CURRENT
Jurnal Kajian Akuntansi dan Bisnis Terkini
https://current.ejournal.unri.ac.id

GREEN HUMAN RESOURCE MANAGEMENT, SUSTAINABILITY, AND COMPETITIVE PERFORMANCE IN LQ45 FIRMS

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Abstract

This study examines the role of Green Human Resource Management, Corporate Sustainability, and Management Control Systems on the competitive performance of companies listed in the LQ45 index in Indonesia. Using an explanatory quantitative approach, secondary data was collected from the annual and sustainability reports of 20 LQ45 companies over the period 2013–2023, resulting in 200 samples. The analysis was conducted using PLS-SEM to test the direct and moderating effects. The findings indicate that Corporate Sustainability has a strong and positive impact on competitive performance, supporting the view that sustainability-oriented strategies enhance market and financial outcomes. GHRM shows a significant but negative direct effect, indicating that green HR practices in LQ45 companies have not been strategically integrated and may increase short-term costs or inefficiencies. Management Control Systems have a direct positive effect on competitive performance. MCS plays a critical moderating role: it strengthens the relationship between GHRM and competitive performance, but weakens the effect of Corporate Sustainability when control mechanisms become too rigid. This result underscores the importance of aligning sustainability initiatives and green HR with appropriate management control systems to achieve superior competitive performance.

INTRODUCTION

In an increasingly competitive and sustainability-driven business environment, firms are required not only to achieve strong financial performance but also to maintain long-term competitive advantages (Mohammad & Marcel, 2025). Competitive performance reflects a firm's ability to outperform rivals through superior profitability, market valuation, growth, and strategic positioning (Dewasiri et al., n.d.). However, many publicly listed companies, including those in the LQ45 index, face challenges in sustaining competitive performance amid rising environmental regulations, increasing stakeholder pressure, and escalating operational costs associated with sustainability initiatives (Demaret & Molinari, 2025). These conditions raise concerns regarding how firms can effectively translate sustainability-oriented strategies into tangible competitive outcomes.

Green Human Resource Management (GHRM) (Ametepe et al., 2025) have been widely recognized as strategic approaches to address these challenges. From a resource-based and natural resource-based perspective, GHRM strengthens employee competencies,

environmental awareness, and organizational commitment, which are essential for developing green capabilities and innovatio (Mohammad & Marcel, 2025) Similarly, Corporate Sustainability enhances operational efficiency, reduces environmental risks, improves corporate reputation, and attracts long-term investors, thereby contributing positively to competitive performance (Rahim, 2025)Despite these theoretical expectations, empirical findings remain inconclusive, particularly regarding whether green HR practices deliver short-term competitive benefits or instead impose additional costs that may weaken firm performance.

Moreover, the effectiveness of GHRM and Corporate Sustainability does not operate in isolation. Management Control Systems (MCS), as accounting-based mechanisms, play a critical role in planning, monitoring, and aligning organizational strategies with performance objectives (Nations & Development, 2025). Prior studies emphasize that MCS enhance corporate performance by ensuring strategic alignment, accountability, and performance measurement (Demaret & Molinari, 2025). However, sustainability-oriented strategies often require flexibility, learning, and long-term orientation, which may conflict with rigid control mechanisms if not properly designed.

Importantly, existing literature has largely examined the direct effects of GHRM (Monther & Sahan, 2025), sustainability (Ametepe et al., 2025), or MCS on performance (Nations & Development, 2025), while the moderating role of MCS remains underexplored, especially in the context of publicly listed firms with high organizational complexity. MCS may strengthen or weaken the impact of GHRM and Corporate Sustainability on competitive performance by shaping how green initiatives are implemented, evaluated, and rewarded. Without appropriate control systems, green strategies risk becoming symbolic, inefficient, or misaligned with competitive objectives.

