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Research paper

Digital Marketing Investment and The Sustainability Performance of Manufacturing Firms in Emerging Markets

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Abstract

This paper investigated the relationship between digital marketing investment and the sustainability performance of manufacturing firms in emerging markets. The survey utilized a self-administered questionnaire approach, gathering a total of 287 completed responses for data analysis utilizing Smart PLS-SEM (version 4). The study reveals that digital marketing capability has a significantly positive effect on environmental performance. Similarly, digital marketing capability has a significant impact on financial performance. However, digital marketing capability exhibits no statistically significant effect on social performance. Furthermore, digital marketing strategic integration exhibits a significant effect on both environmental and social performance. Also, digital marketing strategic integration has a statistically significant, but negative effect on financial performance. The adoption of digital marketing technologies demonstrates a positively significant influence on financial performance. Also, the adoption of digital marketing technologies positively affects social performance significantly. Moreover, the adoption of digital marketing technologies has a significant effect on environmental performance. This investigation provides insights into the value of digital marketing investment and the sustainability performance of manufacturing firms in emerging markets, thereby highlighting their implications for theory, managers, and business success.

Keywords: *Digital Marketing Investment; Digital Marketing Technologies; Digital Marketing Capability; Digital Marketing Strategic Integration and Sustainability Performance.*

1. Introduction

As global attention intensifies around climate change, resource efficiency, and corporate accountability, manufacturing firms, known for their high environmental footprints, are increasingly required to adopt sustainable practices that align with environmental, social, and governance (ESG) standards. Stakeholders, including consumers, investors, regulators, and NGOs, are increasingly demanding not only operational efficiency but also transparent sustainability performance from companies (Sun et al., 2025). Concurrently, the digital revolution has profoundly transformed marketing paradigms, with advanced tools and platforms enabling firms to engage stakeholders in real time, deliver highly personalized messages, and strengthen corporate values—particularly sustainability through data-driven strategies (Gündüzyeli, 2024).

Digital marketing encompassing social media, content strategies, SEO, influencer campaigns, and data analytics is increasingly being recognized as a strategic enabler not only for customer acquisition and loyalty, but also for advancing environmental and social responsibility (Ibrahim et al., 2025; Kamyabi et al., 2025). Many manufacturing firms have begun investing in digital campaigns to communicate their sustainability initiatives, improve public perception, and satisfy regulatory or consumer expectations. Despite this growing trend, the actual impact of digital marketing investments on sustainability performance, measured through metrics such as reduced carbon emissions, improved stakeholder trust, enhanced community engagement, or supply chain transparency, remains poorly understood, particularly within manufacturing contexts (George et al., 2023).

One of the major issues lies in the lack of integrated frameworks or empirical models linking digital marketing strategies to tangible sustainability outcomes. Although digital marketing has been shown to enhance sustainability awareness and stakeholder engagement, most research concentrates on service sectors or general corporate contexts, overlooking manufacturing firms, which prioritize operational efficiency, cost control, and technological adaptation (Galvani et al., 2025). Moreover, the capital-intensive nature of manufacturing operations often necessitates cautious budget allocation, with investments in non-core areas such as digital marketing facing scrutiny unless they demonstrate a clear financial or environmental return (Ferreira et al., 2023).

In developing economies, the situation is even more complex. Manufacturing firms in these regions are often resource-constrained and may lack the infrastructure or expertise to deploy sophisticated digital marketing strategies effectively. At the same time, manufacturing firms, particularly in emerging economies, are under increasing pressure to demonstrate robust sustainability credentials as essential prerequisites for participation in global value chains and access to trade and investment opportunities (Li et al., 2025).

In Ghana, the manufacturing sector contributes significantly to industrial output and job creation, yet faces persistent challenges in integrating sustainability into core operations and communicating ESG efforts effectively to stakeholders (GSS, 2023). For manufacturing firms in Ghana to perform well, they need to implement unique strategic and sustainable policies (Akude et al., 2025a; Akude et al.,2025b; Akude et al., 2025c). While the Ghanaian government and agencies such as the Environmental Protection Agency (EPA) promote sustainable industrial practices, many local firms, particularly small and medium-sized enterprises (SMEs), face significant challenges in digital transformation and sustainability reporting due to resource constraints and limited digital competencies (Appiah-Kubi, 2025). Furthermore, evidence on how digital marketing tools are being leveraged by Ghanaian manufacturers to improve sustainability outcomes is scarce, and existing literature largely overlooks Sub-Saharan Africa in this intersection of digital marketing and sustainability.

Despite the increasing adoption of digital channels across sectors in Ghana, including the rising use of social media, mobile platforms, and e-commerce, there is a limited understanding of how these digital tools are being applied within manufacturing firms to support ESG goals (Guo et al., 2025). Additionally, no comprehensive empirical studies to date have systematically assessed whether digital marketing investments improve sustainability performance in Ghana's manufacturing landscape.

Another significant challenge is the absence of standardized sustainability marketing performance metrics, which impedes firms from evaluating the effectiveness of their digital campaigns in delivering real impact. This ambiguity hampers decision-making for marketing and sustainability managers, potentially leading to misallocated resources or "greenwashing" risks, where firms appear to promote sustainability without achieving substantive environmental or social improvements (Kathan et al., 2025).

Given these gaps, there is a pressing need for rigorous empirical research that examines the interplay between digital marketing investment and the sustainability performance in manufacturing firms, particularly within Ghana and similar developing economies. Addressing this knowledge gap is critical for guiding managerial strategy, informing national industrial policy, and advancing the discourse on how digital innovation can drive sustainable industrial development in Ghana and beyond. Therefore, this study aims to scrutinize the influence of digital marketing investment on the sustainability performance of manufacturing firms in Ghana. Explicitly, the objectives of this investigation are:

- To evaluate the relationship between the adoption of digital marketing technologies and the sustainability performance of manufacturing firms.
- To examine the relationship between digital marketing capability and the sustainability performance of manufacturing firms.
- To assess the relationship between digital marketing strategic integration and the sustainability performance of manufacturing firms.

In the sections that follow, the document shall encompass an aggregation of literature about the domain of digital marketing investment and the sustainability performance of manufacturing firms. The paper will then follow with methodology and discussion of findings. There will then be a conclusive section that will reflect on the discovered outcomes as well as their implications, both theoretically and in practical application.

2. Literature Review

2.1. Theoretical foundation and hypotheses

This section explains the theories that justify the relationships among the variables used in this study.

