The Role of Corporate Growth in Mediating the Influence Green Technology Innovation on Green Competitive Advantage

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Abstract. This study explores the link between disclosure related to the environment, the application of environmentally friendly technology, and environmentally oriented accounting to achieve competitive advantage. This study specifically analyzes the role of sustainable development. This study uses the theoretical framework of Natural Resource-Based View (NRBV) to expand the understanding of companies in achieving competitive advantage through the application of environmentally friendly technologies. The information used comes from 50 companies engaged in manufacturing in Indonesia. The Data were analyzed using SEM-PLS version 4.0 to test the hypothesis. The results showed that reporting related to the environment, environmentally friendly technology, and accounting that focuses on the environment have a significant influence on the company's competitive advantage. In addition, the results of this study indicate that sustainability serves as a bridge in the relationship between the use of environmentally friendly technologies and the company's competitive advantage. This research enriches the existing literature by providing empirical evidence that shows the importance of adopting environmentally friendly technologies to support the implementation of environmentally focused accounting in achieving competitive advantages. Furthermore, organizations can benefit by prioritizing the use of environmentally friendly technologies and developing competitive advantages to improve overall environmental performance, which can be used by policymakers and interested parties to achieve sustainable competitive advantages in the manufacturing sector.

Keywords: eco-friendly technology, green accounting; competitive advantage.

1 Introduction

In the contemporary commercial landscape, which is defined by volatility and intense rivalry, sustainability has transcended its origins as a moral footnote. It is now recognized as a fundamental strategic pillar. Organizations are facing a rising tide of pressure from regulatory bodies, global stakeholders, and an increasingly vocal consumer base, forcing a radical shift in how they design operations and chart long-term growth. Rather than a burden, sustainability is now a primary vehicle for securing and defending a competitive edge in markets that are shifting beneath our feet. To thrive, modern enterprises are increasingly turning toward eco-centric operational models, embedding green technologies into their core, and refining their internal capabilities to boost environmental protection [2]. These shifts do more than just lower a firm's ecological footprint; they solidify a company's commitment to Corporate Social Responsibility (CSR) and unlock fresh avenues for market differentiation. Furthermore, the integration of green technologies acts as a catalyst for ongoing innovation in both products and processes, ensuring that firms remain flexible and relevant amidst global ecological shifts [3].

The modern marketplace is witnessing a massive surge in the demand for products that are not only high-performing but also ethically produced and environmentally benign. Today's consumers are more informed and

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environmentally conscious than ever, often prioritizing sustainability standards over traditional metrics when making purchasing decisions. Consequently, moving toward sustainable product development has evolved from a "nice-to-have" feature into a survival requirement. Companies that successfully marry advanced technology with responsible practices find themselves in a superior position: they can deliver goods that are both eco-friendly and cost-effective. By leveraging technological breakthroughs and fine-tuning internal assets, organizations can sharpen their operational efficiency, minimize waste, and create distinct product identities that resonate with the public. These specialized capabilities are the keys to maintaining a dominant position in an increasingly crowded and competitive global arena [4][5][6]. Thus, innovation rooted in sustainability is the new engine for business resilience.

Despite the widespread conversation surrounding these issues, our collective understanding of how Green Technology Innovation and Green Accounting work in tandem to produce sustainable growth remains fragmented. Green Technology Innovation—the development and adoption of systems designed to curb environmental damage, such as renewable energy, waste-minimization tools, and pollution control—has shown a clear positive correlation with competitive advantage. It achieves this by streamlining operations, mitigating environmental liabilities, and bolstering the brand's public image [3][7][9]. Nevertheless, the specific "black box" through which these innovations translate into long-term strategic success still requires deeper investigation.

Parallel to technological advances, Green Accounting is emerging as a vital tool for weaving sustainability into the fabric of corporate governance. This practice involves the systematic integration of environmental costs, risks, and dividends into a firm's financial and managerial reporting. By quantifying environmental variables, leaders can move beyond guesswork to make data-driven, responsible strategic choices [11]. Organizations that adopt these accounting frameworks tend to be more agile; they anticipate regulatory changes faster, respond more effectively to market pressures, and build more robust business models [3][12]. This alignment between environmental stewardship and financial transparency is a critical component of modern organizational health.

