	0.914	0.933	0.700
FP	0.941	0.948	0.955	0.809
GIM	0.856	0.879	0.902	0.698
GMC	0.932	0.945	0.952	0.832
GP	0.905	0.922	0.933	0.778
GS	0.869	0.878	0.938	0.884
SP	0.933	0.936	0.968	0.937

Note: EP = Environmental performance, FP = Financial performance, GIM = Green internal marketing, GMC = Green marketing communication, GP = Green product, GS = Green strategy, SP = Social performance.

Table 2 demonstrates that items, as well as constructs in this investigation, had adequate degrees of convergent validity as well as reliability on each of the seven constructs used in this investigation. We used the most conservative method, the heterotrait-monotrait (HTMT) ratio, to evaluate the discriminant validity (Henseler et al. 2015). The HTMT ratio has also recently been proven to be a better evaluation standard in comparison to other conventional appraisal techniques (Henseler et al. 2015). To prove discriminant validity, each concept's HTMT ratio needs to be less than 0.9. (Ringle et al. 2022). The findings of HTMT are presented in Table 5, which reveals a satisfactory discriminant validity (Table 3).

Table 3: Discriminant validity assessment (HTMT).

	EP	FP	GIM	GMC	GP	GS
FP	0.525					
GIM	0.866	0.591				
GMC	0.805	0.325	0.775			
GP	0.831	0.418	0.826	0.576		
GS	0.821	0.336	0.899	0.752	0.719	
SP	0.759	0.584	0.756	0.832	0.479	0.568

Evaluation of the Structural Model

The structural model must be appraised to scrutinize the interrelationship between green marketing practices as well as sustainability performance. Consequently, the hypotheses of the investigation were tested.

Collinearity Assessment

Collinearity among latent variables is assessed through the Variance Inflated Factor (VIF) (Table 4). Implicatively, $VIF \geq 5$ specifies a probable collinearity problem (Hair et al. 2011). The results presented in Table 6 revealed that all the values are below 5; therefore, the model does not have any potential collinearity problem. Consequently, the model is free of common method bias (Kock 2015).

Table 4: Inner VIF.

	VIF
GIM -> EP	3.919
GIM -> FP	3.919
GIM -> SP	3.919
GMC -> EP	2.307
GMC -> FP	2.307
GMC -> SP	2.307
GP -> EP	2.160
GP -> FP	2.160
GP -> SP	2.160
GS -> EP	2.806
GS -> FP	2.806
GS -> SP	2.806

The significance of the path coefficients should be evaluated, together with the R-square (R^2) and Stone-Geisser criterion (Q^2), for green marketing practices and sustainability performance to appraise the structural model (Hair et al. 2017). The R^2 values of 0.777 for environmental performance are regarded as excellent scores in the behavioral sciences (Rasoolimanesh et al. 2017). This indicates that 77.7% of the four predictors are explained by the variance in environmental performance. Moreover, The R^2 value of 0.330 for financial performance is regarded as a medium score (Rasoolimanesh et al. 2017). This indicates that 33.0% of the four predictors are explained by the variance in financial performance. Furthermore, The R^2 value of 0.670 for social performance is regarded as an excellent score (Rasoolimanesh et al. 2017). This indicates that 67.0% of the four predictors are explained by the variance in social performance. The variances, as explained, were above the minimum threshold R^2 assessment of 25% (Hair et al. 2016).

According to Ali et al. (2018), the assessment of Q^2 ought to be greater than zero to show that a structural model is prognostic, in this situation, we observed a Q^2 assessment of 0.772 for environmental performance, 0.310 for financial performance, and 0.663 for social performance. These numbers demonstrate the model's good predictive capabilities.

Green internal marketing has a positive effect on environmental, financial, and social performance, respectively. Moreover, green marketing communication has a positive effect on environmental and social performance, respectively. However, green marketing communication has a negative effect on financial performance. Furthermore, the green product has a positive effect on environmental and financial performance respectively. However, the green product has a negative

effect on social performance. Also, green strategy has a negative effect on financial and social performance, respectively. However, a green strategy has a positive effect on environmental performance. It is worthy of note that green internal marketing influenced financial performance the most. Green marketing communication also influenced social performance the most. In addition, green products influenced environmental performance the most.

