MANAGERIAL STRATEGIES FOR OPTIMIZING SUSTAINABILITY IN DIGITAL BUSINESS: A GREEN ECONOMY APPROACH IN E-COMMERCE COMPANIES

Chavid Moyo Jaladri

Universitas Islam Negeri Sayyid Ali Rahmatullah, Tulungagung, Indonesia

* Correspondence: chavidmoyojaladri@gmail.com

Abstract

The rapid growth of e-commerce has precipitated significant environmental challenges, including increased carbon emissions from logistics, excessive packaging waste, and high energy consumption in data centers. Integrating green economy principles into digital business models is imperative for achieving sustainable development. This study aims to identify and analyze effective managerial strategies for optimizing sustainability performarticleance within e-commerce companies through a green economy lens. A mixed-methods approach was employed, combining quantitative surveys with 150 mid-to-senior-level managers from Indonesian e-commerce firms and qualitative in-depth interviews with 15 sustainability officers. Quantitative data were analyzed using descriptive statistics and multiple linear regression to examine the relationship between strategic dimensions (Green Operations, Sustainable Supply Chain, Eco-Innovation, and Stakeholder Engagement) and perceived sustainability performance. The regression model explained 68.4% of the variance in sustainability performance ($R^2 = 0.684$, $p < 0.001$), with Eco-Innovation ($\beta = 0.412$, $p < 0.001$) and Sustainable Supply Chain ($\beta = 0.387$, $p < 0.001$) emerging as the strongest predictors. Qualitative findings revealed that successful implementation hinges on top management commitment, cross-departmental integration, and the use of digital tools for monitoring environmental impact. The discussion synthesizes these results, arguing that a synergistic, strategy-driven approach that aligns digital efficiency with ecological responsibility is critical. This study contributes to the literature by providing an integrated framework that connects specific managerial actions with measurable sustainability outcomes in the e-commerce context, offering practical guidance for practitioners and policymakers aiming to foster a green digital economy.

Keywords: *Managerial Strategy, Sustainability, Green Economy, E-commerce, Digital Business*

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1. Introduction

The digital revolution, epitomized by the explosive growth of e-commerce, has fundamentally transformed global commerce, offering unprecedented convenience and market access. However, this paradigm shift carries a substantial environmental cost. The operational backbone of e-commerce—extensive logistics networks, energy-intensive data centers, and single-use packaging—generates significant carbon footprints, resource depletion, and waste (Sarkis, Zhu, & Lai, 2021). The linear "take-make-dispose" model prevalent in many digital businesses is increasingly untenable within planetary boundaries. Concurrently, the green economy paradigm has gained prominence as a framework for achieving sustainable development by fostering low-carbon, resource-efficient, and socially inclusive economic activities (UNEP, 2011). This paradigm calls for a decoupling of economic growth from environmental degradation, a challenge that the digital sector must urgently address.

The intersection of digital business and sustainability presents a complex managerial challenge. While digitalization can enable sustainability through dematerialization and optimized resource use (e.g., smart logistics), it can also exacerbate environmental problems through rebound effects and increased consumption (Bocken & Short, 2021). For e-commerce companies, this tension is palpable. Prior research has explored various facets of this issue, such as green supply chain management (Zhu, Sarkis, & Lai, 2012), consumer attitudes toward green e-commerce (Yadav & Pathak, 2017), and the role of corporate social responsibility (CSR) reporting in the digital age. However, a significant research gap persists. Existing studies often treat sustainability initiatives in isolation—focusing solely on logistics, packaging, or marketing—without providing an integrated view of the *managerial strategies* that orchestrate these elements into a coherent, performance-enhancing whole. There is a lack of empirical studies that systematically link specific, multifaceted managerial strategies rooted in green economy principles to the overall sustainability performance of e-commerce firms.

Furthermore, the context of emerging economies, where e-commerce growth is most rapid and regulatory frameworks may be evolving, is underexplored. Studies like Kusumah et al. (2025) on community empowerment through tourism highlight the importance of localized, integrated approaches to sustainable economic development, a perspective that can inform business strategy. This study posits that for e-commerce companies to genuinely contribute to a green economy, sustainability must be strategically embedded into core managerial decisions and operations, moving beyond peripheral CSR activities. Therefore, this research seeks to answer the central question: **What are the key managerial strategies, aligned with green economy principles, that effectively optimize sustainability performance in e-commerce companies?**

The primary objective of this study is to develop and validate a framework of managerial strategies for sustainability in digital business. Specifically, it aims to: (1) Identify the core dimensions of green economy-aligned managerial strategies in e-commerce; (2) Analyze the relative impact of these strategic dimensions on perceived sustainability performance; and (3) Explore the enablers and barriers to implementing these strategies from a managerial perspective. By addressing these aims, this research contributes to bridging the identified gap, offering both theoretical insights and practical, actionable guidance for leaders navigating the sustainability imperative in the digital marketplace.