While global attention is focused on the green transition, there is still a noticeable gap in the literature regarding how these variables—innovation, accounting, growth, and advantage—interact within a single, unified framework. Specifically, we lack a clear picture of how these practices jointly dictate a company's long-term trajectory. It is therefore crucial to analyze the degree to which green innovation fuels both competitive standing and enduring growth. Furthermore, exploring how green accounting shapes innovation outcomes can provide vital clues on how environmental strategies become tangible business profits [13][14]. This inquiry seeks to determine if sustainability is merely a shield for compliance or a sword for superior performance.

This study adds to the growing body of knowledge on sustainability and tech adoption by offering empirical clarity on the nexus between green innovation, accounting practices, and organizational success. By analyzing these elements simultaneously, we offer a holistic view of how eco-centric strategies transform corporate performance. For instance, integrated accounting systems allow leaders to spot environmental opportunities and pivot before risks become crises, ultimately improving the firm’s growth path [15].

Theoretically, this research is anchored in the Natural Resource-Based View (NRBV). This theory expands the traditional Resource-Based View by arguing that a firm's relationship with the natural environment is a source of unique, non-imitable capabilities. According to NRBV, long-term competitive success rests on three pillars: environmental transparency, the deployment of green technologies, and the strategic optimization of internal resources [19]. This lens suggests that being environmentally responsible is not an overhead cost, but a strategic asset.

Transparency, or environmental openness, builds a bridge of trust with stakeholders and legitimizes the company's presence in the market. Meanwhile, Green Technology Innovation provides the tools to balance economic ambitions with the preservation of the planet. Sustainable development, in this context, is the art of merging growth targets with environmental care in a way that looks toward the future [20]. To win in the current era, firms must prioritize a resource-centric strategy that places green innovation at the heart of their development.

Ultimately, when environmental transparency, technological ingenuity, and resource efficiency are aligned, the result is a powerful formula for sustainable growth. This synergy allows firms to boost efficiency, lower risk, and foster deeper connections with their communities, creating value that lasts for both the company and society at large [21]. Therefore, decyphering the complex interplay between these factors is no longer just an academic exercise; it is a management priority in an era where sustainability defines the terms of competition.

1.1 Environmental Disclosure and Competitive Advantage

Environmental disclosure serves as a strategic communication bridge between an organization and its stakeholders, detailing how the firm manages its ecological footprint, waste, and resource efficiency. By pulling back the curtain on their internal environmental policies and pollution controls, companies satisfy the growing demand for corporate

accountability and transparency. This practice is intrinsically linked to Corporate Social Responsibility (CSR), as it provides documented evidence of a firm's ethical governance and commitment to global sustainability standards [17][18]. Beyond mere compliance, high-quality environmental reporting acts as a powerful tool for differentiation; it bolsters a company's reputation and legitimacy, fostering deeper trust among investors and consumers alike. Consequently, firms that proactively share their environmental journey often enjoy enhanced brand loyalty and easier access to capital, transforming transparency into a sustainable competitive edge [4].

1.2 Environmentally Friendly Technological Innovation and Competitive Advantage

Environmentally friendly technological innovation, or green innovation, is defined by its dual capacity to generate economic value while systematically neutralizing ecological harm. As industries grapple with the realities of resource scarcity and climate change, these innovations provide the necessary technical infrastructure to develop low-carbon products and energy-efficient systems. This approach does not only involve creating new goods but also redesigning existing manufacturing processes to slash waste and operational overhead [10]. By integrating these green advancements, companies can achieve a "cost leadership" position through heightened efficiency while simultaneously meeting the public's appetite for sustainable solutions [23]. Scholars highlight that such innovative capabilities provide the essential knowledge and resources required for long-term industrial resilience, making green technology a central driver of a firm's market superiority [24][15].