Hypotheses Testing (Direct Effect)

As a conclusion of the direct effect, nine of the twelve hypotheses were supported: green internal marketing to environmental performance ($\beta = 0.143, p < 0.05$), green internal marketing to financial performance ($\beta = 0.769, p < 0.05$), green internal marketing to social performance ($\beta = 0.474, p < 0.05$), green marketing communication to environmental performance ($\beta = 0.343, p < 0.05$), green marketing communication to social performance ($\beta = 0.643, p < 0.05$). However, green marketing communication to financial performance is insignificant ($\beta = -0.140, p = 0.139$), and green product to environmental performance is significant ($\beta = 0.400, p < 0.05$). However, green product to financial performance is insignificant ($\beta = 0.082, p = 0.116$). Also, green product to social performance is insignificant ($\beta = -0.084, p = 0.060$), green strategy to environmental performance ($\beta = 0.133, p < 0.05$), green strategy to financial performance ($\beta = -0.242, p < 0.05$) and green strategy to social performance ($\beta = -0.240, p < 0.05$) were supported (Table 5).

Table 5: Hypotheses Analysis.

	Original sample (O)	f-square	T statistics (O/STDEV)	P values	Decision
GIM -> EP	0.143	0.024	2.082	0.037	Significant
GIM -> FP	0.769	0.225	13.089	0.000	Significant
GIM -> SP	0.474	0.173	7.193	0.000	Significant
GMC -> EP	0.343	0.229	10.522	0.000	Significant
GMC -> FP	-0.140	0.013	1.481	0.139	Insignificant
GMC -> SP	0.643	0.543	13.904	0.000	Significant
GP -> EP	0.400	0.332	8.898	0.000	Significant
GP -> FP	0.082	0.005	1.571	0.116	Insignificant
GP -> SP	-0.084	0.010	1.884	0.060	Insignificant
GS -> EP	0.133	0.028	2.930	0.003	Significant
GS -> FP	-0.242	0.031	3.054	0.002	Significant
GS -> SP	-0.240	0.062	5.114	0.000	Significant

The investigation also appraised the effect size (f^2), which is a measure of whether a certain exogenous construct significantly affects an outcome variable. Subject to Cohen’s (1988) suggestion, the result of the investigation revealed that green marketing communication has a large effect size on social performance. Moreover, the green product has a medium effect size on environmental performance. Nevertheless, green internal marketing and green marketing communication have a small effect size on financial performance and environmental performance, respectively.

Discussion

Grounded on the stakeholder theory, resource-based theory, as well as the triple bottom line framework, the investigation contrasts the relationships between green marketing practices and the sustainability performance of manufacturing firms. Our results provide actual evidence for the crucial part that green marketing practices play a critical role in channeling the sustainability performance of manufacturing firms.

Overall, nine of the twelve hypotheses were supported, the study noted the presence of a significant positive relationship between green internal marketing as well as environmental performance. Similarly, the relationship between green internal marketing as well as financial performance, and green internal marketing as well as social performance were also significant. In addition, there is a significant positive connection between green marketing communication and environmental performance, as well as green marketing communication and social performance. However, the relationship between green marketing communication and financial performance is insignificant. Moreover, the relationship between green products and environmental performance is positively significant. However, the relationship between green products as well as financial performance is insignificant.

Similarly, the relationship between green products as well as social performance is insignificant. The relationship between green strategy as well as environmental performance is positively significant, while the relationship between green strategy as well as financial performance as well as green strategy, and social performance was negatively significant (Table 5). The result of the investigation revealed that green marketing communication has a large effect size on social performance. Moreover, the green product has a medium effect size on environmental performance. Nevertheless, green internal marketing, as well as green marketing communication have a small effect size on financial performance and environmental performance, respectively.

Implicatively, manufacturing firms who engage in green internal marketing (like looking at environmental achievements of job seekers and contractors before engaging them as well as annual presentation of environmental reports) are more likely to enhance their environmental performance (EP), financial performance (FP) and social performances (SP). The improvements in EP include using machines that consume less energy, the routine use of recycled materials, winning more environmental awards, and fewer environmental complaints from the public. Improvement in FP includes higher sales, profits, cash flows, and market share, while that of SP includes more implementation of corporate social responsibilities as well as maintaining cleaner environments for residents through regular clean-up exercises.