Resource-Based View (RBV) Theory

The Resource-Based View (RBV) explains how firms can gain and sustain competitive advantage through the utilization of internal resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991). In the context of digital marketing investment, the resource-based view (RBV) contends that digital technologies, platforms, and capabilities function as strategic assets, particularly when they are deeply integrated, difficult to replicate, and embedded in a firm's culture and processes (Willie, 2024).

In modern manufacturing, digital marketing resources include advanced data analytics, customer relationship management (CRM) systems, social media engagement platforms, content creation expertise, and search engine marketing tools. These assets enable firms to target customers more effectively, personalize communication, and adapt in real time to changes in consumer preferences or sustainability expectations (Kumar et al., 2021). These capabilities are particularly valuable in sustainability-focused marketing, where firms must engage stakeholders with credible and dynamic content that reflects their environmental and social efforts (George et al., 2023).

For example, Ghanaian manufacturing firms investing in social media platforms or mobile campaigns not only expand their market reach but also build legitimacy by communicating their alignment with ESG values (Amoako et al., 2023). In economies where sustainability disclosure is voluntary or underregulated, such strategic use of digital resources serves as both a marketing tool and a soft governance mechanism. Thus, digital marketing investment becomes a form of resource deployment that offers both market-based and legitimacy-based advantages.

Furthermore, firms that can integrate sustainability messaging into their digital branding build a distinctive identity, one that appeals to ethically minded consumers, regulators, and investors. This strengthens their competitive positioning, supporting RBV's assertion that unique, firm-specific capabilities lead to superior performance (Ferreira et al., 2023).

It should be noted that the RBV presents a strategic lens to conceptualize digital marketing investment not as an operational expense but as an asset-based approach to market differentiation, stakeholder alignment, and sustainable competitiveness.

Triple Bottom Line (TBL) Theory

The Triple Bottom Line (TBL) framework, introduced by Elkington (1997), proposes that firms must simultaneously pursue economic (Profit), social (People), and environmental (Planet) goals to achieve long-term sustainability. In evaluating sustainability performance, this model shifts focus from traditional profit-centric metrics to a multi-dimensional performance assessment that includes stakeholder well-being, environmental stewardship, and ethical governance (George et al., 2023).

TBL is particularly relevant in assessing the outcomes of digital marketing investments that are aligned with sustainability objectives. Through TBL, firms are encouraged to examine how their marketing strategies promote community engagement, reduce ecological footprints, and foster ethical supply chains, while maintaining profitability. For instance, a manufacturing firm using digital platforms to promote eco-friendly products or share carbon reduction goals is not only advancing brand equity but also contributing to broader societal and environmental well-being (Ibrahim et al., 2025; Al-Swidi et al., 2024).

In Ghana, where enforcement of sustainability reporting remains weak, the Triple Bottom Line framework offers a voluntary but structured approach for firms to assess and communicate their ESG progress (Acheampong et al., 2024). It enables firms to use digital marketing tools to measure and report on their triple-bottom-line outcomes. For example, digital platforms can monitor energy consumption trends, engage communities via CSR storytelling, and educate customers on sustainable consumption actions closely aligning with the Triple Bottom Line (TBL) framework (McCarthy et al., 2024).

Importantly, the TBL theory also supports stakeholder-centric thinking, emphasizing that firms should create value not only for shareholders, but also for employees, communities, and the environment. This aligns with growing expectations in the digital age, where consumers and regulators increasingly scrutinize companies' social and environmental claims. When marketing content is grounded in verified sustainability practices, it bolsters authenticity and mitigates greenwashing risk, thereby fostering long-term stakeholder trust (Santos et al., 2023).

Thus, TBL provides a performance measurement lens for understanding how digital marketing investments can lead to meaningful sustainability outcomes across the economic, environmental, and social domains.

2.2. Adoption of digital marketing technologies and sustainability performance

The digital transformation of global industries has introduced significant shifts in how firms communicate with stakeholders, deliver value, and align with sustainability goals. Among these shifts, the adoption of digital marketing technologies—including social media platforms, data analytics, artificial intelligence, search engine optimization (SEO), and marketing automation tools—has become increasingly central to business strategy (Kask et al., 2024). For manufacturing firms, which traditionally rely on product-centric and efficiency-driven models, DMTs offer a novel pathway to enhance financial, social, and environmental performance, the core dimensions of corporate sustainability.

A substantial body of research supports the idea that adopting DMTs enhances financial performance by improving marketing efficiency, customer targeting, and return on investment (Ferreira et al., 2023). For instance, AI-driven analytics and programmatic advertising allow firms to optimize budget allocation, automate lead generation, and personalize communication, which increases conversion rates and customer retention (George et al., 2023).

Ferreira et al. (2023) found that manufacturing firms adopting predictive analytics and customer relationship management (CRM)-integrated platforms reported improved cost-efficiency and revenue growth, especially when digital marketing tools were aligned with value-driven narratives. Similarly, recent empirical research demonstrates that digital adoption enhances organizational agility and resilience in marketing operations, which in turn leads to increased profitability (Abuseta et al., 2025).

However, despite these promising findings, most studies concentrate on service-oriented sectors or large multinationals, overlooking the unique resource limitations and operational constraints of manufacturing firms, especially in emerging economies like Ghana. Moreover, few studies distinguish between mere digital presence and strategic adoption of digital tools, leaving a gap in understanding which technologies drive tangible financial gains in the manufacturing context.

The adoption of DMTs also plays a critical role in enhancing social sustainability, particularly through improved stakeholder engagement, transparency, and social responsibility communication. Social media, chatbots, and interactive web platforms empower firms to foster relationships with employees, communities, and advocacy groups, thereby enhancing engagement, trust, and stakeholder inclusion (Figueroa-Torres, 2025). These tools have been used to share CSR efforts, labor policies, and inclusivity practices, contributing to stakeholder trust and corporate legitimacy.

George et al. (2023) emphasized that manufacturing firms with active digital engagement channels were more likely to respond to social concerns quickly and demonstrate ethical commitments, which in turn enhanced their brand reputation and stakeholder support. Nevertheless, most existing studies do not link technology adoption directly to measurable social impact metrics such as employee satisfaction, community development, or stakeholder inclusion, resulting in a lack of clarity on how such technologies contribute to long-term social performance.

In Sub-Saharan Africa, although many Ghanaian firms have embraced digital communication channels for public engagement, their effectiveness remains constrained due to the absence of structured frameworks, systematic impact monitoring, and social performance tracking mechanisms (Acheampong et al., 2024). This reflects a broader challenge: without integrated systems to measure outcomes, DMT adoption risks being superficial or symbolic rather than transformational.