2. Methods

This study employed a sequential explanatory mixed-methods design to provide a comprehensive understanding of the research problem. The initial quantitative phase aimed to identify and measure the relationship between key strategic variables and sustainability performance. The subsequent qualitative phase was designed to elaborate on, explain, and contextualize the quantitative findings by exploring the underlying managerial processes and perceptions.

The research population consisted of mid-to-senior-level managers and sustainability officers working in e-commerce companies operating in Indonesia. For the quantitative phase, a non-probability purposive sampling technique was used. An online survey was distributed through professional networks and industry associations, resulting in 150 usable responses from managers with decision-making authority in areas such as operations, logistics, marketing, or strategy. The survey instrument

was developed based on a synthesis of literature on green business strategy, sustainable supply chain management, and digital transformation. It measured four independent variables—Green Operations (5 items, α=.89), Sustainable Supply Chain (6 items, α=.91), Eco-Innovation (5 items, α=.87), and Stakeholder Engagement (4 items, α=.85)—and the dependent variable, Perceived Sustainability Performance (6 items, α=.92), using a 7-point Likert scale (1=Strongly Disagree to 7=Strongly Agree). Content validity was established through expert review, and reliability was confirmed via Cronbach's Alpha scores all above 0.7. Data were analyzed using SPSS 26.0, employing descriptive statistics and multiple linear regression analysis to test the hypothesized relationships.

The qualitative phase involved semi-structured in-depth interviews with 15 sustainability officers or senior managers directly responsible for environmental strategy in their e-commerce firms. Participants were selected from survey respondents who volunteered for further contact, ensuring they represented companies with varying levels of sustainability performance. Interviews, conducted virtually, lasted 45-60 minutes and were guided by a protocol exploring the implementation, challenges, drivers, and outcomes of the strategies identified in the quantitative phase. All interviews were recorded, transcribed verbatim, and analyzed using thematic analysis following the steps outlined by Braun and Clarke (2006): familiarization, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. This process allowed for a rich, nuanced interpretation of the quantitative results, grounding them in the lived experience of practitioners.

3. Results and Discussion

Quantitative Findings

Descriptive statistics for the key variables are presented in Table 1. The mean scores indicate that, on average, managers perceive their companies to be moderately engaged in the four strategic dimensions, with Sustainable Supply Chain (M=4.82) and Stakeholder Engagement (M=4.79) scoring slightly higher than Green Operations (M=4.65) and Eco-Innovation (M=4.58). Perceived Sustainability Performance had a mean of 4.88, suggesting room for improvement across the sector.

Table 1. Descriptive Statistics of Research Variables (N=150)

Variable	No. of Items	Mean	Std. Deviation	Min	Max
Green Operations (GO)	5	4.65	1.12	1.80	6.60
Sustainable Supply Chain (SSC)	6	4.82	1.08	2.00	6.83
Eco-Innovation (EI)	5	4.58	1.15	1.60	6.80
Stakeholder Engagement (SE)	4	4.79	1.05	2.25	6.75
Sustainability Performance (SP)	6	4.88	1.04	2.17	6.83

A multiple linear regression was performed to predict Sustainability Performance based on the four strategic dimensions. The assumptions of linearity, independence of errors, homoscedasticity, and normality were met. The results of the regression analysis are summarized in Table 2.

Table 2. Results of Multiple Linear Regression Analysis

Model	R	R^2	Adjusted R^2	Std. Error	F	Sig.
1	.827	.684	.675	.592	78.634	.000
Predictors	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (β)	t	Sig.	
(Constant)	0.451	0.214		2.107	.037	
GO	0.118	0.055	.127	2.145	.034	
SSC	0.352	0.061	.387	5.770	.000	
EI	0.372	0.058	.412	6.414	.000	
SE	0.165	0.052	.167	3.173	.002	

Dependent Variable: Sustainability Performance (SP)

The regression model was statistically significant, $F(4, 145) = 78.634$, $p < .001$, indicating that the combination of the four predictors significantly explains the variance in Sustainability Performance. The model explains 68.4% of the variance ($R^2 = .684$). All four strategic dimensions were significant positive predictors. Eco-Innovation ($\beta = .412$, $p < .001$) had the strongest unique contribution, followed closely by Sustainable Supply Chain ($\beta = .387$, $p < .001$). Stakeholder Engagement ($\beta = .167$, $p = .002$) and Green Operations ($\beta = .127$, $p = .034$) also contributed significantly, though with smaller effect sizes.