Therefore, this study addresses a critical research gap by examining how Management Control Systems moderate the relationships between Green Human Resource Management, Corporate Sustainability, and Competitive Performance among LQ45 firms. By integrating sustainability strategy and management accounting perspectives, this research provides deeper insights into how firms can effectively leverage green initiatives through appropriate control mechanisms to achieve sustainable competitive performance.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPTMENT
Natural Resource-Based View (NRBV)

The Natural Resource-Based View (NRBV) proposed by Hart (1995) extends the traditional Resource-Based View by emphasizing the strategic importance of environmental capabilities in achieving sustainable competitive advantage. NRBV argues that firms that effectively manage natural resources, environmental risks, and ecological challenges can develop capabilities that are difficult for competitors to imitate. These capabilities enable organizations to create long-term value while simultaneously addressing environmental sustainability. In this perspective, environmental strategies are not merely a form of corporate social responsibility but constitute strategic assets that enhance operational efficiency, innovation capacity, and long-term competitiveness (Murtaza et al., 2025).

NRBV further suggests that environmental initiatives such as pollution prevention, waste reduction, and eco-innovation can strengthen organizational performance by improving resource efficiency and lowering operational costs (Angsoyiri, 2025). Firms that invest in environmentally oriented capabilities—such as sustainable production systems, green technologies, and environmentally responsible management practices—are more likely to achieve superior performance outcomes. In particular, Green Human Resource Management (GHRM) plays a critical role in building these capabilities by developing employees' environmental awareness, skills, and commitment to sustainability-oriented organizational

practices. As a result, green capabilities become valuable, rare, and difficult to imitate, thereby fulfilling the conditions for sustainable competitive advantage as outlined in the NRBV framework (Hart, 1995).

Within this theoretical perspective, environmental strategies can contribute to firm performance through several mechanisms. First, the development of green capabilities through practices such as environmental training, green recruitment, and sustainability-based performance evaluation enables firms to strengthen internal competencies that support ecological innovation and operational efficiency. Second, environmental management practices aimed at reducing pollution and waste can significantly decrease operational costs, improve resource utilization, and minimize regulatory risks. Third, firms that actively pursue sustainable product management can enhance their reputation among stakeholders and attract environmentally conscious investors, including those focusing on Environmental, Social, and Governance (ESG) criteria. Finally, eco-innovation enables firms to differentiate their products in the marketplace, creating new opportunities for competitive positioning and brand development (Murtaza et al., 2025; Angsoyiri, 2025).

However, NRBV also assumes that organizations possess the internal mechanisms necessary to translate environmental strategies into consistent organizational practices. In this context, Management Control Systems (MCS) become essential mechanisms for coordinating, monitoring, and evaluating the implementation of sustainability-oriented initiatives (Alam, 2025; Saleh et al., 2025). MCS provides structured processes through performance measurement systems, internal controls, and organizational governance mechanisms that ensure environmental strategies are effectively integrated into operational activities. Through these mechanisms, organizations can align sustainability objectives with operational targets, monitor the implementation of environmental initiatives, and evaluate their impact on financial and competitive performance.

In large and complex organizations such as companies listed in the LQ45 index, the role of management control becomes particularly critical. These firms operate under high regulatory scrutiny, face strong stakeholder expectations, and manage complex operational structures. Consequently, MCS functions as a strategic infrastructure that integrates sustainability objectives into business processes, facilitates the monitoring of environmental initiatives, and enhances organizational accountability in responding to ESG-related pressures. By providing reliable performance information and structured evaluation mechanisms, MCS strengthens corporate legitimacy and improves investor confidence in capital markets (Demaret & Molinari, 2025).

Resource-Based View (RBV)

The Resource-Based View (RBV), introduced by Barney (1991), provides a foundational framework for understanding how firms achieve sustained competitive advantage through the strategic utilization of internal resources and capabilities. According to RBV, organizations can generate superior performance when they possess resources that are valuable, rare, inimitable, and effectively organized—commonly referred to as the VRIO framework. These strategic resources enable firms to implement strategies that competitors cannot easily replicate, thereby creating long-term competitive advantages.

In the context of sustainability-oriented organizations, human capital represents one of the most critical strategic resources. Green Human Resource Management (GHRM) can therefore be viewed as an important organizational capability that supports environmental innovation and sustainability performance. Through practices such as environmental training, green recruitment, and sustainability-based performance evaluation, organizations develop employees' competencies and behaviors that contribute to environmentally responsible business operations (Renwick et al., 2013; Wright et al., 2001). Employees who possess

environmental awareness and sustainability-oriented skills represent unique organizational assets that are difficult for competitors to imitate.