Digital marketing technologies can also support environmental sustainability by promoting green consumption, reducing paper use, and enabling firms to share eco-innovation with stakeholders. Content management systems, automated newsletters, and e-commerce platforms reduce reliance on physical materials, while digital campaigns can elevate awareness of environmentally friendly practices (Avlonitou et al., 2025).

In the Middle East, manufacturing firms are increasingly leveraging digital technologies to showcase their sustainability credentials—including sustainability certifications, green product attributes, and waste-reduction initiatives—through digital platforms (Alquraish, 2025). However, they also noted that few firms invest in long-term green digital strategies due to cost constraints, lack of expertise, or limited market pressure. In Ghana, although many firms have adopted digital communication channels for public engagement, their effectiveness is often hindered by the absence of structured frameworks, systematic impact monitoring, and social performance tracking mechanisms (Odoom et al., 2024).

Critically, many studies do not explore causal mechanisms or performance indicators linking DMT adoption to environmental improvements such as carbon reduction, supply chain transparency, or material efficiency. This gap prevents managers and policymakers from making evidence-based decisions about investing in digital technologies as a means to achieve environmental goals.

Notwithstanding the growing academic interest in the nexus between digital transformation and sustainability, critical empirical gaps remain that justify further investigation into how the adoption of digital marketing technologies influences the financial, social, and environmental performance of manufacturing firms. Most existing studies are skewed toward developed economies and service-based industries, offering limited insights into manufacturing contexts where operations are capital-intensive and sustainability practices are often less visible (Ferreira et al., 2023).

Moreover, in emerging markets like Ghana, empirical evidence remains limited regarding how the strategic use of digital marketing tools translates into tangible sustainability outcomes, especially given infrastructure challenges and low levels of digital maturity (Bruce et al., 2023). Studies also tend to examine financial, social, or environmental performance in isolation rather than adopting an integrated approach that reflects the multidimensional nature of sustainability.

Compounding this is the lack of standardized performance metrics and causal models that could guide firms in evaluating the real impact of digital tool adoption beyond mere symbolic communication (George et al., 2023). Therefore, a focused study in this area is not only timely but necessary to fill these gaps, inform managerial decisions, enhance sustainable industrial competitiveness in developing

economies, and provide policymakers with context-specific insights for promoting responsible digitalization in the manufacturing sector. Hence, the following hypotheses will be tested;

H_1: There is a statistically significant connection between the adoption of digital marketing technologies and the sustainability performance of manufacturing firms.

H_{1a}: There is a statistically significant connection between the adoption of digital marketing technologies and the financial performance of manufacturing firms.

H_{1b}: There is a statistically significant connection between the adoption of digital marketing technologies and the social performance of manufacturing firms.

H_{1c}: There is a statistically significant connection between the adoption of digital marketing technologies and the environmental performance of manufacturing firms.

2.3. Digital marketing capability and sustainability performance

In the era of digital transformation and heightened global sustainability consciousness, digital marketing capability (DMC) has emerged as a strategic asset that enables firms to create value, foster innovation, and engage stakeholders effectively. DMC is broadly defined as a firm's integrated capability to leverage digital technologies—such as data analytics, customer engagement platforms, and content delivery systems across multiple channels to achieve marketing and organizational objectives (Sharafuddin & Janarthanam, 2023). For manufacturing firms, which are often characterized by complex supply chains, high resource usage, and limited direct customer contact, enhancing DMC can provide a competitive advantage while contributing to sustainable development goals.

A growing body of literature confirms that DMC is positively associated with financial performance. Firms with strong digital marketing competencies can leverage data-driven insights to optimize pricing, improve customer segmentation, reduce acquisition costs, and increase return on investment (Ferreira et al., 2023). Recent evidence demonstrates that manufacturing firms integrating digitalization into their marketing activities, particularly through data analytics, experience enhanced marketing effectiveness and customer value (Conti et al., 2023). Similarly, George et al. (2023) observed that high DMC enabled better product-market alignment, resulting in increased profitability and market share. However, much of the current research is concentrated in developed countries and large corporations, with limited empirical insight into how DMC affects the financial sustainability of manufacturing firms in emerging economies, such as Ghana, where digital maturity is still evolving and resource constraints affect technology adoption.

In terms of social sustainability, DMC facilitates transparent communication, stakeholder engagement, and inclusive brand narratives through digital platforms. Recent evidence suggests that strong digital capabilities such as AI, data analytics, and digital platforms enhance firms' ability to engage employees, communities, and advocacy groups through inclusive and responsive communication (Tomiwa, 2024). Digital storytelling and social media campaigns enhance the visibility of CSR activities and strengthen relational capital. However, in the manufacturing sector, particularly in resource-limited contexts, there is often a capability–implementation gap: even when digital tools are available, firms may lack the internal skills and strategic orientation to fully deploy them for social impact. Recent empirical evidence highlights that while Ghanaian SMEs increasingly adopt digital channels, their overall digital marketing capabilities remain underdeveloped, resulting in inconsistent, surface-level engagement with social sustainability themes (Bruce et al., 2023).

The contribution of DMC to environmental sustainability is becoming more evident as firms adopt digital channels to communicate green values, promote eco-friendly products, and reduce ecological footprints. Recent studies reveal that manufacturing firms with advanced digital marketing capabilities increasingly leverage digital platforms to promote energy efficiency initiatives, circular economy models, and green supply chain practices (Lozano & Mount, 2025). Moreover, DMC supports resource optimization by reducing reliance on print materials and enabling paperless campaigns. However, few studies examine how DMC directly correlates with quantitative environmental performance indicators such as carbon emissions, energy use, or waste reduction, particularly in developing country contexts. In Ghana, environmental messaging via digital channels remains fragmented and ineffective, constrained by limited digital marketing capabilities, lack of standardized metrics, and infrastructural weaknesses (Kyere & Kankam, 2025).

Despite increasing academic and managerial interest in the digital–sustainability nexus, several important gaps persist that necessitate further empirical inquiry into the connection between digital marketing capability and sustainability performance, especially in the manufacturing sector. Much of the existing literature is concentrated on service industries or developed economies, overlooking the distinctive operational complexities and resource limitations faced by manufacturing firms in emerging markets such as Ghana (Deku et al., 2024; Dinh Van Hoang et al., 2025).