1.3 Green Accounting and Competitive Advantage

Green accounting redefines traditional financial management by embedding environmental costs and liabilities directly into a company's reporting and decision-making framework. This integration allows leadership to identify hidden inefficiencies, optimize resource allocation, and align budgeting with the firm's ecological responsibilities [7][14]. Empirical evidence suggests that this level of financial transparency often results in superior economic performance, as it enables better risk management and significant reductions in production-related waste [25]. Furthermore, by providing clear data on environmental impact, green accounting supports the broader Sustainable Development Goals (SDGs) and enhances a firm's credibility in the eyes of a modern, environmentally conscious market. Ultimately, it functions as a sophisticated management tool that converts environmental stewardship into a measurable strategic asset [27].

1.4 Sustainable Growth and Competitive Advantage

Sustainable growth represents an organization's pursuit of long-term expansion that balances financial health with social and environmental integrity. It often serves as a critical intermediary in the corporate ecosystem; for instance, green accounting practices and technological breakthroughs foster the operational efficiency required to sustain growth without depleting natural resources [32]. Research indicates that sustainable growth acts as a strategic bridge, mediating the relationship between green innovation and competitive advantage by translating eco-centric initiatives into resilient market positioning [31]. This creates a self-reinforcing cycle where environmental responsibility drives operational success, which in turn fuels expansion and reinforces the company's competitive standing [16]. Thus, firms that effectively synchronize their accounting, innovation, and growth strategies are best equipped to maintain superior performance in a landscape increasingly defined by sustainability. Model development can be seen in Figure 1.

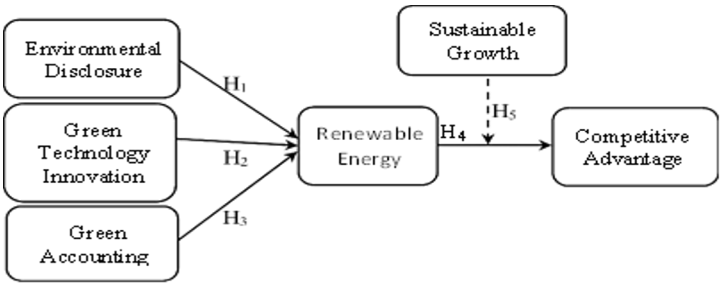

FIGURE 1. Model Development

2 Research Method

To investigate the impact of eco-centric practices on corporate success, this study employs a quantitative, causal-comparative (ex post facto) design, focusing on the 2024–2025 performance of 50 manufacturing firms listed on the Indonesia Stock Exchange (IDX). This sector was specifically targeted due to its high production intensity and significant environmental footprint across industries such as pharmaceuticals, automotive, and consumer goods [33][34]. Using a purposive sampling method, the research filters for companies with a consistent two-year listing history and transparent reporting habits, ensuring that the final sample represents firms with genuine, documented commitments to sustainability rather than mere formal compliance. Data is harvested from audited annual and sustainability reports to maintain high objectivity and minimize the biases typical of self-reported surveys. These secondary datasets are then analyzed via Structural Equation Modeling–Partial Least Squares (SEM-PLS), a robust technique ideal for mapping complex, multi-layered relationships and mediation effects without requiring strict data normality. By evaluating both the measurement (outer) and structural (inner) models, the study systematically validates the reliability of its indicators while uncovering the strength and direction of how green innovation and accounting drive both immediate competitive advantages and long-term sustainable growth.