Similarly, corporate sustainability reflects an organizational capability that enables firms to manage environmental risks, optimize resource utilization, and maintain long-term operational stability. Within companies included in the LQ45 index—characterized by large market capitalization and high liquidity—the integration of sustainability-oriented capabilities may enhance firm reputation, attract long-term investors, and strengthen competitive positioning in capital markets. From an RBV perspective, firms that successfully integrate sustainability into their strategic resources and organizational processes are more likely to achieve superior competitive performance compared to firms that treat sustainability merely as a compliance requirement.

Triple Bottom Line (TBL)

The theoretical foundation of this study is further supported by the Triple Bottom Line (TBL) framework introduced by Elkington (1997), which argues that corporate success should not be evaluated solely based on financial performance. Instead, organizations must balance economic objectives with environmental sustainability and social responsibility. This framework is commonly summarized through the three interconnected dimensions of profit, planet, and people.

The TBL perspective emphasizes that long-term organizational sustainability depends on the ability of firms to integrate financial performance with responsible environmental management and social accountability. Firms that successfully balance these three dimensions are better positioned to achieve sustainable competitive advantage and maintain long-term stakeholder trust. In contemporary capital markets, investors increasingly evaluate companies not only based on financial indicators but also on Environmental, Social, and Governance (ESG) performance.

In practice, the implementation of TBL principles is often operationalized through sustainability reporting frameworks such as those developed by the Global Reporting Initiative (GRI). These standards provide internationally recognized guidelines for measuring and disclosing sustainability performance across economic, environmental, and social dimensions. For companies included in the LQ45 index, which operate under high public visibility and investor scrutiny, adherence to such reporting standards enhances transparency and strengthens market credibility. Consequently, the integration of TBL principles and standardized sustainability reporting frameworks provides an important conceptual foundation for understanding how corporate sustainability contributes to competitive performance in capital markets (Elkington, 1997; Demaret & Molinari, 2025).

Hypothesis Developtment

According to the Resource-Based View (RBV), firms achieve sustained competitive advantage by possessing valuable, rare, inimitable, and well-organized resources (Barney, 1991). Strategic HRM practices, including those oriented toward environmental objectives, can constitute unique human capital that drives innovation and efficiency when properly integrated (Wright et al., 2001; Renwick et al., 2013). Without effective organization of these resources, however, the theoretical benefit may be diminished due to increased costs and administrative burden.

Novelty emerges when GHRM is not only seen as a conventional HR approach, but as a strategic capability builder that directly drives competitive performance, especially in the context of large companies like LQ45. Previous research has largely focused on employes' green behavior, rather than its impact on the company's macro competitive performance. Therefore, the first hypothesis proposed is:

H₁: Green human resource management has a positive and significant effect on company competitive performance.

Based on the Natural Resource-Based View (NRBV) and John Elkington's Triple Bottom Line theory, sustainability capabilities enable companies to reduce environmental risks, enhance operational efficiency, and gain social legitimacy. Sustainability is not just about compliance, but a source of strategic differentiation. In the context of the capital market, such as LQ45 companies, ESG disclosure based on the Global Reporting Initiative standards enhances transparency and credibility, thereby strengthening investor perception. Causally, sustainability enhances reputation lowers cost of capital increases company value.

When sustainability is no longer positioned as compliance, but as a strategic driver for the competitive advantage of LQ45 companies, a context that is highly sensitive to investor sentiment, ESG regulatory risks, and strict governance standards (College & Ha, 2024)Literature is still limited in testing the direct influence of sustainability on competitive performance in capital market index companies. Therefore, the proposed hypothesis 2 is:

H₂: Corporate sustainability has a positive and significant effect on company competitive performance.

The novelty lies in presenting MCS not just as a tool for internal control, but as a source of strategic competitiveness in the face of the financial and business environment dynamics of LQ45 companies (Nations & Development, 2025)). Until now, MCS has rarely been considered a determinant of competitive performance in the context of sustainability-driven strategy. Therefore, the proposed hypothesis 3 is:

H₃: Management control systems have a positive and significant effect on company competitive performance.