Furthermore, studies tend to treat financial, social, and environmental performance as separate constructs, lacking an integrated framework that captures their interdependence within the context of digital capability. Critically, most empirical work has focused on digital marketing adoption or expenditure, rather than the strategic and operational competencies; that is, the actual capability that drives sustainability outcomes. Compounding these gaps is the absence of standardized performance metrics, particularly for measuring how DMC influences social and environmental outcomes beyond communication or perception. Given these limitations, a focused study on how digital marketing capability contributes to holistic sustainability performance in manufacturing firms is not only timely but essential. Such research would provide context-sensitive insights for firm-level strategy, promote capability building, and support policymakers in designing interventions that link digital transformation with sustainable industrial development in Ghana and other developing economies. Hence, the following hypotheses will be tested;

H_2: There is a statistically significant connection between digital marketing capability and the sustainability performance of manufacturing firms.

H_{2a}: There is a statistically significant connection between digital marketing capability and the financial performance of manufacturing firms.

H_{2b}: There is a statistically significant connection between digital marketing capability and the social performance of manufacturing firms.

H_{2c}: There is a statistically significant connection between digital marketing capability and the environmental performance of manufacturing firms.

2.4. Digital marketing strategic integration and sustainability performance

The strategic integration of digital marketing into corporate operations has become increasingly crucial for firms seeking to remain competitive, adaptive, and socially responsible in an evolving digital economy. Digital marketing strategic integration (DMSI) refers to the degree to which digital marketing tools, platforms, and data-driven insights are embedded into a firm's broader business and sustainability strategies. For manufacturing firms characterized by resource-intensive operations and complex supply chains, the strategic integration of

digital marketing extends beyond conventional marketing functions, serving as a transformative enabler for advancing Sustainable Development Goals (SDGs) (Gohar et al., 2024; Akhtar et al., 2025).

Empirical studies indicate a positive correlation between the strategic integration of digital marketing and financial performance. Organizations that treat digital marketing as a core business function, rather than an isolated promotional activity, achieve better alignment between brand messaging, customer targeting, and revenue generation (Ferreira et al., 2023). In manufacturing, the use of integrated digital platforms to support product launches, customer feedback, and market analytics has been shown to boost cost-efficiency and return on investment (George et al., 2023). Contemporary research shows that embedding digital platforms and capabilities into strategic planning significantly enhances firms' agility, especially in volatile markets, by enabling adaptive marketing responses and strategic flexibility (Zhu et al., 2025). However, while these studies highlight the financial benefits of DMSI, they often overlook the manufacturing sector in emerging economies, where digital transformation is uneven and traditional marketing models still dominate.

From a social sustainability standpoint, DMSI enables firms to align marketing practices with stakeholder expectations around ethics, inclusivity, and transparency. Recent research indicates that firms embedding digital strategies within their CSR programs are more effective in fostering meaningful engagement with employees, communities, and advocacy groups (Wolf et al., 2024). Tools like social media listening, influencer partnerships, and employee advocacy campaigns have been used to amplify social narratives and improve public trust. Nonetheless, many manufacturing firms, particularly in Africa, lack a coherent approach to integrating digital engagement with social impact goals. In Ghana, although firms have increasingly adopted digital platforms for corporate communication, the absence of strategic alignment with CSR objectives leads to fragmented messaging and minimal creation of social value (Dzage et al., 2024). This disconnect points to a need for more evidence on how DMSI can serve as a mechanism for institutionalizing social sustainability practices within manufacturing settings.

In the realm of environmental sustainability, DMSI offers avenues for promoting green innovations, enhancing supply chain transparency, and engaging consumers in eco-conscious behavior. Strategically integrated digital campaigns can publicize firms' environmental commitments, green certifications, and waste-reduction achievements. Recent evidence from Saudi Arabia indicates that manufacturing firms integrating sustainability messaging into digital channels experience enhanced stakeholder engagement and higher adoption rates of eco-friendly products (Al-Swidi et al., 2024). Moreover, platforms such as lifecycle assessment tools, AI-driven sustainability reporting, and blockchain-enabled traceability systems are increasingly part of strategic digital toolkits. Nevertheless, studies emphasize that many manufacturing firms in emerging economies struggle to integrate digital tools into overarching environmental strategies due to capacity constraints and the absence of robust measurement systems (Mukwarami et al., 2023; Alshahrani, 2023).

Despite the expanding literature on digital marketing strategic integration and sustainability, several interrelated gaps persist, particularly concerning the strategic integration of digital marketing within manufacturing firms. Most existing research focuses on digital marketing adoption or operational capabilities, rather than on how deeply digital strategies are embedded into core sustainability and business planning.

Moreover, much of the empirical evidence originates from service sectors and developed economies, offering limited relevance to manufacturing firms in emerging markets such as Ghana, where digital maturity varies greatly and organizational structures often hinder strategic alignment (Deku et al., 2024; Dinh Van Hoang et al., 2025).

Additionally, studies tend to assess financial, social, and environmental performance in isolation, overlooking the synergies and trade-offs involved in achieving holistic sustainability. Few models have examined the causal pathways linking DMSI to measurable ESG outcomes or provided firms with integrated frameworks and metrics for assessing the effectiveness of their strategic digital initiatives.

This presents both a conceptual and empirical void that justifies deeper investigation. A study exploring the extent to which digital marketing is strategically integrated into sustainability efforts and how this integration influences overall performance would offer critical insights for managers, policymakers, and scholars. It would also support more evidence-based resource allocation, help firms avoid greenwashing, and enhance the competitiveness of manufacturing firms in Africa's rapidly digitizing and sustainability-focused global economy. Hence, the following hypotheses will be tested;

H_3: There is a statistically significant connection between digital marketing strategic integration and the sustainability performance of manufacturing firms.

H_{3a}: There is a statistically significant connection between digital marketing strategic integration and the financial performance of manufacturing firms.

H_{3b}: There is a statistically significant connection between digital marketing strategic integration and the social performance of manufacturing firms.

H_{3c}: There is a statistically significant connection between digital marketing strategic integration and the environmental performance of manufacturing firms.

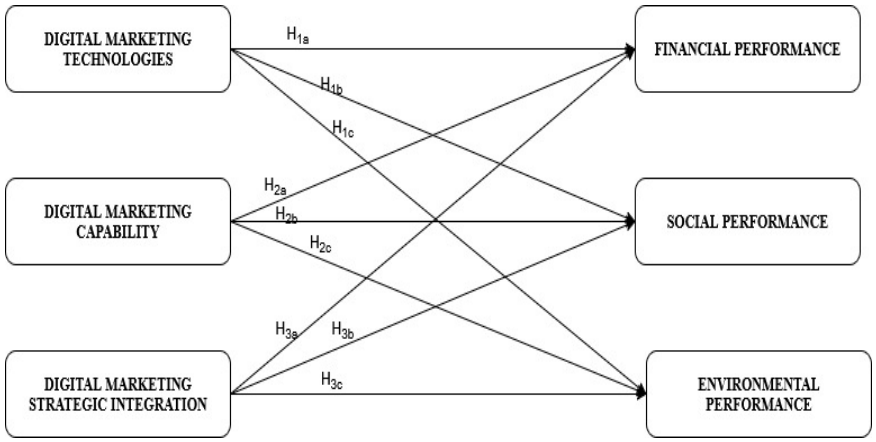

Fig. 1: Conceptual Framework (2025).

