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Green Capabilities and Corporate Competitive Advantage: The Moderating Effect of Green Culture

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Abstract

Purpose: This study aims to examine the influence of Green Intellectual Capital (GIC), Green Leadership (GL), Green Human Resource Management (GHRM), and Green Organizational Learning Capability (GOLC) on Corporate Competitive Advantage (CCA), with a particular focus on the moderating role of Green Culture (GC) in strengthening these relationships.

Methodology/approach: This study uses a quantitative approach with an online survey conducted among 163 key decision-makers from listed companies practicing sustainability. Data were analyzed using PLS-SEM to test the research hypotheses.

Results/findings: The findings indicate that GIC, GL, GHRM, and GOLC exert a significant positive influence on CCA. Moreover, GC strengthens these relationships as a moderating factor, although variations across variables suggest the influence of other organizational factors.

Conclusions: This study concludes that GL, GHRM, and GOLC significantly enhance CCA, while GIC shows no direct effect. Moreover, GC strengthens the relationships between GL and GOLC with CCA, highlighting the importance of a sustainability-oriented culture in driving competitive performance.

Limitations: This study is limited to Indonesian companies and relies solely on quantitative survey data, which may not fully capture the depth of green management practices. Future research could explore cross-country comparisons or adopt a mixed-method approach for deeper insights.

Contribution: This study contributes to the field of green strategic management by emphasizing the role of GC in enhancing sustainability performance. It provides valuable guidance for companies and policymakers aiming to embed environmental values into organizational strategies.

Keywords: *Corporate Competitive Advantage, Green Culture, Green Intellectual Capital, Green Leadership, Sustainability*

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1. Introduction

In recent years, sustainability has evolved from a peripheral initiative into a strategic imperative across various industries worldwide. Organizations are increasingly striving to generate profits while minimizing their environmental footprint through the adoption of sustainability-oriented business models and green management practices (Nguyen et al., 2023). Maximizing firm value remains the primary objective of business organizations, as it reflects how investors evaluate a company through its stock price in the capital market (Artika et al., 2025). This global transition reflects a fundamental redefinition solely by financial performance but also by a firm's ability to integrate environmental and social responsibility into its strategic operations (C. H. Wang, 2019). However, maintaining Corporate Competitive Advantage (CCA) in this era of sustainability-driven competition remains challenging, as

firms must balance operational efficiency, regulatory compliance, and environmental stewardship while adapting to dynamic market expectations.

Despite extensive research on green management and sustainable competitiveness, the mechanisms that link organizational green capabilities to competitive advantage remain insufficiently understood. Previous studies have primarily focused on the direct effects of specific green capabilities such as Green Intellectual Capital (GIC), Green Leadership (GL), Green Human Resource Management (GHRM), and Green Organizational Learning Capability (GOLC) on firm performance (Khan et al., 2023; Özgül & Zehir, 2023). While these studies have enriched the theoretical landscape, they often neglect the contextual factors that determine when and how these capabilities translate into sustained advantage. As organizations evolve within increasingly complex institutional and cultural environments, it becomes essential to examine the internal mechanisms that enable green capabilities to be effectively utilized and integrated into everyday business operations. In this regard, Green Culture (GC) emerges as a potentially crucial, yet underexplored, factor shaping the success of sustainability-oriented strategies.

Green culture reflects the shared environmental values, beliefs, and norms that guide employee behavior and organizational decision-making (C. H. Wang, 2019). When strongly embedded, green culture enables firms to internalize environmental principles into their routines, fostering commitment to sustainability at all organizational levels. However, most prior research has overlooked GC as a moderating mechanism. Existing studies tend to examine GC as an independent or mediating variable rather than as an internal contextual condition that influences the strength of relationships between green capabilities and competitive outcomes. For example, Hosseini et al. (2020) and Chandra and Agnes (Chandra & Agnes, 2021) found that GIC enhances innovation and competitiveness, but they did not account for the possibility that a supportive green culture could amplify these effects. Similarly, studies on GL and GHRM have documented positive associations with performance (Faeni et al., 2025), yet they rarely explore how culture may condition these relationships. Consequently, the absence of cultural analysis limits our understanding of the boundary conditions under which green management practices yield optimal results.

Empirical findings in the literature also remain inconsistent. Some studies demonstrate significant positive effects of GHRM and GOLC on competitive advantage(Faeni et al., 2025; Özgül & Zehir, 2023), while others report negligible or even non-significant relationships (Kim et al., 2023; Rehman et al., 2024). These discrepancies suggest that the impact of green capabilities may be contingent on contextual variables such as organizational culture. Without a shared culture that values environmental stewardship, green strategies may remain symbolic or fragmented rather than transformative. This inconsistency underscores the need to examine GC not merely as an outcome of green management, but as a critical enabler that determines the success of green capability deployment.

Moreover, existing research is predominantly concentrated in developed economies, where environmental regulations and sustainability cultures are more institutionalized. As a result, little is known about how firms in developing economies, particularly in Southeast Asia, integrate green management into their strategic frameworks. Indonesia provides a compelling context for this investigation. As one of the fastest-growing emerging economies, Indonesia has demonstrated a strong commitment to sustainability through national initiatives such as the National Medium-Term Development Plan (RPJMN) 2020–2024 and the National Action Plan for Greenhouse Gas Emission Reduction (RAN-GRK) 2011–2030 (Perpres, 2011). However, the effectiveness of these initiatives largely depends on how well firms internalize environmental values within their organizational culture. Despite the growing emphasis on the green economy, empirical studies examining the moderating role of GC in the relationship between green capabilities and CCA in the Indonesian context remain scarce.