Prior studies have rarely positioned Management Control Systems (MCS) as a moderating variable in the relationship between Green Human Resource Management (GHRM) and competitive performance. From a Resource-Based View (RBV) and Natural Resource-Based View (NRBV) perspective, GHRM contributes to competitive advantage by developing environmentally oriented human capital, skills, and pro-environmental behaviors that are valuable and difficult to imitate (Bedford, 2015; Almada & Borges, 2018). However, these green capabilities do not automatically translate into superior competitive performance without appropriate organizational mechanisms to coordinate, monitor, and evaluate employee behavior.

Management Control Systems function as accounting-based coordination and alignment mechanisms that translate strategic intentions into measurable actions and performance outcomes (Revellino & Mouritsen, 2015). Prior research suggests that control systems enhance the effectiveness of human resource practices by aligning employee incentives, performance appraisal, and strategic objectives (Malmi & Brown, 2008). In complex organizations, such as publicly listed firms, the absence of strong control systems may cause GHRM initiatives to remain symbolic or administratively driven, thereby limiting their contribution to competitive performance (Ametepe et al., 2025).

Empirical evidence further indicates that MCS strengthens the performance impact of strategic initiatives by reducing implementation ambiguity and improving accountability (Nations & Development, 2025). Dewasiri et al. (2025) argue that in large and complex firms, control systems act as amplifiers that convert intangible strategic resources into tangible performance outcomes. Therefore, it is reasonable to expect that MCS enhances the effectiveness of GHRM in improving competitive performance. Accordingly, the following hypothesis is proposed:

H₄: Management control systems positively moderate the relationship between green

human resource management and company competitive performance.

Based on management control theory (Simons, 1995; Malmi & Brown, 2008), Management Control Systems (MCS) function as mechanisms that translate strategy into operational actions thru KPIs, performance measurement, incentives, and monitoring.

There is still limited empirical research that positions Management Control Systems (MCS) as a moderating variable in the relationship between corporate sustainability and competitive performance. Most prior studies have predominantly examined the direct effect of corporate sustainability on firm performance, without considering the internal control mechanisms that enable sustainability strategies to be effectively executed and monitored (Susitha, 2025).

From a contingency theory perspective, management control systems are not neutral tools, but strategic mechanisms that align organizational resources, behaviors, and processes with strategic objectives (Revellino & Mouritsen, 2015). Sustainability initiatives such as environmental responsibility, social engagement, and long-term value creation often involve complex trade-offs, long investment horizons, and uncertainty. Without adequate control systems, these initiatives may fail to generate tangible competitive outcomes

Prior empirical studies support this argument by demonstrating that well-designed MCS enhance strategic alignment and performance outcomes. (Jardioui et al., 2020) shows that interactive and diagnostic control systems strengthen the relationship between strategic priorities and performance. Based on these theoretical propositions and empirical findings, this study argues that corporate sustainability alone is insufficient to generate superior competitive performance. Instead, Management Control Systems function as an enabling architecture that strengthens or weakens the effectiveness of sustainability initiatives depending on how controls are designed and used. Thus, positioning MCS as a moderator provides a novel contribution by explaining why sustainability leads to competitive advantage in some firms but not in others. Therefore, the following hypothesis is proposed:

H$_5$: Management control systems moderate the relationship between corporate sustainability and company competitive performance, such that the positive effect of corporate sustainability on competitive performance becomes stronger when management control systems are effectively implemented.
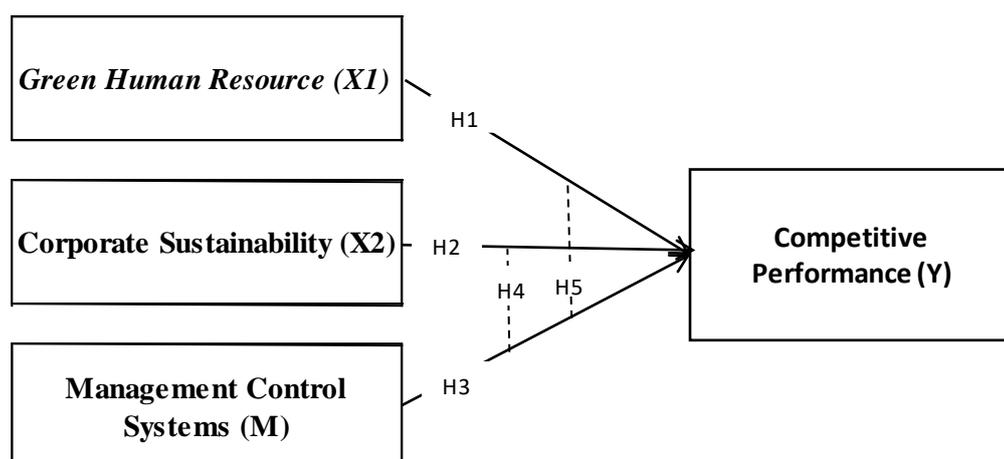