3 Results And Discussion

Statistical analysis was performed using SmartPLS version 4.0. PLS-SEM analysis was used to test six research hypotheses. The utilization of PLS-SEM is considered very appropriate for this study because of the mediation variable (SG) in the structural framework (see fig.1), which is evaluated for its positive mediating impact on other variables. Table 1 presents the Ave, CR, and alpha values of each latent variable as well as the factor loading for all elements of the measured variable. To determine the presence of collinearity, the variance of the inflation factor (VIF) is calculated for each latent variable using the recommended range < 3.3 or < 5. The results showed a significant absence of collinearity. The factor loading of the selected measurement is shown in Table 1. All items have a loading factor greater than 0.6. All CR exceeded the recommended limit of 0.70. Reliability assumption, confirmed because the value of CA for each construct exceeds the criterion of 0.70. In assigning, the Ave value goes beyond 0.5 to establish the convergent validity (CV) The Ave value of the model construction, which varies from 0.614 to 0.712, supports the convergent validity (CV) of the research data (Table 1).

TABLE 1. Results Of The Measurement Model

Constructs	Items	Outer Loadings	Alpha	CR	AVE
Environmental Disclosure	ED1	0.825	0.873	0.873	0.657
	ED2	0.625			
	ED3	0.776			
	ED4	0.833			
	ED5	0.748			
Green Technology Innovation	GTI1	0.825	0.713	0.764	0.614
	GTI2	0.940			

	GTI3	0.722			
	GTI4	0.605			
	GTI5	0.887			
Green Accounting	GA1	0.735	0.829	0.835	0.712
	GA2	0.817			
	GA3	0.856			
	GA4	0.798			
Sustainable Growth	SG1	0.764	0.876	0.824	0.652
	SG2	0.775			
	SG3	0.796			
	SG4	0.751			

Source: processed Data, 2025.

Description: Alpha = Alpha Cronbach's, CR = Composite Reliability, AVE = Average Variance Extracted.

Discriminant validity (DV) was evaluated using Fornell and Larcker criteria and heterotrait-monotrait correlation ratio (HTMT) criteria. The square root of the relevant extracted average variance (AVE) measurement obtained from the correlation matrix is shown in Table 2. The discriminant validity of the correlation matrix between the latent variables is indicated by the diagonal values exceeding the values below the diagonal. HTMT values were found to be below a threshold value of 0.90, indicating the presence of DV (Table 2).

TABLE 2. Discriminant Validity

Fornell Larcker Criterion					
	ED	GTI	GA	SG	CA
ED	0.761				
GTI	0.632	0.794			
GA	0.594	0.573	0.762		
SG	0.682	0.599	0.654	0.672	
CA	0.691	0.583	0.679	0.632	0.714
HTMT Criterion					
	ED	GTI	GA	SG	CA
ED	0.759				
GTI	0.671	0.713			
GA	0.656	0.785	0735		
SG	0.731	0.764	0.761	0.694	
CA	0.684	0.591	0.654	0.627	0.705

Source: processed Data, 2025.

Description : ED = Environmental Disclosure; SG = Sustainable Growth; GTI = Green Technology Innovation; CA = Cometitive Advantage GA = Green Accounting;

The quantitative analysis, conducted via SmartPLS 4.0, confirms the robustness and predictive power of the research model. Initial diagnostic tests for collinearity yielded Variance Inflation Factor (VIF) values well within the acceptable threshold of less than 3.3, indicating no significant overlap between variables. The measurement model demonstrated high reliability and validity, with factor loadings exceeding 0.6 and Composite Reliability (CR) and Cronbach's Alpha (CA) values both surpassing the 0.70 benchmark. Furthermore, convergent validity was established as the Average Variance Extracted (AVE) values ranged from 0.614 to 0.712, comfortably exceeding the 0.5 minimum requirement. Predictive accuracy was also verified through R^2 values (0.364 for GCA and 0.562 for RE) and positive Q^2 values, ensuring the model's relevance in explaining the factors driving corporate success. The results showed that the constructs studied had significant predictive relevance, as evidenced by the values of GCA Q2 (0.242) and RE Q2(0.337) presented in Figure 2 and Table 3.