Grounded in the Resource-Based View (RBV) and its ecological extension, the Natural Resource-Based View (NRBV), this study conceptualizes green capabilities as strategic, inimitable, and non-substitutable resources that enable firms to achieve sustainable competitive advantage (Hart, 1995). GIC captures a firm's ability to utilize environmental knowledge and intellectual assets to foster

innovation and efficiency (Xin & Wang, 2023), while GL represents leadership that embeds sustainability values into vision and strategy (Khan et al., 2023). GHRM encompasses employee training, recruitment, and incentive systems that promote environmental responsibility (Faeni et al., 2025), and GOLC reflects an organization's capacity to learn, adapt, and innovate in response to environmental challenges (Özgül & Zehir, 2023). Yet, without an organizational culture that supports environmental principles, these capabilities may fail to generate meaningful competitive outcomes. Thus, GC is expected to strengthen the relationship between green capabilities and CCA by providing an enabling environment in which sustainability becomes an integral part of corporate identity and decision-making.

This study contributes to the growing body of sustainability and strategic management literature in several important ways. It is among the first to examine the moderating role of GC in the link between green capabilities and competitive advantage within the Indonesian context. By integrating four green capabilities GIC, GL, GHRM, and GOLC into a single empirical framework, the study provides a more comprehensive understanding of how intangible, knowledge-based, and leadership-driven resources collectively enhance competitive advantage. Moreover, by positioning GC as a moderator rather than as a direct antecedent, this research extends the RBV and NRBV perspectives by elucidating the conditions under which green capabilities become sources of sustainable competitive advantage. Finally, by focusing on Indonesia, an emerging economy transitioning toward sustainability, the study offers context-specific insights that can inform both theory and managerial practice, guiding firms and policymakers seeking to align green culture and capability development with long-term competitiveness.

2. Literature Review and Hypothesis Development

2.1. Resource Based View (RBV)

The Resource-Based View (RBV) proposes that an organization's resources, both tangible such as physical and financial assets and intangible such as knowledge, reputation, and managerial expertise, can serve as the foundation for competitive advantage when they are valuable, rare, inimitable, and non-substitutable (Hendi et al., 2022; Özgül & Zehir, 2023; Pan et al., 2021). In corporate competition, RBV highlights the importance of developing internal competencies to create sustainable strategies (H. G. Rahayu et al., 2023).

RBV is particularly relevant in explaining the link between green management strategies and corporate competitive advantage. The theory suggests that distinctive and difficult-to-imitate internal resources serve as the basis for achieving a sustainable competitive advantage (Juniarti et al., 2024). Within this context, green management efforts that focus on efficient energy use, reduced waste, and sustainable innovation become valuable strategic resources when effectively incorporated into organizational activities. These practices reflect a company's commitment to environmental sustainability while enhancing its reputation, customer loyalty, and operational efficiency, thereby reinforcing corporate competitive advantage.

RBV provides the theoretical foundation for integrating green intellectual capital (GIC), green leadership (GL), green human resource management (GHRM), and green organizational learning capability (GOLC) as key internal capabilities that foster corporate competitive advantage (CCA). Moreover, green culture (GC) strengthens the utilization of these resources by embedding environmental values within the firm's strategic and operational systems. This study extends RBV by incorporating green management constructs and emphasizing how environmental sustainability transforms traditional resources into sources of enduring competitive advantage.

2.1.1. The Effect of Green Intellectual Capital on Corporate Competitive Advantage

Green Intellectual Capital (GIC) refers to the knowledge, skills, and competencies possessed by a company that relate to sustainable development and the implementation of environmentally oriented technological innovation (Safitri et al., 2024). From the RBV perspective, GIC functions as a valuable and inimitable internal resource that enhances firms' ability to create environmentally friendly products and processes, thereby differentiating them in competitive markets (Biancardi et al., 2023).

Empirical studies demonstrate that GIC enhances competitive advantage through green innovation and adaptability to market dynamics (Wang & Juo, 2021). Moreover, when a firm's sustainability values align with those of its consumers, this fosters loyalty and strengthens market position (Pokhrel, 2024).
H_1: Green Intellectual Capital (GIC) positively affects Corporate Competitive Advantage (CCA).

2.1.2. The Effect of Green Leadership on Corporate Competitive Advantage
Leaders who practice green leadership actively promote and embed environmentally responsible policies and practices within their organizations' goals, operations, and culture (Zacher et al., 2024). Green leadership refers to a leadership approach that prioritizes sustainability and environmental responsibility in both decision-making processes and the execution of organizational activities (Juniarti et al., 2024). This leadership approach motivates individuals to adopt environmentally responsible behaviors, create sustainable initiatives, and actively support environmental preservation within and beyond the organization (Y. Wang et al., 2023). In line with leadership theory, effective leaders play a crucial role in shaping employees' attitudes, guiding behavior, and fostering the values required to achieve organizational sustainability goals (Nugroho et al., 2025).