Figure 1.
Framework

Framework of Thought

This research uses a quantitative approach with an explanatory research method, aiming

to test and explain the causal relationships between variables in the research model. The data used is secondary data sourced from the company's annual reports and sustainability reports. Data processing was conducted using SmartPLS 3 thru the PLS-SEM approach, presenting the results of model suitability tests (outer and inner models) as well as testing the direct and moderating effects between variables. The focus of this research is companies included in the TOP 20 LQ45 index, which is a group of companies with the best stock performance on the Indonesia Stock Exchange (IDX). The observation period covers the years 2013–2023, resulting in 200 observation units (20 companies × 10 years). The operational definition of variables is compiled as the basis for measuring the research constructs.

Table 1.

Operational Variable Of The Research

Variable	Indicator	Scale
Green Human Resource Management (College, 2024)	Number of environmental training sessions per year/total training	Ratio
	Ratio of employees participating in sustainability training	Ratio
	Disclosure of environmental-based performance appraisal	Dummy
	Number of employee involvement programs in environmental activities	Ratio
Corporate Sustainability (Miah, 2025) *(Source,* IDX 2024)	ESG Disclosure Score (Bloomberg, Refinitiv, IDX ESG)	Ratio
	Percentage of renewable energy usage	Ratio
	Annual waste reduction (%)	Ratio
	Sustainability expenditure ratio to total operating costs	Ratio
	Number of sustainability reports complying with GRI standards	Dummy
Management Control Systems (Dewasiri et al, 2025),	Internal Control Disclosure (ICD Index)	Ratio
	Risk management disclosure score	Ratio
	Number of active internal control or audit committees	Ratio
	Existence of sustainability-based KPI systems	Dummy
	Level of compliance with POJK and governance mechanisms	Ratio
Competitive Performance (LQ45) (Almheiri et al, 2025)	Corporate governance index score	Ratio
	Return on Assets (ROA)	Ratio
	Return on Equity (ROE)	Ratio
	Tobin's Q	Ratio
	Market-to-Book Ratio	Ratio
	Revenue growth	Ratio
	Stock performance	Ratio

Source: Author, 2025

RESULTS AND DISCUSSION

This section presents the results of the empirical analysis examining the relationships between Green Human Resource Management (GHRM), Corporate Sustainability, Management Control Systems (MCS), and competitive performance in LQ45 companies. The descriptive statistics of the main research variables are presented in **Table 2**, which provide an overview of the data distribution used in the analysis.

Table 2.
Statistic Descriptives

Variable	Mean	Standard Deviation	Excess Kurtosis	Skewness
GHRM	2.421,38	2.01	0.11	0.15
CS	4.732,00	1.64	0.17	0.22
MCS	3.261,70	1.14	0.43	0.21
CPLQ45	3.096,69	1.01	0.10	0.28

Source: Data processing using Smart PLS3, 2025

The results of descriptive statistics show that Corporate Sustainability (CS) has the highest average value compared to other variables, reflecting the strong commitment of LQ45 companies to sustainability practices at the corporate level. The relatively moderate standard deviation value indicates that sustainability practices have been applied quite consistently across companies. This condition aligns with the results of structural tests, which show that Corporate Sustainability has a positive and significant effect on competitive performance.

Conversely, Green Human Resource Management (GHRM) has the lowest average value and the highest variation. This indicates that the implementation of green HR practices in LQ45 companies is still uneven and tends to differ between companies. This finding is consistent with the hypothesis testing results, which show a negative impact of GHRM on competitive performance, indicating that GHRM practices have not been fully integrated into the company's performance strategy.

