ISSN : 2962-9195 E-ISSN : 2963-8992

Journal of Educational Management Research
Vol. 05 No. 03 (2026): 2940-2961
Available online at https://serambi.org/index.php/jemr

Green Marketing Strategy for Gaining Sustainable Competitive Advantage in Industry 4.0: Evidence from the Energy Sector

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DOI: https://doi.org/10.61987/jemr.v5i3.2148

Keywords:
Green Marketing Orientation; Green Innovation; Digital Marketing;Sustainable Competitive Advantage

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ABSTRACT

This research is driven by global pressures on sustainability and the urgent need for clean energy transitions in the industrial sector, particularly in energy, during the Industry 4.0 era. Digital transformation and green marketing strategies are vital to improving operational efficiency, fostering environmentally friendly innovations, and building sustainable competitive advantage. This study aims to examine the influence of Green Marketing Orientation, Green Innovation, and Digital Marketing on Sustainable Competitive Advantage in energy sector companies in Indonesia within the decarbonization context. A quantitative approach was applied using a survey method and Structural Equation Modeling–Partial Least Squares (SEM-PLS) analysis on 50 managerial respondents from companies with environmental policies, decarbonization initiatives, and digital marketing platforms. Findings show that Green Marketing Orientation significantly and positively affects Green Innovation, Green Innovation significantly enhances Sustainable Competitive Advantage, and Digital Marketing has the strongest effect on competitive advantage, whereas the direct influence of Green Marketing on competitive advantage is not significant. The study concludes that integrating green strategy, innovation, and digital capabilities is essential to achieving sustainable competitive advantage, offering theoretical contributions to Resource-Based View and dynamic capabilities frameworks and practical implications for strategic corporate management in the decarbonization era.

Article History:
Received: January 2026; Revised: February 2026; Accepted: March 2026

Please cite this article in APA style as:
Nababan, E. N., Ibrahim, Y., Sinaga, J. T. G., & Malau, H. (2026). Green Marketing Strategy for Gaining Sustainable Competitive Advantage in Industry 4.0: Evidence from the Energy Sector. *Journal of Educational Management Research*, *5*(3), 2940-2961.

INTRODUCTION

The current developments in industry and digital technology are bringing significant changes in the global competitive structure through the integration of

advanced technologies such as artificial intelligence (AI), big data analytics, the Internet of Things (IoT), cloud computing, and business process automation (Sambhav & Chen, 2022; Wei et al., 2023). This digital transformation improves operational efficiency, production flexibility, supply chain integration, and real-time data-driven decision-making (Dhananjaya et al., 2024; Garcia et al., 2023; Sambhav & Chen, 2022). However, technological advances are taking place at the same time as global pressures on sustainability issues, including climate change, environmental degradation, and the demand for reducing greenhouse gas (GHG) emissions. Without systemic transformation in the industrial and energy sectors, the target of limiting global temperature rise of 1.5°C will be difficult to achieve (Zhang et al., 2023). This issue has a wide impact on society, as climate change affects quality of life, health, and economic stability. Thus, this research is important for the wider community because it explores how the integration of technology and sustainable management strategies can support the transition to an environmentally friendly industry while maintaining competitiveness in the era of globalization.

The industrial sector plays a major role in national energy consumption, particularly the processing and transportation industries, which are the largest contributors to carbon emissions (Central Statistics Agency, 2023). The dominance of fossil energy, especially coal, which accounts for about 40% of Indonesia's primary energy consumption (Ministry of Energy and Mineral Resources of the Republic of Indonesia, 2023), leads to high carbon emission intensity (Muslim, 2024; Wadi et al., 2023). This dependence creates a strategic dilemma for companies: they must meet production and profitability needs while facing environmental regulatory pressures and global market demands. These sustainability issues require companies to adopt management strategies that integrate energy efficiency, process innovation, and clean technologies (Dangaiso & Tsvere, 2025). Without effective solutions, the industrial sector risks failing to achieve national emission reduction targets, which can affect the company's reputation and access to international markets. Therefore, this research arises from the need for society and industry to find a managerial approach that is able to address environmental challenges while maintaining sustainable competitiveness.