3. Methodology

3.1. Survey instrument

The study adapted an existing validated instrument from the literature to suit the context of the study. The items related to the adoption of digital marketing technologies were modified from previous studies to reflect contextual relevance (Trainor et al., 2014; Chaffey & Ellis-Chadwick, 2019). The measurement of digital marketing capability was based on adapted items drawn from (Day, 2011 & Trainor et al.,2014), while the items assessing digital marketing strategic integration were tailored from (Morgan et al.,2009 & Bharadwaj et al., 2013). Constructs relating to financial performance, social performance, and environmental performance were measured using items modified from the established performance evaluation models (Kaplan and Norton, 1996; Venkatraman and Ramanujam,1986; Schaltegger & Wagner, 2006; Erevelles et al., 2016) to ensure alignment with the sustainability dimensions of the study.
This paper employed a 5-point Likert scale. It is pertinent to acknowledge that the preliminary survey underwent evaluation for content validity by three distinct academic faculties, specifically marketing, finance, and accounting.

3.2. Sampling and data collection

The cross-sectional survey design was aimed at a total of 634 manufacturing enterprises that were noted to be registered with the Association of Ghana Industries (AGI) as of the year 2025, which constituted the population of interest. These enterprises were systematically classified according to the specific types of products they manufacture. The investigation utilized the formula propounded by Krejcie and Morgan (1970), delineated below, for the ascertainment of the minimum requisite sample size.

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

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)
Per the sample size calculation methodology posited by Krejcie and Morgan (1970), considering a focal population of 634 registered manufacturing entities, it is determined that the minimal requisite sample for the current inquiry, at a confidence threshold of 95% and a permissible margin of error set at 0.05, is quantified to be 242. To secure this requisite, a total of 300 questionnaires were dispensed utilizing the Google Forms platform, implementing a simple random sampling approach on a pro-rata basis. The retrieval of questionnaires culminated in a total of 287, thereby producing a response rate of 95.7%. Table 1below presents a summary of the sample.

Table 1: Sample Size

Manufacturing sector	Number of respondents	Percentage %
Furniture firms	29	10
Beverages and meals firms	52	18
Pharmaceutical firms	26	9
Chemical firms	17	6
Construction firms	43	15
Clothing firms	11	4
Cosmetics and toiletries firms	34	12
Electronic and electrical firms	43	15
Energy-producing firms	9	3
Printing and packaging firms	23	8
TOTAL	287	100%

Source: Field Survey (2025).

Each questionnaire was filled out by a managerial representative from each sampled manufacturing firm. The manufacturing companies encompassed in this analysis possess significant repute, both at a national level and on an international scale, recognized for their substantial engagement and dedication towards sustainable operational practices. The objectives of the study were explained to the respondents, and only those who were willing to be part of the survey were included. Following the expression of interest, those inclined to complete the questionnaire were extended an invitation to partake voluntarily.

4. Results

4.1. Profile of respondents

The dataset reveals a pronounced gender disparity among the respondents, with males constituting 85% to 15% females. This highlights the continued male dominance in managerial and executive roles within Ghana's manufacturing sectors. The relatively low representation of female respondents suggests systemic underrepresentation of women in leadership positions. This trend may also point to broader gender gaps in career advancement opportunities and executive pipeline development across firms.
Respondents primarily fall within the mid-to-late career stages, with the largest segment around 90% aged between 30 and 50 years. This age bracket reflects a concentration of experienced professionals occupying senior positions within their firms. A smaller fraction of 5% are above 50 years, typically holding high-ranking positions such as board members or long-serving executives. Very few respondents are under 30(5%), suggesting that the survey predominantly captured insights from mature professionals with considerable experience, thus reflecting seasoned decision-making perspectives.

The educational attainment of respondents is notably high, with the majority possessing university-level and professional qualifications. This underscores the emphasis on managerial and technical qualifications in managerial recruitment across the manufacturing firms surveyed. A significant number of respondents 80% have served as managers in their manufacturing firms for more than 5 years. This longevity indicates strong institutional knowledge and long-term engagement with company operations. This is essential for understanding both legacy operations and innovation-oriented change within the sector.

Ownership structures in the surveyed firms vary, with Ghanaian-owned businesses 70% forming the majority. These local enterprises reflect the country's robust entrepreneurial base in the manufacturing sector. Foreign-owned firms 15% are also present, indicating Ghana's role as a host for international investment and multinational operations. In addition, several firms 15% are jointly owned, which likely represent both local and international stakeholders. This mix of ownership types enriches the dataset, offering a comparative look at how domestic and foreign entities operate within Ghana's manufacturing landscape.

4.2. Data analysis

The execution of statistical analysis was accomplished utilizing Smart PLS (version 4.0) software with the objective to evaluate the interrelations among digital marketing investment and outcomes pertaining to the sustainability performance of manufacturing firms (Ringle et al., 2022). Engaging PLS-SEM was deemed appropriate due to its superior flexibility in addressing diverse modeling complexities, especially when contrasted with the stringent and challenging assumptions typically associated with the application of multivariate statistics (Boonlertvanich, 2019).

In accordance with Hair et al. (2019), it is recommended that metrics evaluating a theoretical construct within the structural model achieve a threshold of 0.70 in investigations that utilize previously validated constructs. This threshold is significant because it signifies that the indicator shows more than 50% of the variance linked to the indicator itself. After performing the reliability appraisal of the variables used in this study, only those that met the 0.70 threshold were utilized.

4.3. Evaluation of measurement model

The assessment of the measurement model was conducted using Smart PLS-SEM (version 4). The conceptual framework is constituted by six distinct constructs, which include adoption of digital marketing technologies (DMT), digital marketing capability (DMC), digital marketing strategic integration (DMS), financial performance (FP), Social performance (SP), and environmental performance (EP).