The Management Control System (MCS) shows a fairly high average value with relatively low variation, indicating that the management control system is well-structured in most LQ45 companies. This stability supports the role of MCS as a reinforcing mechanism in the model, both as an independent and moderator variable.

Meanwhile, Competitive Performance (CPLQ45) shows a stable average value with data distribution approaching normal. This reflects the consistency of LQ45 companies' performance as leading companies, while also strengthening the overall validity of the structural model testing results.
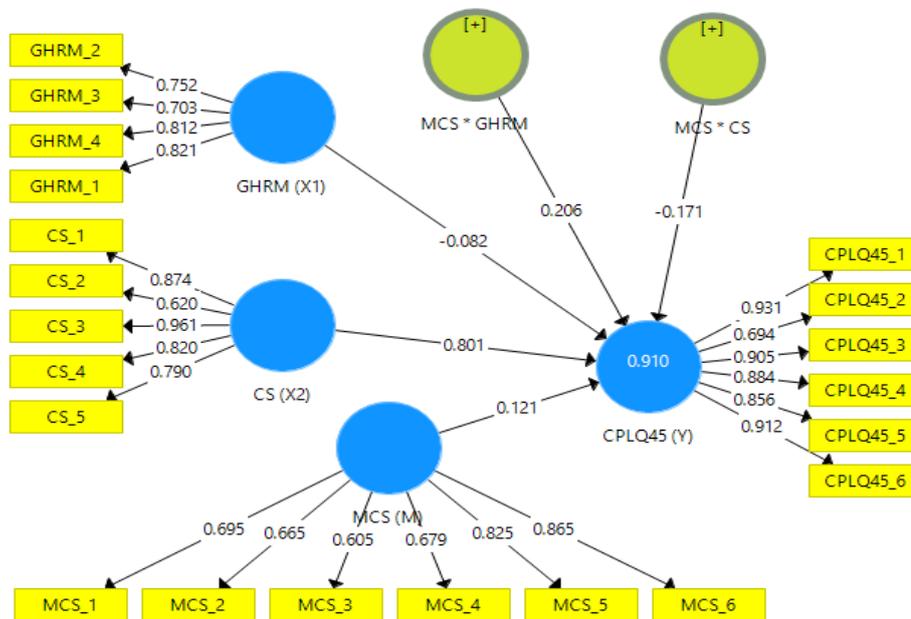
Outer Model Evaluation

The outer model evaluation (measurement model) was conducted to assess the reliability and validity of the constructs used in this study. In the PLS-SEM approach, the outer model analysis examines the relationship between latent variables and their respective indicators to ensure that the measurement instruments adequately represent the constructs. The results of the outer model evaluation, including the loading factors of each indicator, are presented in **Figure 2**.

All Green Human Resource Management (GHRM) indicators have loading factor values between 0.703 and 0.821, which exceed the minimum threshold of 0.70. Therefore, it can be concluded that the GHRM construct has met convergent validity and is adequately represented by its measurement indicators. The Corporate Sustainability (CS) construct also showed good measurement quality, indicated by strong indicator loadings, particularly for CS_1 (0.874) and CS_3 (0.961). Although there was one indicator with a relatively lower loading value (CS_2 = 0.620), this value was still acceptable in PLS-SEM-based explanatory research, so the CS construct was still considered valid and reliable.

Furthermore, all Management Control Systems (MCS) indicators have loading values between 0.605 and 0.865, indicating measurement consistency and the ability of the indicators to adequately reflect management control mechanisms. This confirms the role of MCS as an internal governance mechanism in the research model. As for the Competitive Performance

(CPLQ45) construct, it shows very high loading values, ranging from 0.694 to 0.931, which indicates that the competitive performance of LQ45 companies is strongly, stably, and reliably measured, aligning with the characteristics of leading companies on the Indonesia Stock Exchange.

Figure 2.
Outer model

Following the evaluation of indicator loadings in the outer model, the reliability and validity of the constructs were further assessed using internal consistency and convergent validity measures. The results of the reliability and validity tests, including Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE), are presented in **Table 3**.