Consequently, incorporating green marketing communication (like using eco-friendly items that decay easily like paper in packaging products, putting eco-friendly information on websites, as well as engaging in green advertisements) leads to an enhancement in the EP and SP of manufacturing firms. The improvements in EP include using machines that consume less energy, the routine use of recycled materials, winning more environmental awards and fewer environmental complaints from the public, while that of SP includes more implementation of corporate social responsibilities as well as maintaining cleaner environments for residents through regular clean-up exercises. However, green marketing communication does not enhance the financial performance of manufacturing firms in developing countries.

Using green products (like the production and sale of green products, using raw materials that are safe for the environment and health of consumers to produce goods, producing energy-efficient goods that reduce environmental pollution, use of quality energy efficient appliances as well as production of toxic-free products) contribute to the EP of manufacturing firms. The enhancements in EP include using machines that consume less energy, the routine use of recycled materials, winning more environmental awards and fewer environmental complaints from the public. However, green products do not contribute to both the financial and social performance of manufacturing firms.

Moreover, the practice of green strategy (like incorporating green marketing as a culture as well as promotion of environmental preservation) has a positive significant influence on EP. This means as firms practice green strategy (GS), their EP improves. This EP includes more use of machines that consume less energy, the routine use of recycled materials, winning more environmental awards, and fewer environmental complaints from the public. The study, however, found a negative but significant impact of GS on both financial performance (FP) and social performance (SP). Thus, the more manufacturing firms practice GS, the worse their FP and SP will be, and vice versa. These firms should, therefore, integrate their green strategies with costing since it has the likelihood of lowering the FP and SP.

Green marketing practices play a pivotal role in shaping the sustainability performance of manufacturing firms, offering opportunities to reduce environmental impacts, enhance stakeholder relationships, and drive competitive advantage. By embracing sustainability as a core business imperative and integrating green principles into their marketing strategies, manufacturing firms can contribute to a more environmentally responsible and socially conscious marketplace while securing long-term profitability, agility, and resilience in an increasingly sustainability-focused world. Overall, the findings suggest that manufacturing firms can effectively leverage green marketing practices to enhance their sustainability performance to meet growing consumer demand for sustainable products, comply with regulatory requirements, and enhance corporate reputation.

CONCLUSIONS

The empirical findings of this study underscore the pivotal role of green marketing practices in enhancing the sustainability performance of manufacturing firms. Green internal marketing and green strategy exhibit significant positive relationships with sustainability performance, indicating that internal efforts to align organizational practices with environmental objectives and strategic orientations toward sustainability yield substantial benefits. The significant positive effects of green marketing communication on both environmental and social performance further illustrate the critical role of effective communication in fostering a corporate culture attuned to sustainability goals and enhancing external stakeholder engagement.

Contrarily, the findings reveal that the relationship between green marketing communication and financial performance, as well as the relationship between green products and both financial and social performance, is not significant. These results suggest that while green marketing initiatives contribute positively to environmental and social dimensions of sustainability, their direct impact on financial outcomes remains limited. This highlights a potential area for further investigation and strategic refinement, as firms might need to explore more integrative approaches that concurrently address financial performance while pursuing sustainability goals.

Overall, the study emphasizes the importance of adopting comprehensive green marketing strategies that not only focus on environmental and social dimensions but also strive to align these efforts with financial performance metrics. Manufacturing firms aiming to achieve sustainable growth must, therefore, consider a balanced approach, integrating green marketing practices across all facets of their operations to foster long-term sustainability and competitive advantage.

Theoretical Implications

Our study establishes a critical linkage between green marketing practices as well as the sustainability performance of manufacturing firms. Consequently, this study adds to the investigation of green marketing practices as well as sustainability performance. This investigation enhances the pertinent inquiry by focusing on the aforementioned constructs.

Furthermore, the conceptualization of the link between green marketing practices as well as the sustainability performance of manufacturing firms offers a new direction for inquiry to increase knowledge of sustainability performance while also empowering manufacturing firms to adopt green marketing initiatives in an attempt to be competitive.

By analyzing the connection between green marketing practices as well as the sustainability performance of manufacturing firms, this research significantly adds to the body of literature. To make sure that the inquiry is pertinent and legitimate in the particular context of interest, the modified measurement of latent constructs in the study is essential. This can result in a more precise and detailed understanding of the connections between the different constructs and offer insightful information.