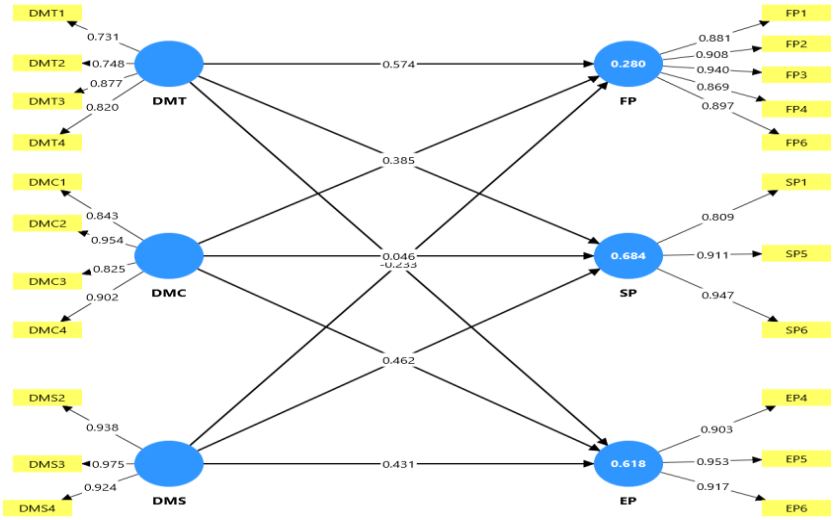

Fig. 2: Measurement Model.

The study assessed the measurement model by engaging in a thorough examination of the construct reliability, convergent, and discriminant validity. Reliability of the variables was established because Cronbach's alpha and composite reliability met the 0.70 threshold (Hair et al., 2019; Hanafiah, 2020). Furthermore, convergent validity was firmly established as the average variance extracted (AVE) exceeded the benchmark value of 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)
DMC	0.905	0.919	0.933	0.778
DMS	0.941	0.946	0.962	0.895
DMT	0.808	0.834	0.873	0.633
EP	0.915	0.920	0.947	0.855
FP	0.941	0.945	0.955	0.809
SP	0.868	0.874	0.920	0.794

Note: DMC = Digital marketing capability, DMS = Digital marketing strategic integration, DMT = Adoption of digital marketing technologies, EP = Environmental performance, FP = Financial performance, SP = Social performance.

The information encapsulated in Table 2 conveys that the items alongside the constructs within this research exhibited sufficient levels of convergent validity and reliability regarding each of the six constructs being analyzed. In this study, the evaluation of discriminant validity was conducted utilizing the heterotrait-monotrait (HTMT) ratio (Henseler et al.,2015). To affirm the discriminant validity, the HTMT ratio for each concept must remain beneath the threshold of 0.9 (Ringle et al., 2022). The findings pertinent to HTMT are delineated in Table 3, which indicates an acceptable level of discriminant validity. This criterion has also been corroborated in the work of Akude et al. (2024) as well as Akuma et al. (2025).

Table 3: Discriminant Validity Assessment (HTMT)

	DMC	DMS	DMT	EP	FP
DMS	0.596				
DMT	0.814	0.832			
EP	0.636	0.792	0.813		
FP	0.422	0.301	0.555	0.542	
SP	0.637	0.860	0.898	0.844	0.612

4.4. Evaluation of the structural model

The structural model necessitates evaluation to analyze the interconnections between digital marketing investment and sustainability performance. Hence, the hypotheses put forth in the study underwent testing.

4.5. Collinearity assessment

The assessment of collinearity concerning latent variables is conducted utilizing the Variance Inflated Factor (VIF). As elucidated by Hair et al. (2017), a VIF threshold equal to or exceeding 5 serves as a possible indicator of collinearity complications. The data presented in Table 4 reveal that the entirety of VIF figures remains beneath the 5 markup, thus suggesting the absence of any prospective collinearity predicaments within the model. Therefore, it can be concluded that the model remains unperturbed by the influence of common method bias (Kock, 2015).

Table 4: Inner VIF

	VIF
DMC -> EP	1.879
DMC -> FP	1.879
DMC -> SP	1.879
DMS -> EP	2.383
DMS -> FP	2.383
DMS -> SP	2.383
DMT -> EP	3.100
DMT -> FP	3.100
DMT -> SP	3.100

The examination of the path coefficients necessitates evaluation alongside the R-square (R^2) and the Stone-Geisser criterion (Q^2) in relation to digital marketing investment and sustainability performance for the purpose of assessing the structural model (Hair et al., 2017).
The R^2 value of 0.614 for environmental performance (EP) is classified as a moderate score within the behavioral sciences (Ali et al., 2018; Hair et al., 2019). This value implies that 61.4% of the variance in EP is elucidated by the three predictors. However, the R^2 value of 0.273 for financial performance is classified as a weak, but acceptable score within the behavioral sciences (Ali et al., 2018; Hair et al., 2019). This value implies that 27.3% of the variance in financial performance is elucidated by the three predictors. In addition, the R^2 value of 0.680 for social performance (SP) is classified as a moderate score within the behavioral sciences (Ali et al., 2018; Hair et al., 2019). This value implies that 68.0% of the variance in SP is elucidated by the three predictors. It should be noted that this variance surpassed the minimum R^2 threshold assessment of 25% (Hair et al., 2021), which is noteworthy.
Per the findings of Hair et al. (2021), the Q^2 assessment must exceed zero to indicate that a structural model possesses predictive capacity; in this instance, a Q^2 value of 0.604 was determined for environmental performance, 0.264 for financial performance, and 0.677 for social performance. Such figures underscore the model's adequate predictive competencies.

4.6. Path coefficient

Digital marketing capability (DMC) has a small positive impact on environmental performance ($\beta = 0.141$) and financial performance ($\beta = 0.148$). However, the effect on social performance is positive but negligible ($\beta = 0.046$).
Digital marketing strategic integration (DMS) shows a moderate-to-strong positive effect on both environmental performance ($\beta = 0.431$) and social performance ($\beta = 0.462$). However, a moderate negative effect is observed on financial performance ($\beta = -0.233$).
The adoption of digital marketing technologies (DMT) has a strong positive impact on financial performance ($\beta = 0.574$). Additionally, DMT has a moderately positive influence on environmental performance ($\beta = 0.300$) and social performance ($\beta = 0.385$).

Table 5: Path Coefficient

Path	coefficients	Strength and direction
DMC -> EP	0.141	Weak Positive
DMC -> FP	0.148	Weak Positive
DMC -> SP	0.046	Negligible
DMS -> EP	0.431	Moderate Positive
DMS -> FP	-0.233	Moderate Negative
DMS -> SP	0.462	Moderate Positive (Strongest)
DMT -> EP	0.300	Moderate Positive
DMT -> FP	0.574	Strong Positive (Highest)
DMT -> SP	0.385	Moderate Positive

4.7. Hypothesis testing (direct effect)

The analysis reveals that digital marketing capability demonstrates a positive effect on environmental performance ($\beta = 0.141$, $p < 0.05$). Similarly, digital marketing capability has a positive effect on financial performance ($\beta = 0.148$, $p < 0.05$). However, digital marketing capability exhibits no statistically significant effect on social performance ($\beta = 0.046$, $p = 0.243$).