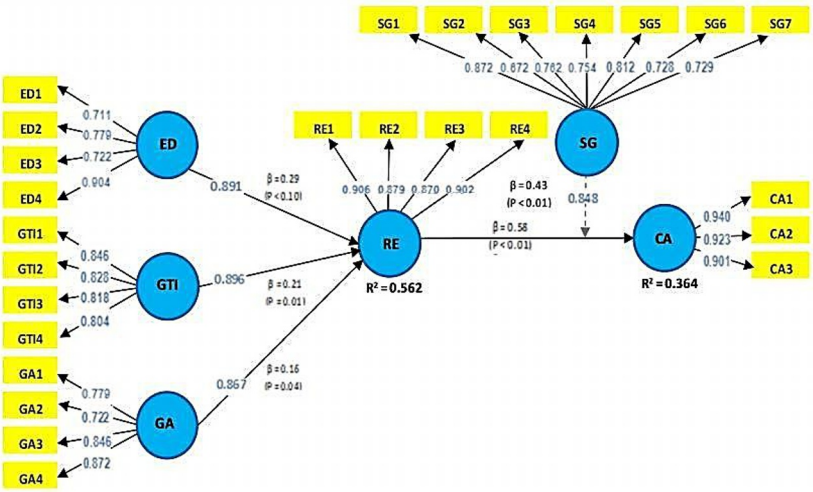

FIGURE 2. Structural Model

TABLE 3. Predictive Power Of Models

Construct	R^2	Q2
Green Competitive Advantage	0.364	0.242
Renewable Energy	0.562	0.337

Source: processed Data, 2025.

The structural evaluation validated all six research hypotheses, uncovering strong positive relationships between environmental strategies and firm performance. Specifically, Environmental Disclosure (ED) showed a significant impact on Renewable Energy (RE) outcomes (β_1 = 0.520), t-values (t = 9.146), and p- values (p = 0.000), thus validating the H1 hypothesis. Furthermore, the company'S GTI has a significant impact on the RE (β_2 = 0.521, t = 7.987, p = 0.000), which provides support for the H2 hypothesis. Furthermore, there is a positive relationship between GA and RE, as evidenced by the significant correlation coefficient β_3 (0.254) with a t-value of 5.012 and a p-value of 0.000, thus providing support for H3. In addition, we observed that RE had a significant impact on the CA of the company (β_4 = 0.276, t = 4.649, p = 0.000), which supports the H4 hypothesis. The findings of the study suggest that SG serves as a significant mediator in the linkage between RE and CA, as evidenced by the mediation analysis (β_5 = 0.052, t = 2.216, p = 0.025), This suggests that while green initiatives are valuable on their own, their ability to generate a competitive edge is maximized when they are channeled through a sustainable expansion framework. Thus confirming the fifth hypothesis presented in Table 4.

TABLE 4. Hypothesis Testing Results

Hypotheses	Coefficients	SE	T Statistics	*p*Values	Remarks
H1 : ED RE	0.520	0.042	9.146	0.000	Supported
H2 : GTI RE	0.521	0.056	7.987	0.000	Supported

H3 :	GA → RE	0.254	0.058	5.012	0.000	Supported
H4 :	RE → CA	0.276	0.052	4.649	0.000	Supported
H5 :	RE → SG → CA	0.052	0.024	2.216	0.025	Supported

Source: processed Data, 2025.

Description : ED = Environmental Disclosure; SG = Sustainable Growth; GTI = Green Technology Innovation; CA = Competitive Advantage GA = Green Accounting;

4 Discussion

This study was conducted to evaluate how Environmental Information Disclosure, green technology innovation, and environmentally friendly accounting influence competitive advantage, with sustainable growth acting as an intervening variable. The findings indicate that sustainable growth plays an important connecting role in strengthening the relationship between environmental initiatives and long-term competitiveness.

The disclosure of environmental information appears to positively influence competitive advantage. When companies transparently communicate their environmental performance and the social impact of their operations, they build credibility and strengthen stakeholder trust. Clear disclosure also signals that the organization aligns its strategic objectives with sustainability goals, which can enhance corporate reputation and long-term performance [20][21]. Rather than serving merely as a compliance tool, environmental disclosure becomes a strategic mechanism that supports differentiation and strengthens market positioning.