According to RBV, leadership that nurtures environmental responsibility creates unique organizational capabilities that enhance brand reputation and innovation (Angelita and Murwaningsari, 2023). Leaders who practice GL inspire pro-environmental behavior, foster sustainable initiatives, and promote value-based innovation (Suparna et al., 2021). These outcomes collectively strengthen the firm's long-term competitive advantage.
H_2: Green Leadership (GL) positively affects Corporate Competitive Advantage (CCA).

2.1.3. The Effect of Green Human Resource Management on Corporate Competitive Advantage
The fundamental concept of Green Human Resource Management (GHRM) involves managing human resources with an emphasis on commitment, performance, and strategic alignment, while incorporating environmental responsibility to promote long-term business sustainability (Ren et al., 2018). Human resource management emphasizes the productive aspects of tasks by focusing on how people use their resources and abilities to accomplish them. GHRM incorporates all of the key elements of human resource management, including hiring, selection, performance reviews, training, and incentives. Each process includes environmental considerations with the purpose of encouraging environmentally responsible employee behavior and supporting companies in achieving eco-friendly goals (Ahmed et al., 2021; Karatepe et al., 2022; Kim et al., 2023), where the adoption of management information systems such as personnel information systems can further enhance efficiency and data accuracy in managing human resources (Rahu et al., 2023).

When an organization's environmental objectives are aligned with its human resource goals, this alignment represents the practice of GHRM (Ong et al., 2022). Employee engagement and retention that are supported by GHRM-based management practices create a sense of belonging which increases job involvement and satisfaction (Siburian & Sugiarto, 2022). When employees feel that they are part of a sustainable mission, they tend to stay longer in the company, which reduces turnover and minimizes the costs associated with recruitment and training. In addition, GHRM highlights the importance of sustainability-oriented training, where management provides employees with the necessary skills to innovate and improve work processes. These initiatives not only enhance efficiency but also help build a workforce that is more aware, responsible, and aligned with the organization's long-term environmental vision.
H_3: Green Human Resource Management (GHRM) positively affects Corporate Competitive Advantage (CCA).

2.1.4. The Effect of Green Organizational Learning Capability on Corporate Competitive Advantage
Within the framework of the RBV, Green Organizational Learning Capability (GOLC) represents a strategic intangible resource that enables organizations to continuously acquire, disseminate, and apply knowledge related to environmental sustainability (Özgül & Zehir, 2023). Such learning capability allows firms to transform information into innovative practices that enhance both environmental and

financial performance. GOLC fosters adaptability and resilience by promoting a culture of continuous improvement in response to changing environmental conditions. Through this capability, organizations integrate sustainability principles into strategic and operational processes, ensuring that green initiatives are embedded in decision-making (Firmansyah, 2019). When firms consistently learn from their environmental experiences and institutionalize this knowledge, they can anticipate market trends, comply with environmental regulations more efficiently, and maintain a competitive position that is difficult for rivals to imitate.

Empirical findings have demonstrated that firms with higher learning capabilities are more successful in developing eco-innovations and achieving long-term sustainability-oriented competitive advantages (Nguyen et al., 2023). Therefore, GOLC functions as a crucial mechanism through which organizations convert environmental learning into enduring strategic value.

H_4: Green Organizational Learning Capability (GOLC) positively affects Corporate Competitive Advantage (CCA).

2.1.5. The Moderating Role of Green Culture in the Relationship between Green Intellectual Capital and Corporate Competitive Advantage

According to the RBV, green intellectual capital serves as a unique and valuable organizational resource that enhances innovation and sustainability performance. However, the extent to which GIC contributes to CCA depends on the cultural environment within the organization. A strong Green Culture (GC) facilitates the effective integration and utilization of GIC by aligning employees' environmental values with organizational objectives (Heryana et al., 2024). GC establishes a shared mindset that supports sustainability-oriented knowledge creation and application. When employees and leaders collectively value environmental responsibility, GIC, which comprises green human, structural, and relational capital, can be utilized more efficiently to develop eco-innovations and sustainable business models (Pratiwi & Kusumawardani, 2023).

Moreover, GC cultivates a shared sense of unity and commitment among employees in achieving sustainability goals. This collective commitment enhances the impact of GIC since motivated employees are more inclined to apply their knowledge and skills in developing innovative and sustainable practices that support competitive advantage. Empirical studies have confirmed this moderating effect. Hosseini et al. (2020) found that a sustainability-oriented culture strengthens the relationship between intellectual capital and innovation performance. In line with RBV, GC enhances the strategic potential of GIC by transforming it into a more powerful source of competitive advantage through improved innovation capability, reputation, and stakeholder trust.

H_5: Green Culture moderates the relationship between Green Intellectual Capital (GIC) and Corporate Competitive Advantage (CCA).

2.1.6. The Moderating Role of Green Culture in the Relationship between Green Leadership and Corporate Competitive Advantage

From the RBV perspective, leadership represents a crucial intangible resource that guides the effective use of organizational assets. As highlighted by Saha et al. (2025), strong leadership is essential for developing a clear organizational vision, establishing objectives, and adapting to environmental changes, all of which are fundamental for long-term success. When GL operates within a strong Green Culture (GC), the influence of leadership on CCA is strengthened. GC creates a shared set of sustainability-oriented values that align leaders' environmental vision with employees' actions (Şengüllendi et al., 2024).

A well-developed GC enhances the positive impact of GL by facilitating communication, trust, and participation in green initiatives. Employees are more likely to internalize sustainability goals when these are consistent with the organization's culture. Consequently, the synergy between GL and GC fosters innovation, improves decision-making, and strengthens long-term competitiveness (C. H. Wang, 2019).