Qualitative Findings

The thematic analysis of interview data provided depth to the quantitative results, elucidating *how* these strategies are enacted and the factors influencing their success. Three overarching themes emerged:

1. **Strategic Integration as a Core Challenge:** Participants consistently emphasized that the most significant barrier was not a lack of individual green initiatives (e.g., biodegradable packaging) but the difficulty of integrating sustainability into the core business strategy and across all departments. A sustainability officer noted, "Marketing runs campaigns on 'green delivery,' but operations are measured purely on cost and speed. The strategies are siloed, so the impact is limited" (Interviewee 7). Successful companies were described as those where sustainability KPIs were embedded in performance reviews for logistics, procurement, and even IT departments.
2. **The Enabling Role of Digital Tools and Data:** The interviews revealed that data analytics and digital platforms were critical enablers. Managers used tools to calculate carbon footprints per shipment, optimize delivery routes to reduce fuel consumption, and monitor supplier compliance with environmental standards. "You can't manage what you don't measure. Our dashboard tracks packaging waste, energy use in warehouses, and emissions. This data is what convinces the board to invest in new, cleaner technologies" (Interviewee 3). This aligns with the strong quantitative showing of Eco-Innovation.
3. **Leadership and Ecosystem Collaboration:** The importance of top management commitment was unequivocal. Participants stated that without CEO and board-level advocacy, sustainability projects struggled for funding and priority. Furthermore, the theme of collaboration extended beyond internal stakeholders. Engaging with suppliers to adopt greener practices, partnering with logistics companies for electric vehicle fleets, and even collaborating with competitors on packaging standardization were cited as advanced applications of the Stakeholder Engagement strategy. One manager explained, "Our Sustainable Supply Chain score improved only after we worked *with* our top ten suppliers on a joint audit and improvement program, rather than just imposing requirements" (Interviewee 11).

Discussion

The findings of this study offer substantial insights into the managerial orchestration of sustainability within the e-commerce sector. The quantitative results confirm that a multi-faceted strategic approach is essential, with Eco-Innovation and Sustainable Supply Chain management being particularly potent levers for enhancing sustainability performance. This underscores a shift from viewing environmental responsibility as a cost center to recognizing it as a domain for strategic innovation and competitive advantage (Bocken & Short, 2021). The strong predictive power of Eco-Innovation ($\beta = .412$) suggests that developing new business models, digital platforms for product lifecycle management, or novel recycling technologies is more impactful than incremental improvements to existing operations. This resonates with the green economy's emphasis on systemic innovation for decoupling growth from resource use (UNEP, 2011).

The significant role of Sustainable Supply Chain ($\beta = .387$) highlights that an e-commerce company's environmental footprint is largely determined by its extended network. This finding aligns with and extends the work of Zhu et al. (2012), applying it specifically to the digital commerce context. It implies that managerial strategy must look beyond corporate boundaries, requiring skills in governance, collaboration, and incentivizing partners—a complex task that the qualitative data revealed to be a major focus for leading firms.

The qualitative themes provide a crucial explanatory layer. The challenge of **Strategic Integration** explains why Green Operations, while significant, had a lower beta (β = .127). Isolated operational fixes (like changing light bulbs in warehouses) are easier to implement but yield limited returns if not part of a reconfigured, system-wide strategy. This integration challenge is a key contribution to the literature, highlighting a critical implementation gap. Furthermore, the theme of **Digital Tools and Data** directly links the digital nature of the business to its sustainability potential. It demonstrates how the core asset of digital companies—data—can be leveraged to manage ecological impact, creating a virtuous cycle where digitalization enables greening.

The emphasis on **Leadership and Ecosystem Collaboration** reinforces the importance of Stakeholder Engagement. Its significant but moderate beta (β = .167) may reflect that while engagement is a necessary foundation, its direct performance payoff is realized through the concrete innovations and supply chain changes it facilitates. This aligns with stakeholder theory, which posits that addressing broader societal concerns is integral to long-term business success (Freeman, Harrison, & Wicks, 2010). The study's integrated framework, validated by both statistical relationships and managerial narratives, addresses the identified research gap. It moves beyond a siloed examination of sustainability tactics to propose a coherent set of interdependent managerial strategy dimensiarticleons. In line with the localized approach seen in studies like Kusumah et al. (2025), this research confirms that effective strategy is not generic but requires contextual adaptation, navigating specific regulatory, market, and infrastructural conditions of the operating environment.

Limitations and Suggestions for Future Research

This study has limitations. Its reliance on perceptual measures from managers may introduce bias, though this was mitigated by focusing on informed key informants. The sample, while diverse, is from a single country, which may limit generalizability. Future research should employ objective performance metrics (e.g., actual carbon emission data) and conduct longitudinal or cross-country comparative studies. Furthermore, investigating the role of specific digital technologies (e.g., AI, blockchain) in enabling each strategic dimension presents a promising avenue for deepening understanding at the nexus of digitalization and sustainability.

4. Conclusion

This research demonstrates that optimizing sustainability in e-commerce is not a matter of adopting a single best practice but requires a deliberate, integrated managerial strategy rooted in green economy principles. The most impactful path forward involves prioritizing Eco-Innovation to redesign business models and processes, coupled with deep collaboration to green the entire supply chain. These core efforts must be supported by engaged leadership that breaks down internal silos and leverages digital tools for transparency and improvement. For practitioners, the study provides a validated framework to audit, design, and implement their sustainability strategies. For policymakers, it underscores the need to create ecosystems that incentivize such integrated, innovation-driven approaches, fostering a digital economy that is not only efficient and profitable but also regenerative and just. The journey toward sustainable digital business is complex, but a clear, strategy-driven roadmap is essential for navigating it successfully.

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