On the ground, many companies still operate on fossil energy bases and traditional production processes, so the contribution of emissions remains high. Data shows that despite the Indonesian government's industrial decarbonization roadmap, the implementation of clean technologies and green management

strategies is still limited to a few large companies (Ministry of Industry of the Republic of Indonesia, 2023). This phenomenon creates a gap between national policies and industrial operational practices. In addition, consumer awareness of environmentally friendly products is increasing, creating additional market pressure for companies to innovate (Bashith et al., 2025). Companies that do not adapt face reputational risks, regulatory sanctions, and loss of customer loyalty. This phenomenon underscores the need to integrate management, digitalization, and green marketing strategies as an effort to build a sustainable competitive advantage, which at the same time supports the clean energy transition in the Industry 4.0 era (Wang & Sarkis, 2022; Xie et al., 2022).

Previous research has highlighted the relationship between digital transformation, green marketing, and corporate sustainability. Digital integration enables operational efficiency, data-driven decision-making, and green product innovation that supports corporate reputation and consumer loyalty (Singh et al., 2022). Some studies have also shown that sustainable management strategies are able to create competitive advantages that are difficult for competitors to replicate, in line with the Resource-Based View perspective(Irfan et al., 2023). However, most of the research is still focused on a global or industry-specific context, while Indonesia's context with carbon regulatory pressures and growing markets has not been comprehensively explored. This gap demonstrates the need for research that places green marketing as an organization's core strategy, not just a promotional tool, in managing external and internal corporate pressures.

Furthermore, the latest study (2020–2025) emphasizes that the integration of green marketing with digital transformation can increase sustainable competitive advantages, especially for industries that face regulatory pressures and high ESG (Environmental, Social, and Governance) demands (Shahbaz & Sinha, 2023). However, previous research has lacked the spotlight on how this management strategy can be applied systemically in the context of the decarbonization of national industries (Karim et al., 2023). This research position is at the intersection between digitalization, green marketing, and decarbonization strategies, making an important contribution to the development of corporate strategic management in Indonesia. This research gap is important to be resolved to provide practical guidance for companies in building green capabilities that support national policies and improve their reputation and competitiveness in the global market.

This research presents novelty by placing green marketing as a source of sustainable competitive advantage in the context of Industry 4.0 and the national

industrial decarbonization agenda. In addition, this research emphasizes strategic management aspects that integrate digitalization, process innovation, and energy efficiency as the core of organizational capabilities. This approach differs from previous studies that emphasized green marketing as a promotional tool or simply as a technical strategy. By combining a strategic management perspective and external environmental pressures, this study offers an integrative model that is relevant for Indonesian industries in the face of regulations, global market demand, and net-zero emission targets 2050 (Ministry of Industry of the Republic of Indonesia, 2023; Xie et al., 2022).

Based on the existing phenomenon and literature, the research question arises: can green marketing be a source of sustainable competitive advantage in the Industry 4.0 era, especially in the context of industrial decarbonization in Indonesia? In the meantime, the argument that emerges is that green marketing not only functions as an environmentally friendly communication tool, but also as a strategic capability that supports green product innovation, process efficiency, digital technology integration, and the creation of shared value between companies and society. Thus, this research offers theoretical and practical contributions: linking green marketing with sustainable management strategies, building green capability models, and providing relevant implementation guidance for companies in Indonesia that are committed to the transformation of an environmentally friendly industry (Singh et al., 2022; Shahbaz & Sinha, 2023).

The contribution of this research is twofold. Theoretically, the research strengthens the Resource-Based View perspective by affirming green marketing as a sustainable strategic capability that is difficult to replicate and of high value. In practical terms, the research provides managerial guidance for companies in designing integrative strategies that include green product innovation, energy efficiency, digital transformation, and sustainability communication, in line with national emission reduction targets and global ESG demands (United Nations Framework Convention on Climate Change, 2022; Wang & Sarkis, 2022). Thus, this research is not only important for companies, but also for society at large, as it encourages more environmentally friendly industries, reduces the impact of climate change, and improves social and economic well-being. This research confirms that green marketing can be a strategic tool to achieve business and sustainability goals simultaneously in the Industry 4.0 era.