H_6: Green Culture moderates the relationship between Green Leadership (GL) and Corporate Competitive Advantage (CCA).

2.1.7. The Moderating Role of Green Culture in the Relationship between Green Human Resource Management and Corporate Competitive Advantage

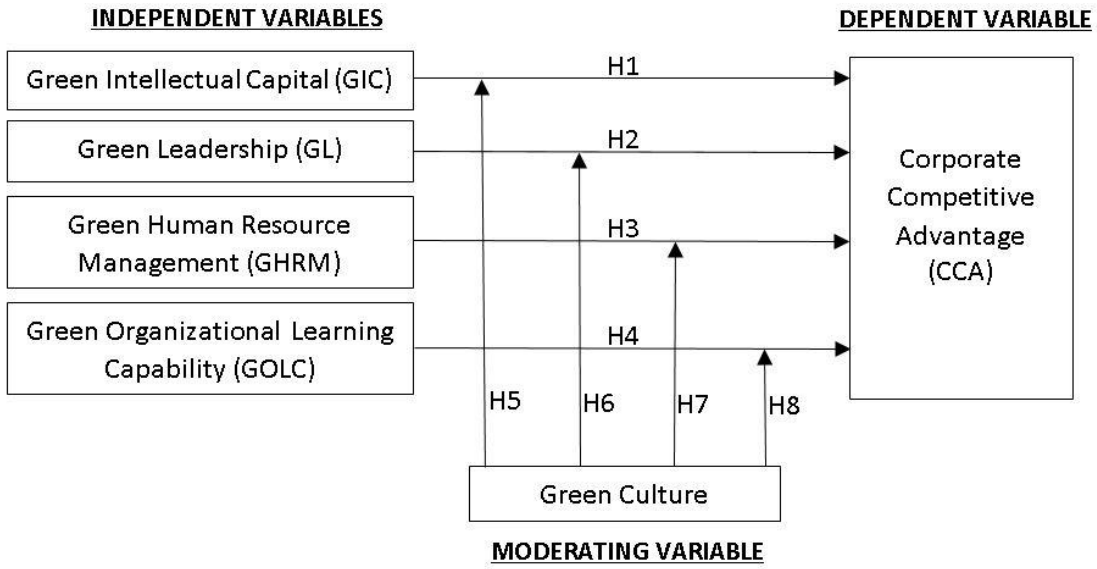
GHRM represents a corporate approach to tackling environmental issues through employee training and development. It allows organizations to embed eco-conscious practices within essential human resource areas, including employee selection, development, performance assessment, and reward systems. Nonetheless, challenges may arise when companies implement green management initiatives without adequately acknowledging the role of GC. When GC is properly integrated, GHRM can have a stronger and more sustainable impact on CCA (P. K. Muisyo et al., 2021). Strengthening GHRM practices through value alignment and employee competence development has been proven to enhance corporate competitiveness (Julianto et al., 2025). CCA refers to the superiority a company holds over its competitors, which can result from innovation, efficiency, product quality, or effective marketing strategies. Companies that successfully integrate sustainability values into their organizational culture are more likely to achieve greater competitive advantages through effective GHRM practices. This alignment between culture and human resource management fosters a workforce that supports environmental objectives while driving long-term organizational growth and success.

H_7: Green Culture moderates the relationship between Green Human Resource Management (GHRM) and Corporate Competitive Advantage (CCA).

2.1.8. The Moderating Role of Green Culture in the Relationship between Green Organizational Learning Capability and Corporate Competitive Advantage

Green Organizational Learning Capability (GOLC) represents the firm's ability to acquire, share, and apply sustainability-oriented knowledge. Within RBV, GOLC acts as a dynamic capability that transforms information into long-term competitive advantage. The strength of this transformation, however, depends on the cultural environment in which learning occurs.A strong GC encourages open communication, experimentation, and collaboration toward environmental goals (Firmansyah, 2019). It motivates employees to engage in continuous green innovation and helps the firm integrate sustainability principles into its strategic decisions. Consequently, GC enhances the positive relationship between GOLC and CCA by ensuring that learning processes translate into real performance outcomes and improved market positioning (Nguyen et al., 2023).

H_8: Green Culture moderates the relationship between Green Organizational Learning Capability (GOLC) and Corporate Competitive Advantage (CCA).



Picture 1. Research Model

3. Research Methodology

This study employed a quantitative survey method, which involved designing structured instruments to collect data from respondents and generalize the findings to a broader population. This method was selected as it enables researchers to efficiently reach a large number of respondents at a relatively low cost (Appiah et al., 2023).

Primary data were obtained from employees of companies listed on the Indonesia Stock Exchange (IDX) in various sectors, including energy, property, healthcare, logistics, basic materials, and technology, with a specific focus on firms operating in Indonesia. A purposive sampling technique was applied because it allows the selection of respondents who possess specific characteristics relevant to the study objectives. Respondents were required to (1) hold managerial, executive, or professional positions, (2) be directly involved in sustainability, human resource management, or corporate strategy, and (3) work for IDX-listed companies that actively engage in environmental or green initiatives (P. Muisyo et al., 2022).