Green technology innovation also demonstrates a significant contribution to competitive advantage. Companies that adopt environmentally friendly technologies are able to improve both environmental and financial performance. These technologies reduce operational costs by lowering energy consumption, minimizing waste generation, and decreasing carbon emissions, while simultaneously increasing production efficiency. In addition, the implementation of green technologies supports the development of eco-friendly products, enabling firms to respond to growing market demand for sustainable solutions [1][9].

Beyond operational efficiency, green technology helps companies enhance their brand image. Organizations that actively demonstrate environmental responsibility are more likely to build stronger customer loyalty. Efficient resource utilization and waste reduction not only decrease costs but also stimulate innovation and encourage continuous improvement. The use of environmentally responsible technologies opens new business opportunities that are aligned with sustainable growth objectives. It also gives firms greater control over environmental considerations during product design and production processes [22][29].

Furthermore, green technology innovation strengthens a company's ability to identify emerging market opportunities and improve research and development capabilities [4][10][17]. The implementation of such technologies often fosters collaboration with suppliers, customers, and research institutions, enhancing knowledge exchange and strategic partnerships. These cooperative relationships further reinforce competitive positioning.

The study also reveals a positive association between green accounting and competitive advantage. Environmentally oriented accounting systems enable companies to monitor environmental costs, anticipate regulatory changes, and understand customer preferences related to sustainability [24]. Through systematic environmental cost management, companies can operate more efficiently, reduce unnecessary waste, and limit negative ecological impacts.

By integrating green accounting practices, firms can differentiate themselves in the marketplace by offering environmentally responsible products. Such differentiation signals a genuine commitment to sustainability and strengthens corporate identity. Green accounting also promotes innovation by helping firms allocate resources more effectively and prioritize sustainable investment opportunities [8][14][25][26][30]. Through improved measurement and reporting, companies can reorganize their activities to support long-term growth strategies, invest in environmentally focused research and development, and cultivate an innovation-driven organizational culture.

Sustainable growth serves as a bridge linking green technology innovation and green accounting to competitive advantage [12]. While environmentally friendly technologies may directly improve efficiency, their long-term competitive impact depends on how effectively companies integrate these technologies into product design and strategic planning. A company's strategic commitment to sustainable growth determines whether environmental initiatives translate into lasting competitive benefits [28].

Green accounting provides the structural foundation for generating innovative, environmentally responsible

solutions. Meanwhile, sustainable growth enables companies to transform these internal capabilities into products and services that deliver both financial value and environmental responsibility [18]. Achieving a sustainable competitive advantage therefore requires organizations to foster an environmentally oriented innovation culture that permeates strategic decision-making [3].

The findings suggest that many manufacturing firms currently treat sustainability as a compliance hurdle rather than a core strategic engine. To unlock genuine value, companies should pivot toward viewing green capabilities, such as eco-conscious branding and resource efficiency securable assets that build long-term market resilience and stakeholder trust. Theoretically, this study fills a gap by highlighting how sustainable growth serves as a mediator in the manufacturing sector, a pathway often overlooked in previous literature. From a governance perspective, there is a clear mandate for bodies like the Indonesia Stock Exchange to refine ESG frameworks and offer sector-specific incentives. Strengthening sustainability reporting standards and incorporating market sentiment would allow for a more precise alignment between environmental stewardship and financial success.

5 Conclusions

Grounded in the Natural Resource-Based View (NRBV), this research concludes that green technology innovation, environmentally sound accounting, and sustainable growth are deeply interconnected drivers of competitive advantage. By deploying green technologies, manufacturers can achieve a dual win: lowering their ecological footprint while sharpening operational efficiency. Furthermore, green accounting provides the necessary data to align financial goals with environmental ethics, ensuring that decision-making is both responsible and profitable. Ultimately, this study demonstrates that when firms integrate these green strategies into a cohesive growth model, they create a unique differentiation that resonates with modern consumers. These insights offer a roadmap for both corporate leaders and national policymakers to leverage environmental innovation as a primary resource for industrial longevity and economic progress.

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