RESEARCH METHOD

Study This use approach quantitative with design explanatory research for test connection causal between variables, namely Green Marketing Orientation (GMO), Green Innovation (GI), Digital Marketing (DM), and Sustainable Competitive Advantage (SCA). The approach explanatory chosen Because study This aim For explain influence direct and No direct between construct based on framework Resource-Based View theory developed by Jay Barney and dynamic capabilities (Liu & Atuahene-Gima, 2021)perspective. Method survey used as technique main data collection because allows measurement perception respondents in a way systematic, objective, and standardized through instrument questionnaire structured research This nature cross-sectional, where data is pooled in One period time certain (Hanelt et al., 2021).

Population and Sampling Techniques

Population in study This is companies in the sector energy renewable as well as industry supporters transition energy in Indonesia which has apply practice sustainability, decarbonization strategies, and utilizing digital media in activity marketing. Selection sector This based on its relevance with sustainability issues, transformation energy and digitalization industry in Industry 4.0 context. Sector energy viewed as one of the sector strategic in effort achieve reduction targets emission carbon as well as development economy low carbon in Indonesia (Ferreira et al., 2023).

Sampling techniques used in study This is non-probability sampling with purposive sampling approach. The purposive sampling method is technique taking sample in which the researcher in a way on purpose choose respondents who have characteristics certain ones that are considered most relevant with objective research. According to Uma Sekaran in In the book Research Methods for Business, purposive sampling was used when researchers need respondents who have knowledge or experience special related the phenomenon being studied. Approach This is also explained by John W. Creswell in Research Design as sampling techniques that allow researchers get more information deep from informants who are considered understand context study (El-Kassar & Singh, 2021).In study this , respondents chosen from among key informants, namely individuals who have understanding on marketing strategy, innovation environment, as well as digital transformation in company.

In this study, respondents were selected based on specific criteria to ensure the relevance and depth of the information obtained. Respondents must hold managerial or supervisory positions, such as marketing manager, sustainability manager, or strategy manager, thus having authority and responsibility in the formulation and implementation of company strategy. Furthermore, the companies where respondents work must have policies or programs related to the environment and decarbonization, in order to assess the contribution of green marketing to sustainability goals, including carbon emission reduction. Furthermore, companies must also utilize digital platforms for marketing communications, so that green marketing strategies can be analyzed in the context of digital technology integration, reputation building, sustainability communications, and data-driven decision-making. Therefore, respondents who meet these criteria are able to provide comprehensive information regarding the relationship between green marketing, digital transformation, and sustainable competitive advantage.

Table 1. Distribution Respondents By Company

Company	Frequency (n)	Percentage (%)	Information Sector
PT. X1	30	60.0	Energy / Infrastructure
PT. X1	16	32.0	Energy
PT. X3	4	8.0	Coal Mining
Total	**50**	**100.0**	

Amount minimum sample is determined based on Structural Equation Modeling approach based on Partial Least Squares (SEM–PLS). Referring to the recommendations (Hair et al., 2021), amount the minimum sample is 10 times the number track the biggest one that goes to something construct in the model. Based on the research model this, the minimum number of respondents is 50, so amount samples used has fulfil criteria SEM–PLS analysis.

Variables Research and Definition Operational

Table 2. Definitions Operational Variables and Indicators

Variables	Definition	Indicator	Code
Green Marketing Orientation (GMO)	Level of integration mark environment in marketing strategy company	Commitment environment	GMO1
		Marketing strategy green	GMO2
		Compliance standard industry green	GMO3
		Communication environment	GMO4

Green Innovation (GI)	Ability company develop innovation friendly environment	Innovation product green	GI1
		Efficiency energy	GI2
		Subtraction emission	GI3
		Use of environmentally friendly materials environment	GI4
Digital Marketing (DM)	Utilization of digital platforms for communication marketing	Social media	DM1
		Website sustainability	DM2
		Transparency information environment	DM3
		Digital interaction with consumer	DM4
Sustainable Competitive Advantage (SCA)	Superiority competitive term difficult length imitated competitors	Differentiation product	SCA1
		Efficiency cost term long	SCA2
		Reputation company	SCA3
		Loyalty customer	SCA4

All questionnaire items measured use five- point Likert scale (1 = very much agree , 5 = strongly agree).

Green Marketing Orientation

1. GMO1: Our company has strong commitment to protection environment.
2. GMO2: Marketing strategy company consider impact environment.
3. GMO3: Company complies standard industry green is valid.
4. GMO4: Information related performance environment communicated in a way transparent to public .