Digital marketing strategic integration (DMS) exhibits a positively significant effect on both environmental ($\beta = 0.431$, $p < 0.01$) and social performance ($\beta = 0.462$, $p < 0.01$). However, DMS has a statistically significant but negative effect on financial performance ($\beta = -0.233$, $p = 0.006$).
The adoption of digital marketing technologies (DMT) demonstrates a significant influence on financial performance ($\beta = 0.574$, $p < 0.01$). Also, the adoption of DMT positively affects social performance ($\beta = 0.385$, $p < 0.01$). Moreover, the adoption of DMT has a positive effect on environmental performance ($\beta = 0.300$, $p < 0.01$) as can be demonstrated in Table 6.

Table 6: Hypotheses Analysis

	Original sample (O)	T statistics (|O/STDEV|)	P values	f-square (f^2)	Decision
DMC -> EP	0.141	1.984	0.047	0.028	Supported
DMC -> FP	0.148	2.871	0.004	0.016	Supported
DMC -> SP	0.046	1.168	0.243	0.004	Not supported
DMS -> EP	0.431	7.495	0.000	0.204	Supported
DMS -> FP	-0.233	2.765	0.006	0.032	Supported
DMS -> SP	0.462	9.593	0.000	0.284	Supported
DMT -> EP	0.300	4.041	0.000	0.076	Supported
DMT -> FP	0.574	7.394	0.000	0.148	Supported
DMT -> SP	0.385	7.430	0.000	0.151	Supported

The examination further evaluated the effect size (f^2), serving as an indicator for ascertaining the significance of a particular exogenous construct with respect to influencing an outcome variable. In accordance with Cohen's (1988) as well as Hair et al. (2017) recommendations, the f^2 effect size values indicate that digital marketing capability (DMC) has a generally weak effect on sustainability performance outcomes. Specifically, digital marketing capability shows a small effect on environmental performance ($f^2 = 0.028$). However, the effect of digital marketing capability on financial performance is negligible ($f^2 = 0.016$), and the impact on social performance is even weaker ($f^2 = 0.004$), indicating that DMC alone does not significantly enhance a firm's financial returns or social engagement.
Digital marketing strategic integration exhibits stronger and more diverse effects on sustainability performance. Specifically, digital marketing strategic integration has a medium effect on environmental performance ($f^2 = 0.204$). Though the effect on financial performance is small ($f^2 = 0.032$), it is still notable, especially considering the negative direction of the path coefficient. The most pronounced influence of digital marketing strategic integration is on social performance ($f^2 = 0.284$), which is approaching a large effect size.
The adoption of digital marketing technologies demonstrates consistently positive and meaningful contributions across all performance metrics. For environmental performance, the adoption of digital marketing technologies registers a small to moderate effect ($f^2 = 0.076$). The effect of digital marketing technologies on financial performance is close to a medium level ($f^2 = 0.148$). Similarly, the effect of digital marketing technology adoption on social performance is moderate ($f^2 = 0.151$).

5. Discussion

The present study, grounded in the resource-based view theory and the triple bottom line theory, embarks on an explanation on the connection between digital marketing investment and the sustainability performance of manufacturing forms. The findings furnish empirical justification regarding the interplay between digital marketing investment and sustainability performance within the manufacturing sector. The findings reveal that digital marketing capability (DMC) plays a statistically significant role in enhancing both environmental and financial performance within organizations, albeit with relatively small effect sizes. The positive relationship between DMC and environmental performance may be attributed to the ability of firms to utilize digital tools to optimize resource use, reduce waste, and promote sustainable practices. Similarly, the significant positive effect on financial performance indicates that digital capabilities may improve operational efficiency, customer targeting, and cost-effectiveness. However, the lack of a significant relationship between digital marketing capability (DMC) and social performance suggests that digital proficiency alone does not ensure societal impact. While DMC boosts efficiency and market reach, it often emphasizes commercial goals over stakeholder concerns without CSR alignment. True social performance requires trust, transparency, ethics, and stakeholder engagement factors beyond technical expertise. Firms with strong DMC but weak CSR risk skepticism. Thus, DMC must be complemented by values-driven strategies and governance to achieve meaningful social outcomes. This divergence highlights the complex and multidimensional nature of performance outcomes associated with digital transformation as delineated in Table 6.
The study reveals that digital marketing strategic integration (DMS) has a significant and positive influence on both environmental performance and social performance, suggesting that embedding digital marketing within broader organizational strategies can enhance sustainability and stakeholder engagement. This supports the notion that when digital efforts are aligned with long-term goals, firms are better positioned to implement eco-friendly practices and strengthen their social responsibility profile. However, the study uncovers a statistically significant but negative relationship between digital marketing strategic integration (DMS) and financial performance, revealing the paradoxical short-term effects of digital transformation. This outcome is largely attributable to substantial initial costs, such as investments in advanced systems, employee training, IT infrastructure, and organizational restructuring, which place downward pressure on profitability. Moreover, firms in transition often face learning curve challenges and resource reallocation, as managers and employees adjust to new technologies, processes, and cross-functional collaboration. These factors temporarily reduce efficiency and divert attention from profit-generating activities, delaying the realization of long-term performance benefits.
The findings reveal that the adoption of digital marketing technologies (DMT) significantly enhances all three dimensions of sustainability performance: financial, social, and environmental, as shown in Table 6. The strong positive effect on financial performance suggests that digital technologies such as analytics, automation, and customer relationship tools drive cost-efficiency, sales growth, and revenue optimization. The positive impact on social performance may be attributed to improved communication, inclusivity, and stakeholder engagement enabled by digital platforms. Likewise, the influence on environmental performance likely stems from the use of data-driven insights to reduce waste, optimize resource use, and adopt greener marketing practices. These results highlight the comprehensive value that digital technology adoption brings to modern businesses, supporting its role as a key enabler of the sustainable success of firms.

6. Conclusion

Digital marketing capability contributes positively to organizational environmental and financial outcomes, but not to social performance. This implies that while the development of digital skills and infrastructure is beneficial for improving ecological sustainability and profitability, it does not necessarily enhance a firm's social responsibilities or engagement practices. The results underscore the need for organizations to move beyond digital proficiency and adopt more integrative strategies that align digital capabilities with broader social value creation objectives.