Based on the criteria suggested by E. Rahayu & Hasanah (2020), the minimum sample size should be at least five times the number of indicators, with an ideal range of 100 to 200 respondents. A total of 163 valid responses were obtained obtained through online distribution between February and April 2025. Prior to data collection, ethical clearance was obtained from the Universitas Internasional Batam research committee. Respondents were informed of the research objectives and assured of anonymity, confidentiality, and voluntary participation before completing the questionnaire.

All indicators were adapted from prior validated research and measured using a five-point Likert scale, with responses ranging from 1 (strongly disagree) to 5 (strongly agree) (Abdelwahed et al., 2022; Almahirah, 2022; Appiah et al., 2023; Atalla et al., 2024; P. Muisyo et al., 2022; Naseem et al., 2024; Roespinoedji et al., 2019; Shaikh et al., 2024). Using SmartPLS software, the Structural Equation Modeling (SEM) method based on Partial Least Squares (PLS) was used to analyze the gathered data, as it effectively handles complex relationships among multiple constructs and is suitable for predictive and exploratory models (Appiah et al., 2023).

All constructs in this study were assessed using measurement items derived from validated sources, with minor wording adjustments to suit the Indonesian corporate context. The measurement of CCA was adopted from Zhang et al. (2024), reflecting a company's ability to outperform its competitors through superior environmental protection, product quality, managerial capabilities, and proactive green initiatives that create customer benefits. GIC was measured using modified indicators from Appiah et al. (2023), encompassing financial rewards for environmental achievements, flexible working hours to support eco-friendly actions, employee competency evaluations, and training programs that enhance environmental knowledge. GL was assessed based on items from S. Srivastava (2024), emphasizing leaders' capacity to stimulate discussions on green ideas, inspire and motivate members through environmental plans, and align actions with shared ecological values.

GHRM followed the scale by Gharbi et al. (2023), which integrates environmental principles into HR practices such as training, performance appraisal, compensation, and recruitment to promote sustainability as a core organizational value. GOLC was adapted from Özgül & Zehir (2023) and describes the firm's ability to acquire, utilize, and integrate green knowledge and technology to enhance environmental innovation. Lastly, GC was measured using items from C. H. Wang (2019), reflecting how environmental preservation is embedded as a fundamental corporate value through awareness programs, clear policies, eco-oriented goals, and the development of environmentally friendly products and processes. To address potential Common Method Bias (CMB), both procedural and statistical remedies were applied. Procedurally, respondents were guaranteed anonymity and items were randomized to reduce social desirability bias. Statistically, Harman's single-factor test was performed, revealing that a single factor explained less than 50% of the total variance, indicating that CMB was not a significant concern. Furthermore, Variance Inflation Factor (VIF) values for all constructs were below 5, confirming the absence of multicollinearity and reinforcing the validity of the data for further analysis.

4. Result and Discussion

With the exception of the financial sector, 163 respondents from a various of industrial sectors listed on the IDX participated in this survey. Female respondents dominated the sample (71.8%), while males accounted for 28.2%, indicating greater female participation that may enrich the diversity of perspectives in sustainability and strategy-related decision-making. Most respondents were aged

between 20 and 40, reflecting early to mid-career professionals who are actively engaged in adapting to the evolving sustainability landscape. In terms of education, the majority held undergraduate degrees, suggesting a relatively high level of understanding of organizational and strategic issues. Regarding job positions, most were from operational and middle management levels, followed by a smaller proportion of managers, board members, and executives, signifying direct involvement in implementing sustainability initiatives. Over half of the respondents had one to five years of work experience, demonstrating active participation in developing sustainable competencies within their organizations. The diverse respondent characteristics enhance the generalizability of the findings by representing various viewpoints related to sustainability practices and corporate competitiveness.

Table 1. Outer Model

Construct	Item	Convergent Validity	Cronbach Alpha	Composite Reliability	AVE	R Square
Corporate Competitive Advantage (CCA)	CCA1	0,757	0,864	0,902	0,649	0,994
	CCA2	0,787				
	CCA3	0,832				
	CCA4	0,828				
	CCA5	0,821				
Green Intellectual Capital (GIC)	GIC1	0,763	0,771	0,854	0,593	
	GIC2	0,772				
	GIC3	0,748				
	GIC4	0,797				
Green Leadership (GL)	GL1	0,797	0,847	0,897	0,686	
	GL2	0,839				
	GL3	0,824				
	GL4	0,853				
Green Human Resource Management (GHRM)	GHRM1	0,858	0,929	0,944	0,737	
	GHRM2	0,878				
	GHRM3	0,882				
	GHRM4	0,900				
	GHRM5	0,872				
	GHRM6	0,753				
Green Organizational Learning Capability (GOLC)	GOLC1	0,791	0,830	0,887	0,663	
	GOLC2	0,839				
	GOLC3	0,801				
	GOLC4	0,824				
Green Culture (GC)	GC1	0,734	0,882	0,911	0,631	
	GC2	0,767				
	GC3	0,810				
	GC4	0,825				
	GC5	0,837				
	GC6	0,787				
Moderating Effect	GIC x GC	1,219	1000	1000	1000	
	GL x GC	1,441	1000	1000	1000	
	GHRM x GC	1,180	1000	1000	1000	
	GOLC x GC	1,430	1000	1000	1000	

Source: Data processed using SmartPLS (2025)

Using the Variance Inflation Factor (VIF) test, possible multicollinearity among indicators was found, but all VIF values were below the upper limit of 5, indicating the absence of multicollinearity and common method bias (Din et al., 2024). Thus, the data were suitable for further analysis using PLS-SEM (Suhayat et al., 2023). Convergent validity was confirmed as most outer loading values exceeded 0.70 and all AVE values were above 0.50, showing that each construct explained more than half of the

variance in its indicators (Rondius, 2012). Construct reliability, assessed through Cronbach's Alpha and Composite Reliability, also met the acceptable threshold of 0.70 (Ahmad et al., 2024). Discriminant validity was achieved since the square root of each construct's AVE was greater than its correlations with other constructs, confirming conceptual distinctness (Rasoolimanesh, 2022). The R Square value of 0.994 indicated that the model has strong predictive power for the endogenous construct.