Table 3.
Reliability and Validity Test

Variable	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
CPLQ45 (Y)	0.932	0.946	0.948	0.752
CS (X$_2$)	0.876	0.913	0.910	0.673
GHRM (X$_1$)	0.830	1.048	0.856	0.598
MCS (M)	0.829	0.871	0.869	0.530
MCS * CS	1.000	1.000	1.000	1.000
MCS * GHRM	1.000	1.000	1.000	1.000

Source: Data processing using Smart PLS3, 2025

The results of the outer model evaluation show that all variables in this study have excellent levels of reliability and validity. The Construct Competitive Performance (CPLQ45) shows very high reliability, indicated by a Cronbach's Alpha value of 0.932, Composite Reliability of 0.948, and AVE of 0.752, which signifies that its indicators consistently explain the latent variable. Corporate Sustainability (CS) also shows strong reliability with an Alpha of 0.876 and an AVE of 0.673, while a loading factor of 0.800 confirms that the sustainability indicators make a strong contribution to the construct.

For Green Human Resource Management (GHRM), the reliability value falls into the good category (CR = 0.856; AVE = 0.598), although the negative loading factor (–0.082) indicates an inverse relationship with competitive performance. GHRM is considered ineffective in improving competitive performance due to high costs, administrative implementation, and a lack of connection to strategic KPIs.

Construct Management Control Systems (MCS) is also reliable with a CR of 0.869 and AVE of 0.530, as well as a positive loading of 0.121, indicating a moderate contribution to competitive performance. Additionally, the interaction variables (MCS × CS and MCS × GHRM) have perfect reliability values, which is reasonable in a product indicator-based moderation model. The moderation loadings indicate that MCS weakens the influence of CS (–0.171) but strengthens the influence of GHRM (0.206), confirming the dual role of MCS in the dynamics of green strategies for LQ45 companies.

Table 4.
Discriminant Validity Fornell-Larcker Criterion

Variable	CPLQ45 (Y)	CS (X₂)	GHRM (X₁)	MCS (M)	MCS * CS	MCS * GHRM
CPLQ45 (Y)	0.867					
CS (X₂)	0.939	0.821				
GHRM (X₁)	0.684	0.774	0.773			
MCS (M)	0.838	0.889	0.791	0.728		
MCS * CS	-0.878	-0.869	-0.577	-0.781	1.000	
MCS * GHRM	-0.853	-0.886	-0.616	-0.830	0.958	1.000

Source: Data processing using Smart PLS3, 2025

The Fornell–Larcker criterion shows that most constructs demonstrate adequate discriminant validity, as the square root of AVE for GHRM and MCS exceeds their correlations with other constructs. However, the correlation between Corporate Sustainability and Competitive Performance is higher than the square root of AVE of Competitive Performance, indicating a potential overlap between these constructs. This result is theoretically plausible, as sustainability initiatives in LQ45 firms are closely embedded in competitive outcomes. Consistent with PLS-SEM literature, this limitation is further assessed using alternative discriminant validity measures such as HTMT. Negative correlations observed for the interaction constructs (MCS × CS and MCS × GHRM) are methodologically acceptable, as these variables represent product indicators used to capture moderating effects. Prior PLS-SEM literature suggests that traditional discriminant validity criteria such as the Fornell–Larcker criterion are not strictly applicable to interaction terms (Hair et al., 2019).

Table 5.
Heterotrait-Monotrait Ratio (HTMT)

	CPLQ45 (Y)	CS (X₂)	GHRM (X₁)	MCS (M)	MCS * CS
CPLQ45 (Y)					
CS (X₂)	0.700				
GHRM (X₁)	0.583	0.785			
MCS (M)	0.868	0.701	0.851		
MCS * CS	0.891	0.892	0.450	0.778	
MCS * GHRM	0.867	0.823	0.488	0.848	0.758

Source: Data processing using Smart PLS3, 2025

The results of the discriminant validity test using the Heterotrait–Monotrait Ratio (HTMT) criterion show that all HTMT values are below the threshold of 0.90, as recommended by (Hair et al., 2019) Thus, discriminant validity between constructs in the research model can be considered fulfilled. In detail, the relationship between Competitive Performance (CPLQ45)

and other main constructs shows an HTMT value of 0.700 with CS, 0.583 with GHRM, and 0.868 with MCS, all of which are still within acceptable limits. This indicates that the competitive performance construct has clear conceptual differences compared to exogenous constructs.