Green Innovation

1. GI1: The company develops friendly products environment.
2. GI2: The company does efficiency energy in the production process.
3. GI3: The company strives reduce emission carbon.
4. GI4: The company uses environmentally friendly materials. environment.

Digital Marketing

1. DM1: Social media used For communicate commitment environment company.
2. DM2: Company website display information sustainability.

3. DM3: Information environment delivered in a way transparent through digital media.
4. DM4: Consumers can interact digitally related issue environment.

Sustainable Competitive Advantage

1. SCA1: Product company own strong differentiation compared to competitors.
2. SCA2: The company is capable pressing cost operational in term long.
3. SCA3: Reputation company more Good compared to competitors.
4. SCA4: Consumer show high loyalty.

Data Collection and Analysis Techniques

Data used in study This is the primary data obtained through distribution questionnaire to respondents who work at the company object research. Instruments study arranged in form questionnaire closed with use five- point Likert scale, where a score of 1 indicates "very dissatisfied"agree" and a score of 5 indicates "strongly agree". Use of Likert scale aims For measure perception respondents to implementation of green marketing orientation, green innovation, digital environmental communication, and sustainable competitive advantage (Sharma & Gupta, 2024).

Before done analysis more further, more data formerly checked completeness and consistenc. Next , the analysis done use Structural Equation Modeling–Partial Least Squares (SEM–PLS) method. The SEM–PLS approach was chosen Because capable analyze connection between latent variables in simultaneous, no demand assumptions strict normality, as well as in accordance For size relative sample limited stages analysis in study This covering two stage main , namely:

Evaluation of Measurement Model (Outer Model)

The outer model evaluation was conducted to test the quality of the constructs in this study through several stages. First, the convergent validity test was conducted by assessing the outer loading value (> 0.70) and Average Variance Extracted (AVE > 0.50) to ensure each indicator adequately represents the construct. Second, the discriminant validity test was conducted using the Fornell-Larcker criteria or cross-loading to ensure each construct has good discriminatory ability against other constructs. Third, the construct reliability test

was conducted by measuring the Composite Reliability value (> 0.70) and Cronbach's Alpha (> 0.70), thus ensuring the internal consistency of the indicators in forming the construct. Thus, this outer model evaluation ensures that the constructs used in the study have adequate validity and reliability, so that the results of the structural model analysis can be interpreted accurately and reliably.

Structural Model Evaluation (Inner Model)

An inner model evaluation was conducted to test the relationships between the latent variables in this study. First, the R-square (R^2) value was used to assess the ability of the independent variables to explain the dependent variable, thus providing an indication of the overall strength of the model. Second, the path coefficient values were analyzed to determine the direction and strength of the influence between the variables, whether positive or negative, and their contribution to the dependent variable. Third, the significance of the influence between constructs was tested by assessing the t-statistic and p-value obtained through the bootstrapping procedure, to ensure that the relationships found did not occur by chance. Thus, this inner model evaluation ensures that the relationships between the latent variables are statistically tested, valid, and can be used to draw accurate conclusions regarding the influence and interactions between constructs in the study.

RESULTS AND DISCUSSION

Results

Validity Test Instrument Study

Validity test aim For evaluate accuracy each questionnaire item in measure variables research . Testing done use Pearson Product Moment correlation with compare r count and r table . With amount 50 respondents, obtained r table of 0.281 at the level significance of 0.05. The item is declared valid if the calculated r > 0.281 and invalid if the calculated r < 0.281.

Validity Test Green Marketing Orientation (GMO) Variable

Table 3. Validity Test Green Marketing Orientation Variable

Indicator	r Count	r Table	Information
GMO1	0.923	0.281	Valid
GMO2	0.904	0.281	Valid

GMO3	0.965	0.281	Valid
GMO4	0.938	0.281	Valid

Based on the table above known that all over indicators on variables Green Marketing Orientation own mark r count more big from r table (0.281). Besides That mark significance all items more small from 0.05 , so that can concluded that all question items on the variable Green Marketing Orientation is declared valid and feasible used in study.