Manufacturing firms that effectively integrate sustainability into their marketing strategies can develop unique capabilities, such as eco-design, green branding, and environmental certifications, which enhance their sustainability performance. By aligning marketing strategies with sustainability goals, manufacturing firms can build trust and legitimacy with stakeholders, leading to enhanced reputation and long-term relationships.

The adoption of green marketing practices by manufacturing firms can be influenced by institutional pressures from regulatory agencies, industry associations, and societal norms. As green marketing practices become more widespread, they contribute to the mainstreaming of sustainability within the manufacturing sector, driving broader societal change.

Managerial Implications

The findings of this analysis have a lot of implications for the ability of manufacturing firms and businesses to make critical green marketing practices and sustainability performance decisions.

Firstly, it facilitates the reduction of environmental footprints throughout the product lifecycle, from raw material extraction to end-of-life disposal. By incorporating sustainability criteria into product design, production processes, and supply chain management, firms can minimize resource consumption, pollution, and waste generation, thereby mitigating environmental risks and improving ecological efficiency.

Furthermore, green marketing practices contribute to stakeholder engagement and relationship building. By transparently communicating their sustainability initiatives and achievements, manufacturing firms can foster trust and loyalty among environmentally conscious

consumers, investors, and communities. This not only enhances brand equity but also strengthens social license to operate and reduces reputational risks associated with environmental controversies.

One of the key managerial implications of green marketing practices is the need for strategic alignment between sustainability objectives and overall business goals. Manufacturing firms must integrate environmental considerations into their strategic planning processes, ensuring that sustainability initiatives are aligned with core competencies, market positioning, and long-term growth objectives. This requires proactive engagement from top management, clear articulation of sustainability priorities, and allocation of resources to support green initiatives across the organization.

Green marketing practices offer manufacturing firms opportunities for innovation and differentiation in increasingly competitive markets. By investing in eco-design, sustainable sourcing, and green technologies, firms can develop innovative products and processes that reduce environmental impacts while meeting customer needs and preferences. This not only enhances market competitiveness but also strengthens brand identity and fosters customer loyalty, driving long-term profitability and market share growth.

Effective green marketing practices can also serve as a strategic tool for risk management, helping manufacturing firms mitigate environmental risks and regulatory compliance challenges. By proactively addressing environmental issues through transparent communication, stakeholder engagement, and responsible product stewardship, firms can reduce the likelihood of environmental liabilities, reputational damage, and regulatory sanctions. This requires proactive monitoring of environmental trends, adoption of best practices, and integration of sustainability into risk assessment and management processes.

Transparency and accountability are essential principles underpinning effective green marketing practices. Manufacturing firms must communicate transparently with stakeholders about their sustainability initiatives, performance, and progress towards environmental goals. This requires robust reporting mechanisms, adherence to sustainability standards and certifications, and engagement with external stakeholders, including investors, customers, NGOs, and regulatory bodies. By demonstrating accountability for their environmental impacts and commitments, firms can build trust, credibility, and long-term relationships with stakeholders, enhancing brand reputation and market legitimacy.

LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

First, only manufacturing firms in Ghana were included in our research sample. The universality of the findings should be confirmed in follow-up investigations using diverse samples. To provide a more thorough explanation of this link, future research could expand on additional potential components like organizational culture, IT integration, regulatory environment, consumer awareness, and education.

Longitudinal studies from other cultures and nations at various stages of development may be included in future studies. Such multi-country analysis allows researchers to compare mean responses and the strength of correlations, which contributes to a more comprehensive knowledge of green marketing practices and their effects on the sustainability performance of manufacturing firms.

Delving into consumer perceptions, attitudes, and behaviors towards green marketing messages and sustainable products can enhance understanding of drivers and barriers to adoption, informing more targeted marketing strategies.

Examining the dynamics of multi-stakeholder collaborations and partnerships aimed at advancing sustainability goals within manufacturing ecosystems can shed light on effective strategies for collective action and impact.

Also, future studies may consider exploring the application of circular economy principles, such as product lifecycle extension, remanufacturing, and closed-loop systems, in driving sustainability performance and creating shared value for manufacturing firms and their stakeholders.

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