Overall, the measurement model satisfied all validity and reliability criteria, and no multicollinearity issues were detected. Therefore, the outer model evaluation supports the validity of the conceptual framework under the RBV theory. The five constructs were found valid and reliable as strategic resources that are valuable, rare, inimitable, and non-substitutable, contributing significantly to achieving CCA (Özgül & Zehir, 2023; Pan et al., 2021).

Table 2. HTMT

	CCA	GC	GHRM	GIC	GL	GOLC
Corporate Competitive Advantage						
Green Culture	0,757					
Green Human Resource Management	0,636	0,688				
Green Intellectual Capital	0,828	0,423	0,595			
Green Leadership	0,823	0,252	0,616	0,338		
Green Organizational Learning Capability	0,326	0,300	0,638	0,379	0,429	

Source: Data processed using SmartPLS (2025).

Within the PLS-SEM framework, the measurement model was examined for discriminant validity using the HTMT assessment. Each construct is guaranteed to measure a unique concept and not overlap with other constructs thanks to discriminant validity. According to Rasoolimanesh (2022), HTMT values should be below 0.90 for theoretically distinct constructs and below 0.85 for conceptually similar ones. All of the HTMT values were below 0.90, according to the data, indicating satisfactory discriminant validity. For example, the HTMT value between CCA and GC was 0.757, between GIC and GOLC was 0.379, and between GC and GHRM was 0.688. These findings show that every model construct is logically sound and experimentally unique (Rasoolimanesh, 2022).

The results also support the RBV idea, which states that integrating distinctive internal resources that are hard to replicate and difficult to replace can provide a competitive edge (Juniarti et al., 2024). The high discriminant validity observed in this study suggests that constructs such as GIC, GL, GHRM, GOLC, and GC function as independent organizational capabilities. This bolsters the RBV viewpoint, which holds that unique and valuable internal resources are essential to gaining a competitive edge for a company (Pan et al., 2021; H. G. Rahayu et al., 2023).

Table 3. Inner Model

X-Y	t-statistic	p- value	Conclusion
GC -> CCA	10,274	0,000	Significant positive
GHRM -> CCA	3,569	0,000	Significant positive
GIC -> CCA	0,004	0,997	Insignificant
GL -> CCA	4,765	0,000	Significant positive
GOLC -> CCA	9,542	0,000	Significant positive
Moderating (GHRM×GC) -> CCA	0,321	0,748	Insignificant
Moderating (GL×GC) -> CCA	2,508	0,012	Significant positive
Moderating (GOLC×GC) -> CCA	2,348	0,019	Significant positive
Moderating (GIC×GC) -> CCA	1,190	0,234	Insignificant

Source: Data processed using SmartPLS (2025).

4.1. Discussion

4.1.1. The Effect of Green Intellectual Capital on Corporate Competitive Advantage

According to the findings of the route coefficient study between CCA and Green Intellectual Capital (GIC), the p-value was 0.997, the t-statistic was 0.004, and the coefficient value was 0.004. These results indicate that GIC does not have a significant effect on CCA. This suggests that environmentally oriented intellectual capital within organizations, such as employees' knowledge, skills, and experience related to environmental management, has not yet made a direct contribution to enhancing CCA. The insignificance of this relationship may occur because GIC alone is not sufficient to directly drive competitive advantage, given its long-term nature and tendency to exert an indirect effect. Therefore, a mediating variable may be necessary to better capture the actual influence of GIC on CCA.

However, other studies have presented contrasting results. H. G. Rahayu et al. (2023) and C. H. Wang and Juo (2021) found that GIC contributes positively to green innovation and competitive advantage. These differences may arise because the implementation of GIC among the respondent companies in this study has not yet been fully optimized or effectively integrated into sustainability strategies, thereby limiting its direct impact on achieving competitive advantage. This highlights the importance of developing a stronger integration of GIC within organizational strategy to ensure that environmentally driven knowledge and innovation can create tangible competitive outcomes.

4.1.2. The Effect of Green Leadership on Corporate Competitive Advantage

The analysis's findings indicate that, with a t-statistic of 4.765 and a p-value of 0.000, the path coefficient value between Green Leadership (GL) and CCA is 0.258. These results indicate that GL has a significant and positive effect on CCA. This finding suggests that leadership oriented toward sustainability principles can foster an environmentally supportive organizational culture, inspire the development of green innovation, and strengthen the company's reputation, all of which ultimately enhance CCA. GL may inspire staff to embrace sustainable practices and match corporate objectives with environmental stewardship, fostering an atmosphere that encourages creativity and competition.
This finding is consistent with the findings of Suparna et al. (2021) and Angelita & Murwaningsari (2023), who revealed that GL increases firm value through sustainable innovation, operational efficiency, and improved brand reputation. In this context, leaders who embrace environmentally responsible values function as a unique internal capability that cannot be easily imitated by competitors. This aligns with the RBV framework, which emphasizes that valuable, rare, and difficult-to-imitate resources are essential for achieving a sustainable competitive advantage.