In addition, digital marketing strategic integration (DMS) proves to be a critical driver of both environmental and social performance, reinforcing its role in fostering sustainability-oriented outcomes. However, its negative significant impact on financial performance suggests potential trade-offs during the implementation phase, where upfront costs or inefficiencies may outweigh immediate monetary returns. The findings highlight that while DMS is beneficial from a sustainability perspective, its financial impact should be carefully managed.

Moreover, the adoption of digital marketing technologies emerges as a vital determinant of organizational success, contributing positively and significantly to financial, social, and environmental performance. This finding confirms that technology adoption is not merely a technical upgrade but a strategic investment with far-reaching impacts across all dimensions of corporate sustainability. By embracing these tools, firms are better positioned to compete, comply with regulatory expectations, and meet the demands of socially and environmentally conscious stakeholders.

7. Theoretical Implications

Theoretically, the findings throw more light on the resource-based view (RBV) by confirming that digital marketing capabilities can serve as valuable organizational resources that enhance specific dimensions of firm performance. However, the non-significant relationship with social performance reveals a limitation in the RBV's ability to fully explain outcomes related to social value creation. This points to the need for integrating additional theoretical lenses, such as stakeholder theory or institutional theory, to better capture the social dimension of digital transformation.

Furthermore, the findings of this study have important implications for the Resource-Based View (RBV) and the Triple Bottom Line (TBL) theory. From the RBV perspective, the integration of digital marketing strategies can be seen as a valuable, rare, and inimitable resource that contributes to sustainable competitive advantage—particularly by enhancing a firm's environmental and social performance. The results demonstrate that strategically leveraging digital marketing not only strengthens operational alignment with sustainability goals but also reinforces the firm's unique internal capabilities. In alignment with the TBL framework, the study confirms that digital strategic integration positively influences both the environmental and social pillars of sustainability. However, the observed significant negative effect on financial performance introduces an important nuance: while such integration advances sustainability objectives, it may temporarily conflict with profitability goals. This suggests that theoretical models should more explicitly account for temporal trade-offs between people, planet, and profit when examining how digital strategies shape organizational outcomes.

The findings affirm the relevance of the Resource-Based View (RBV) and Triple Bottom Line (TBL) frameworks. Under the RBV, digital marketing technologies represent a strategic resource valuable, rare, and difficult to replicate that enabling firms to enhance operational efficiency and create unique value across multiple dimensions. These technologies empower firms to leverage customer insights, optimize processes, and build digital assets that contribute to long-term competitiveness. The findings also support the TBL theory, which posits that businesses should balance financial, social, and environmental goals. The significant positive effects of DMT on all three performance pillars validate the idea that digital technology adoption is central to achieving integrated sustainability. Thus, the results enrich both theories by demonstrating how digital resources drive multi-dimensional performance.

From a theoretical perspective, the statistically significant yet negative relationship between digital marketing strategic integration (DMS) and financial performance aligns with the dynamic capabilities view, which suggests that firms must reconfigure resources and capabilities to adapt to digital disruption, a process that is costly and disruptive in the short run but ultimately enhances competitiveness and performance over time. The negative association, therefore, does not undermine the strategic value of DMS but rather underscores its temporal duality, where initial financial sacrifices may precede future gains.

8. Managerial Implications

The findings of this research have managerial implications.

For practitioners, the results offer important guidance. Managers should recognize that investing in digital marketing capability can yield returns in terms of both environmental efficiency and financial gains. These benefits may come from data-driven decision-making, improved customer engagement, and streamlined marketing processes. However, to realize social impact, managers must go beyond technological competence and consider embedding corporate social responsibility (CSR) frameworks and stakeholder-focused strategies into their digital efforts. Initiatives like inclusive messaging, digital accessibility, and online community building may be necessary to translate digital capability into measurable social performance.

Furthermore, the results underscore the importance of integrating digital marketing initiatives into the broader strategic framework of the organization. Such integration not only enhances the firm's reputation and social impact but also supports environmentally responsible practices. However, managers must remain cautious of the potential financial strain that may arise during the transition. To mitigate negative financial effects, decision-makers should adopt phased rollouts, monitor ROI metrics closely, and ensure cross-functional collaboration to optimize cost-efficiency and value delivery throughout the integration process.

For managers, the statistically significant yet negative relationship between digital marketing strategic integration (DMS) and financial performance emphasizes the need for a long-term perspective in evaluating digital marketing integration, avoiding premature judgments based on short-term profitability declines, and adopting phased implementation strategies that minimize inefficiencies while ensuring capability development.

In addition, these findings underscore the strategic imperative of investing in and deploying digital marketing technologies. Such technologies offer measurable returns in financial performance while simultaneously strengthening the organization's social presence and environmental accountability. Managers should prioritize technologies that support data analytics, content personalization, digital outreach, and green marketing practices. However, successful implementation requires building digital capabilities, training staff, and ensuring

alignment with organizational goals. Firms that proactively integrate these tools will be better equipped to drive holistic performance and maintain a competitive edge in an increasingly digital and sustainability-conscious marketplace.

9. Limitations and Recommendations for Future Research

Despite its contributions, this study has limitations. The focus on digital marketing capability (DMC) as a standalone construct may oversimplify the complex interplay between capability, strategy, and organizational culture. Moreover, the study is context-specific and may not be generalizable across all sectors or regions. Future research should explore the mediating or moderating roles of strategic integration, corporate values, or industry characteristics in shaping the relationship between DMC and performance outcomes. Additionally, longitudinal studies could better help readers to understand the long-term impact of digital marketing capabilities on social sustainability.
Additionally, contextual factors such as industry type, firm size, or market maturity may moderate the relationships observed. Future studies should consider longitudinal approaches to track the evolving financial impact over time and examine whether the negative effect on profitability persists or diminishes. Researchers could also explore the role of organizational readiness, culture, or leadership in mediating the relationship between strategic integration and financial outcomes.
The cross-sectional nature of the data restricts the ability to assess long-term causality between technology adoption and performance outcomes. Additionally, contextual variables such as industry type, organizational culture, or digital maturity level may moderate the effects observed, but were not explored in depth. Future studies should consider a longitudinal design to track changes over time and investigate whether the observed benefits are sustained or amplified. Moreover, qualitative studies could be conducted to explore how organizational culture, leadership, and employee readiness influence the effectiveness of digital marketing technology adoption. Expanding the model across different sectors and geographies could also enhance generalizability and deepen insights into contextual differences.

Ethical Considerations

The authors affirm that the respondents have given permission for the study to be carried out.

Conflict of Interest

The authors assert no conflicts of interest.

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