Validity Test Green Innovation (GI) Variable

Table 4. Validity Test Green Innovation Variable

Indicator	r Count	r Table	Information
GI1	0.918	0.281	Valid
GI2	0.930	0.281	Valid
GI3	0.947	0.281	Valid
GI4	0.937	0.281	Valid

Based on the results of the test above, it can be concluded that all indicator variables of Green Innovation have r-count values greater than the r-table value (0.281) and significance values lower than 0.05. Therefore, all question items measuring the Green Innovation variable are considered valid and can be used as measurement instruments in this study.

Validity Test Digital Marketing (DM) Variables

Table 5. Validity Test Digital Marketing Variables

Indicator	r Count	r Table	Information
DM1	0.941	0.281	Valid
DM3	0.943	0.281	Valid
DM4	0.921	0.281	Valid

Based on results analysis known that all over indicator variables Digital Marketing own mark r count more big compared to r table (0.281) . In addition That mark significance all items are below 0.05 , so that can concluded that all items on Digital Marketing variables are declared valid and can be used in research. For DMO2 indicator eliminated from the model because own the outer loading value is below 0.70 so No fulfil convergent validity criteria.

Validity Test Sustainable Competitive Advantage Variable

Table 6. Validity Test Sustainable Competitive Advantage Variable

Indicator	r Count	r Table	Information
SCA1	0.808	0.281	Valid
SCA3	0.874	0.281	Valid
SCA4	0.843	0.281	Valid

For SCA2 indicator eliminated from the model because own the outer loading value is below 0.70 so No fulfil convergent validity criteria

Evaluation of Measurement Model (Outer Model)

Based on results analysis using the PLS Algorithm, all indicators for each construct show outer loading value above 0.70. According to (Hair et al., 2021), outer loading value ≥ 0.70 indicates that indicator own level strong correlation with latent constructs being measured , so that fulfil convergent validity criteria.

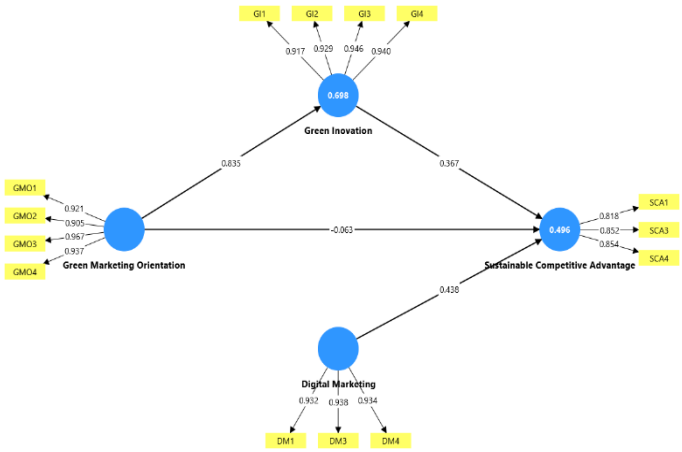

Figure 2. Outer Model

Based on results analysis use SmartPLS , all indicators for each construct show very high outer loading value . Range outer loading value on each variables is as following : Green Marketing Orientation (0.905–0.967), Green Innovation (0.917–0.946), Digital Marketing (0.932–0.938), and Sustainable Competitive Advantage (0.818–0.854) (Kraus et al., 2022).

In a way methodologically, outer loading values above 0.70 have been fulfil convergent validity criteria as recommended by(Hair et al., 2021) in PLS-SEM approach. In fact, some big indicator in study This own value above 0.90, which indicates very strong correlation between indicator with the latent construct it measures. This is show that every indicator capable explain variance construct in a way substantial and have excellent internal reliability.

The height loading value also indicates that the measurement error is relative low . With Thus , the instrument study can stated capable represent draft theoretical in a way accurate and consistent. Stability and consistency measurement This strengthen quality of measurement model as well as increase credibility results structural model estimation at the stage furthermore (Porter & Kramer, 2020).

In a way substantive , the high outer loading on the Green Marketing Orientation, Green Innovation, and Digital Marketing constructs indicates that perception respondents to practice sustainability and digital transformation tend to homogeneous. Respondents own relative understanding in harmony about marketing strategy implementation green, innovation based environment , as well as utilization digital capabilities in organization. Homogeneity perception This indicates that operationalization variables has in accordance with context the industry being studied (Chen et al., 2021).