4.1.3. The Effect of Green Human Resource Management on Corporate Competitive Advantage

Based on the findings, which include a p-value of 0.000, a t statistic of 3.569, and a path coefficient of 0.153, it is evident that GHRM significantly affects CCA. These findings suggest that environmentally oriented HRM practices, such as sustainability training and recruitment based on green values, can increase employee engagement in environmental initiatives and stimulate green innovation, which in turn strengthens the company's competitive advantage. This demonstrates that employees who are empowered through GHRM practices tend to internalize sustainability values, creating a workforce that supports innovation and long-term competitiveness.

This outcome is in line with the conclusions of P. K. Muisyo et al. (2021) and Ong et al. (2022), who found that effective implementation of GHRM fosters a sustainability-oriented culture and facilitates the creation of green innovation, both of which enhance corporate competitiveness. However, contrasting evidence was reported by Kim et al. (2023), who observed that GHRM does not have a direct effect on competitive advantage. This inconsistency may occur because the implementation of GHRM alone is not sufficient to generate competitive outcomes, implying the potential need for a mediating variable to clarify its actual impact on corporate performance.

4.1.4. The Effect of Green Organizational Learning Capability on Corporate Competitive Advantage

A path coefficient of 0.337, a t-statistic of 9.542, and a p-value of 0.000 indicate that Green Organizational Learning Capability (GOLC) significantly and favourably affects CCA. This suggests that organizations possessing strong learning capabilities are more capable of adapting to environmental

changes, assimilating sustainability knowledge, and executing strategies that strengthen long-term competitiveness. Companies that consistently develop green knowledge and apply it to their operations are more capable of creating innovative solutions that support sustainable growth and strengthen their competitive position.

This finding aligns with previous studies emphasizing the crucial role of GOLC in improving competitiveness through continuous innovation and the integration of environmental values into business strategies. According to Özgül & Zehir (2023) and Nguyen et al. (2023) identified GOLC as a key factor in establishing environmentally driven competitive advantage, as it connects internal learning processes with organizational transformation toward sustainability. Therefore, a well-developed GOLC serves as an essential strategic foundation for maintaining competitive advantage that is adaptive to change and oriented toward long-term sustainability.

4.1.5. The Moderating Role of Green Culture in the Relationship between Green Intellectual Capital and Corporate Competitive Advantage

The analysis results show that the t-statistic value is 1.190 and the p-value is 0.234, indicating that Green Culture (GC) does not have a significant moderating effect on the relationship between GIC and CCA. This suggests that although GC supports a sustainability-oriented environment, its presence alone is not sufficient to significantly strengthen the influence of GIC on competitive advantage. The absence of a moderating effect implies that the benefits of GIC may not fully translate into improved competitiveness without the effective integration of GC within organizational systems.

This finding differs from the results of Appiah et al. (2023), who reported that GC significantly reinforces the relationship between environmentally based intellectual capital and competitive advantage. The inconsistency may occur because the role of GIC in many organizations has not been fully optimized due to limited internalization of GC in strategic, structural, and operational practices. The misalignment between environmental knowledge and the depth of cultural implementation may hinder the ability of GIC to generate sustainable competitive advantage. Therefore, these results highlight the importance of embedding GC more deeply into organizational systems to maximize the strategic value of GIC in achieving long-term competitiveness.

4.1.6. The Moderating Role of Green Culture in the Relationship between Green Leadership and Corporate Competitive Advantage

With a coefficient value of 0.184, a t-statistic of 2.508, and a p-value of 0.012, the analysis's findings demonstrate that GC significantly moderates the association between GL and CCA. According to these results, GC has a positive moderating effect, which means that the impact of green leadership on competitive advantage increases when sustainability principles are ingrained in an organization's culture. A well-established GC enhances leaders' ability to promote sustainable innovation, encourage environmentally responsible decision-making, and align strategic actions with sustainability objectives, thereby improving overall corporate competitiveness.

This finding is consistent with the findings of Şengüllendi et al. (2024), Juniarti et al. (2024) and C. H. Wang (2019), who highlighted that the presence of GC enhances the effectiveness of green leadership by inspiring employee commitment, shaping environmentally responsible behaviors, and fostering innovation aligned with sustainability goals. To build adaptive and enduring competitiveness amid the evolving challenges of the global business landscape, sustainability-driven leadership and green organizational culture function synergistically.

4.1.7. The Moderating Role of Green Culture in the Relationship between Green Human Resource Management and Corporate Competitive Advantage

The moderating effect of GC on the GHRM–CCA relationship is insignificant ($\beta = -0.012$, $t = 0.321$, $p = 0.748$). This suggests that although GC may exist symbolically, it is not yet sufficiently embedded in HR practices to strengthen the influence of GHRM on competitive advantage. From a theoretical perspective, this highlights the gap between organizational values and HR execution, where GC has not been fully integrated into recruitment, training, and reward systems.

Contrary to P. Muisyo et al. (2022), who found a significant moderating role, this study implies that the absence of structural reinforcement limits GC's potential. This finding provides an important implication that cultural factors alone cannot enhance competitiveness without integration into managerial systems. It suggests that the interplay between GHRM and GC must be mutually reinforcing for sustainability values to translate into tangible performance outcomes. Embedding GC concretely into HR frameworks could therefore transform sustainability from a symbolic commitment into an operational driver of long-term competitiveness.

4.1.8. The Moderating Role of Green Culture in the Relationship between Green Organizational Learning Capability and Corporate Competitive Advantage

The analysis shows a significant positive moderating effect of GC on the relationship between GOLC and CCA ($\beta = 0.152$, $t = 2.348$, $p = 0.019$). This indicates that organizations with a well-developed GC are more effective at leveraging their learning capabilities to enhance sustainability-driven competitiveness. GC provides an enabling context that facilitates knowledge sharing, continuous improvement, and innovation aligned with environmental goals.

This finding supports Liu et al. (2017) and H. G. Rahayu et al. (2023), who confirmed that GC amplifies the impact of GOLC on performance outcomes. This implies that culture serves as a strategic catalyst that converts organizational learning into a competitive outcome. The integration between GOLC and GC represents a dynamic capability that strengthens an organization's ability to respond to environmental turbulence, aligning with the RBV and dynamic capability perspectives. This synergy allows firms to sustain competitiveness by continuously transforming environmental learning into innovative actions and strategic adaptation.

Table 4. GoF Index

Average AVE	Average Adjusted R Square	GoF Index
0,659	0,994	0,810

Source: Data processed using SmartPLS (2025)

The AVE value that was produced from the data analysis utilizing the PLS-SEM technique was 0.659. This shows that the constructs included in the model fulfill the requirements for convergent validity. According to Hair et al., as cited in Sarstedt et al. (2020), an AVE value greater than 0.50 shows that the indicators within each construct are capable of explaining more than fifty percent of the variance of the construct being measured. An Adjusted R Square of 0.994 was also obtained from the analysis, suggesting that the model effectively explains the variation in the dependent variable. As stated by Henseler & Sarstedt (2013), an R Square value above 0.75 is considered substantial, indicating that the model possesses high predictive capability.

In addition, the Goodness of Fit (GoF) value of 0.810 reflects an excellent level of model fit. The GoF was calculated using the square root of the product of AVE and R Square, following the criteria proposed by Tenenhaus et al. (2005) and cited in later studies by Abid et al. (2020), Muzafar et al. (2023) and Nazir & Qureshi (2023). A GoF value greater than 0.36 is classified as large, indicating that the model has a high level of quality in explaining the dataset as a whole. Overall, these indicators confirm that the model developed in this study demonstrates strong validity and high quality, making it appropriate for further testing in the context of sustainability-oriented strategic research.

5. Conclusions

5.1. Conclusion

This study aimed to examine the influence of Green Intellectual Capital (GIC), Green Leadership (GL), Green Human Resource Management (GHRM), and Green Organizational Learning Capability (GOLC) on Corporate Competitive Advantage (CCA), with Green Culture (GC) serving as a moderating variable. The findings indicate that GL, GHRM, and GOLC have a significant positive impact on CCA, demonstrating that sustainability-oriented leadership, human resource practices, and organizational learning capabilities strengthen a firm's competitive position. Conversely, GIC did not

exhibit a significant direct effect, suggesting that the knowledge and intellectual resources related to environmental management have not been fully optimized in driving competitiveness.

Furthermore, GC was found to strengthen the relationships between GL and GOLC with CCA, implying that a strong sustainability-oriented culture enhances the role of leadership and learning in achieving long-term advantage. However, GC did not significantly moderate the relationships between GIC or GHRM and CCA, indicating that a deeper alignment between cultural values, intellectual capital, and human resource practices is still required.

Overall, the findings confirm that internal green capabilities supported by a solid organizational culture play a pivotal role in achieving sustainable competitive advantage. These results are consistent with the Resource-Based View (RBV), which emphasizes that valuable and unique internal resources can serve as a foundation for long-term strategic advantage. Moreover, this conclusion aligns with the global sustainability agenda outlined in the Sustainable Development Goals (SDGs) and Indonesia's National Medium-Term Development Plan (RPJMN) 2020–2024, both of which encourage organizations to adopt environmentally responsible strategies that contribute to sustainable economic growth.

5.2. Suggestions

future researchers. Companies are encouraged to integrate sustainability into their leadership approach, human resource management, and learning systems to strengthen innovation, efficiency, and long-term competitiveness. The development of Green Intellectual Capital should also be optimized through structured knowledge-sharing mechanisms and environmental training programs that enhance the strategic use of intellectual resources.

Managers should foster a green culture that supports employee commitment to environmental values, as this will increase the effectiveness of green practices across all operational levels. Additionally, aligning corporate strategies with national and global sustainability policies, such as the RPJMN and the SDGs, can enhance the company's contribution to environmental stewardship and social responsibility.

For future research, it is recommended to explore additional mediating or moderating variables, such as green innovation, environmental performance, or stakeholder engagement, to provide a more comprehensive understanding of the mechanisms linking green management and competitiveness. Researchers may also adopt a mixed-method approach by combining quantitative and qualitative data collection to gain deeper insights. Expanding the research scope across countries with different environmental and institutional contexts could also enhance the generalizability of the findings and provide valuable cross-cultural comparisons in sustainability implementation.

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