In the Sustainable Competitive Advantage construct , the outer loading value is in the range of 0.818–0.854, slightly more low compared to construct others , however still be on top threshold limit of 0.70. This is show that construct the still measurable with good and have representation adequate empirical data . Relative loading variations more moderate on construct This can reflect complexity draft superiority competitive sustainable, multidimensional, and influenced by internal and external factors compan.

In perspective theoretical, findings This consistent with Resource-Based View of the Firm framework that emphasizes that internal capabilities of the company such as orientation marketing green, innovation green, and digital capabilities are source Power strategic assets that are valuable, rare, inimitable, and non-substitutable (VRIN). The high consistency indicator show that

constructs the has operationalized in a way appropriate as representation capability strategic company in build superiority compete sustainable (Benito-Hernández et al., 2021).

With thus , based on results outer loading evaluation, all construct in study This stated fulfil criteria validity convergence and internal reliability. The measurement model (outer model) can declared valid and reliable , so that worthy For continued at the stage evaluation of structural models (inner models) for use test connection causal intervariable in a way more comprehensive (Ali et al., 2021).

Structural Model Evaluation (Inner Model)

Coefficient Determination (R^2)

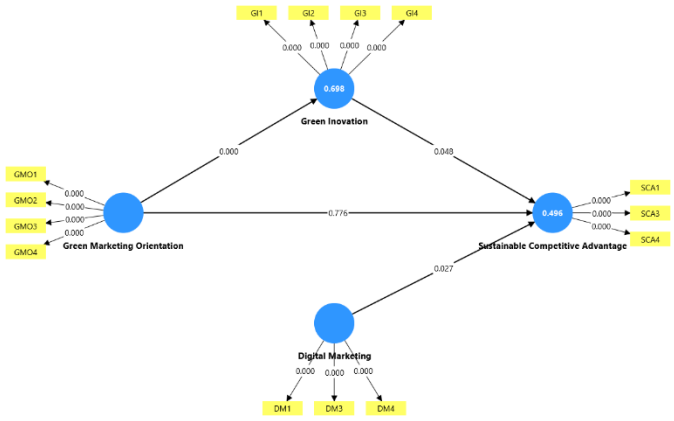

Figure 3. Inner Model

Green Innovation ($R^2 = 0.698$)

The R^2 value of 0.698 indicates that 69.8% of the variation in Green Innovation is explained by Green Marketing Orientation. Based on Hair et al.'s (2022) classification , value This including category strong (substantial) findings This show that orientation marketing green is determinant main formation innovation green . In theoretical , results This consistent with Resource-Based View perspective which emphasizes that orientation strategic company become foundation formation capability valuable and difficult innovation imitated. Compared with study previous ones which are generally find influence moderate between orientation green and innovation, results study This show strength more influence high . This is indicates that in context industry energy that faces pressure decarbonization, orientation green become driver more innovation intensive (Abubakar et al., 2021).

Sustainable Competitive Advantage ($R^2 = 0.496$)

The R^2 value of 0.496 indicates that 49.6% of the variation in Sustainable Competitive Advantage is explained by Green Innovation, Green Marketing Orientation, and Digital Marketing. This value classified as moderate going to strong in study management strategic. This means that the model has Power explain adequately. However Thus, approximately 50.4% of the variation Still influenced other factors such as environmental turbulence, firm size, dynamic capability, or ESG performance. By critical, results This show that superiority compete sustainable No only determined by green strategy, but also by ability company manage source internal power adaptive in environment dynamic business (Bai & Sarkis, 2021).

Hypothesis Testing Direct Effect

Table 4. Summary of Hypothesis Test Results

Hypothesis	Connection	Coefficient (β)	p-value	Decision
H1	GMO → GI	0.835	0,000	Accepted
H2	GI → SCA	0.367	0.048	Accepted
H3	DM → SCA	0.438	0.027	Accepted
H4	GMO → SCA	-0.063	0.776	Rejected

Interpretation

Research result show that Green Marketing Orientation has an influence positive and significant towards Green Innovation ($\beta = 0.835$; $p < 0.001$), which confirms that orientation marketing green is a strategy that encourages internal company transformation, not just tool communication external. Furthermore , Green Innovation is proven influential positive towards Sustainable Competitive Advantage ($\beta = 0.367$; $p < 0.05$), in line with with RBV theory that valuable and difficult innovation imitated become source superiority compete sustainable, especially in context industry energy and ESG demands.

Besides that, Digital Marketing also has a positive and significant influence on Sustainable Competitive Advantage ($\beta = 0.438$; $p < 0.05$), indicating the important role of digital technology utilization in strengthening a company's

competitive position. This finding suggests that companies that effectively leverage digital platforms—such as social media, search engines, and e-commerce are better able to enhance market reach, improve customer engagement, and respond more quickly to changing consumer preferences. As a result, digital marketing becomes a strategic tool that not only supports short-term performance but also contributes to long-term competitive sustainability.

However, Green Marketing Orientation does not have a direct and significant influence on Sustainable Competitive Advantage ($\beta = -0.063$; $p > 0.05$). This result implies that an environmentally oriented strategy alone is not sufficient to create a competitive advantage unless it is supported by concrete actions and tangible outcomes. In other words, green orientation must be translated into real innovations—such as eco-friendly products, sustainable processes, or green technologies—to deliver value that is recognized by the market. Without such implementation, environmental orientation may remain merely symbolic and fail to provide a meaningful impact on the company's competitive position.

Analysis Mediation

Initial Research Hypothesis

Based on the literature review and previous research, the hypotheses in this study are formulated to test the influence of green and digital marketing strategies on sustainable competitive advantage and green innovation. First, hypothesis H1 states that Green Marketing orientation has a positive influence on Sustainable Competitive Advantage, indicating that the implementation of environmentally friendly marketing strategies can strengthen a company's competitive position in a sustainable manner. Second, hypothesis H2 states that Green Marketing Orientation also has a positive influence on Green Innovation, confirming the role of green marketing orientation in driving environmentally friendly product and process innovation. Furthermore, hypothesis H3 states that Green Innovation has a positive influence on Sustainable Competitive Advantage, so that green innovation becomes an important path in creating sustainable competitive value. Finally, hypothesis H4 states that Digital Marketing has a positive influence on Sustainable Competitive Advantage, emphasizing the integration of digital technology in marketing strategies to strengthen sustainable competitive advantage.

Test Results Main Hypothesis

Table 5. Results of SEM-PLS analysis

Hypothesis	Relationship	Result
H1	GMO → SCA	**Not Supported**
H2	GMO → GI	Supported
H3	GI → SCA	Supported
H4	DM → SCA	Supported

Because:

- GMO → significant GI
- GI → significant SCA
- GMO → SCA no significant
- DM → SCA Significant

Test results show that Green Marketing Orientation does not influential significant in a way direct towards Sustainable Competitive Advantage, so that H1 No supported . On the other hand, Green Marketing Orientation has been proven own influence positive and significant towards Green Innovation, as well as Green Innovation's influence significant towards Sustainable Competitive Advantage. Findings This indicates that connection between Green Marketing Orientation and Sustainable Competitive Advantage is not happen in a way direct, but through variables intermediary

Analysis more carry on show existence full mediation effect, Where Green Innovation plays a role as a full mediator in connection between Green Marketing Orientation and Sustainable Competitive Advantage. This means that orientation green only give impact competitive through innovation green

Contribution main study This is show that Green Innovation plays a role as mechanism transformational linking environmental strategies with results competitive . With Thus , research This strengthen integration between the Resource-Based View and the dynamic capability perspective in context sustainability

Findings study This give implications strategic for company sector energy in face transition energy and demands global decarbonization . Mediation results show that Green Marketing Orientation does not influential direct towards Sustainable Competitive Advantage, but rather through Green Innovation as a

full mediator. This confirm that orientation sustainability that is conceptual No Enough For create superiority competitive without implementation concrete innovation.

In a way practical, company need avoid approach symbolic only emphasize green branding without transformation operational . Marketing strategy green must integrated to in policy corporation through investment in development product friendly environment , production process innovation economical energy, as well as adoption technology low carbon. Implementation digital monitoring systems, smart energy systems, and standards certification environment international can strengthen efficiency at a time increase legitimacy companies in the global market.

Besides that , the findings that Digital Marketing has the most dominant influence towards Sustainable Competitive Advantage shows importance digital capabilities as a strategic enabler in the Industry 4.0 era. Digital marketing is not only functioning as tool promotion, but as means transparency report sustainability, communication ESG performance to investors, as well as building customer engagement sustainability- based .

In a way overall, excellence competitive sustainable in industry energy only can achieved through integration between green strategy, green innovation, and digital capability. Fragmented approach No will produce impact competitive term long in context economy low carbon and digital transformation.

Discussion

The results of the study indicate that Green Marketing (GMO) orientation has a positive and significant influence on Green Innovation (GI), with a path coefficient of $\beta = 0.835$ and $p < 0.001$. This aligns with previous literature emphasizing that green marketing strategies drive sustainable product and process innovation (Abubakar et al., 2021; Hair et al., 2022). This finding is consistent with the Resource-Based View (RBV) perspective, which states that a company's internal capabilities that are valuable, rare, difficult to imitate, and non-substitutable (VRIN) are a source of sustainable competitive advantage (Benito-Hernández et al., 2021). However, these results indicate that the direct effect of Green Marketing on Sustainable Competitive Advantage (SCA) is insignificant ($\beta = -0.063$; $p > 0.05$), indicating that a green marketing orientation without concrete implementation through green innovation is insufficient to create competitive advantage.

Furthermore, Green Innovation was shown to have a positive and significant effect on Sustainable Competitive Advantage ($\beta = 0.367$; $p < 0.05$), corroborating the literature showing that green innovation is a key mediator in transforming sustainability strategies into tangible competitive advantages (Shahbaz & Sinha, 2023). This finding emphasizes the importance of integrating green marketing strategies and environmental innovation into a company's strategic management practices. From a theoretical perspective, this extends the understanding of the RBV by emphasizing that green innovation is not only an outcome but also a connecting mechanism that enables sustainability strategies to contribute to sustainable competitive advantage (Bashith et al., 2025; Karim et al., 2023).

Furthermore, Digital Marketing (DM) had a positive and significant effect on Sustainable Competitive Advantage ($\beta = 0.438$; $p < 0.05$), indicating that digital capabilities are a strategic enabler in the context of Industry 4.0. These findings highlight the role of digital platforms not only as promotional tools but also as a means of transparency, sustainability reporting, communicating ESG performance to stakeholders, and enhancing sustainability-based customer engagement (Ali et al., 2021; Bai & Sarkis, 2021). Practically, companies need to leverage digital capabilities to strengthen their green marketing and green innovation strategies to achieve sustainable competitive advantage, particularly in the energy industry, which faces global decarbonization pressures.

Overall, this research provides clear theoretical and practical implications: theoretically, it confirms that sustainable competitive advantage can only be achieved through the integration of green marketing, green innovation, and digital marketing as mutually supportive strategic capabilities; practically, companies need to avoid a symbolic approach to green branding and emphasize concrete implementation through green product innovation, process efficiency, and the adoption of low-carbon technologies (Dangaiso & Tsvere, 2025; Irfan et al., 2023). Strategic fragmentation will reduce long-term competitive impact, while holistic integration allows companies not only to meet sustainability targets but also to strengthen their competitive position in the global market.

CONCLUSION

This study analyzes the influence of Green Marketing Orientation, Green Innovation, and Digital Marketing on Sustainable Competitive Advantage in energy sector companies in Indonesia in the context of decarbonization and the Industry 4.0 era. SEM-PLS results show that Green Marketing Orientation has a

positive and significant influence on Green Innovation, confirming its role as the foundation of environmental-based internal capabilities. Furthermore, Green Innovation is proven to have a positive and significant influence on Sustainable Competitive Advantage, thus acting as a primary mechanism in transforming sustainability strategies into tangible competitive advantages. Digital Marketing also shows the most dominant influence on competitive advantage, emphasizing the importance of digital capabilities in strengthening company competitiveness in the modern era. However, Green Marketing Orientation does not have a direct influence on competitive advantage, but rather through Green Innovation as a full mediator, which theoretically strengthens the integration of the Resource-Based View and dynamic capabilities perspectives, emphasizing that strategy must be converted into innovation to generate competitive advantage. Although the model is only able to explain moderate variations (R^2 = 0.496), this study confirms that the integration of green strategy, innovation, and digital capabilities is the key to achieving sustainable competitive advantage in the decarbonization era.

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