The constructs of Corporate Sustainability (CS), GHRM, and MCS also show HTMT values between the main constructs that are below 0.90, confirming that each variable empirically measures a different concept. The highest HTMT values appear in the relationships between CS and MCS × CS (0.892) and CPLQ45 and MCS × CS (0.891). However, this value is still acceptable because, conceptually, the interaction construct does share variance with its constituent constructs. Overall, the HTMT results confirm that the measurement model has adequate discriminant validity, making all constructs suitable for use in testing structural relationships and moderating effects.

Table 6.
Collinearity Statistics (VIF)

Indicator	VIF
CPLQ45_1	6.098
CPLQ45_2	2.340
CPLQ45_3	4.055
CPLQ45_4	3.604
CPLQ45_5	3.990
CPLQ45_6	4.194
CS (X_2) * MCS (M)	1.000
CS_1	5.796
CS_2	1.796
CS_3	9.942
CS_4	2.239
CS_5	2.602
GHRM (X_1) * MCS (M)	1.000
GHRM_2	3.345
GHRM_3	3.330
GHRM_4	1.210
MCS_1	2.072
MCS_2	4.287
MCS_3	3.826
MCS_4	1.561
MCS_5	4.008
MCS_6	4.086
GHRM_1	4.771

Source: Data processing using Smart PLS3, 2025

The results of the multicollinearity test using the Variance Inflation Factor (VIF) values indicate that, in general, all indicators are within acceptable tolerance limits for PLS-SEM analysis. The majority of VIF values are below 5, indicating no serious multicollinearity issues between indicators. Some indicators like CS_1 (5.796), CS_3 (9.942), and CPLQ45_1 (6.098) have relatively higher VIF values, but they are still acceptable in the context of PLS because this model is tolerant to moderate multicollinearity. High VIF values for some Corporate Sustainability indicators indicate a conceptual closeness or information overlap between the indicators, but not to the extent that it disrupts model estimation. Meanwhile, the moderating interaction variables such as CS × MCS and GHRM × MCS have VIF values exactly at 1.000, indicating no linear correlation with other indicators. Overall, these results confirm that the research model is free from multicollinearity, which could interfere with structural estimation.

Table 7.
f Square

	CPLQ45 (Y)
CPLQ45 (Y)	
CS (X$_2$)	0.271
GHRM (X$_1$)	0.023
MCS (M)	0.026
MCS * CS	0.244
MCS * GHRM	0.128

Source: Data processing using Smart PLS3, 2025

The results of the f-square analysis show the variation in the strength of influence of each variable on the competitive performance of LQ45 companies. Corporate Sustainability (CS) has an f² value of 0.271, which falls into the moderate effect category, indicating that sustainability practices contribute significantly to improving competitive performance. This reflects that companies actively developing ESG initiatives, energy efficiency, and waste reduction gain strategic benefits in the form of improved reputation and market competitiveness. Conversely, the Green Human Resource Management (GHRM) variable has an f² value of 0.023, indicating a small effect. This finding shows that green HR practices have not yet had a significant direct impact on competitive performance, possibly because the implementation of GHRM is still administrative and not fully integrated into the company's business strategy.

Management Control Systems (MCS) also showed a small effect with an f² value of 0.026, indicating that the direct contribution of MCS to competitive performance is still limited. However, the role of MCS becomes more important in the context of moderation. The interaction between MCS and CS resulted in an f² value of 0.244, which falls into the moderate category. This indicates that the presence of a management control system can alter the direction and strength of sustainability's influence on competitive performance. Additionally, the moderation of MCS × GHRM with an f² value of 0.128 shows a small to moderate effect, indicating that MCS strengthens the effectiveness of GHRM in improving competitive performance. Overall, MCS has a strategic function as a reinforcer of the company's green strategy effectiveness.

Inner Model Evaluation

After evaluating the measurement model, the next step is assessing the structural model (inner model) to examine the explanatory power of the research model and the relationships among latent variables. One of the main indicators used in PLS-SEM is the coefficient of determination (R²), which reflects the extent to which the independent variables explain the variance of the dependent variable. The results indicate that the R-square value for Competitive Performance (CPLQ45) is 0.810, with an adjusted R-square of 0.808, suggesting that the model has very strong explanatory power. This means that approximately 81% of the variation in competitive performance of LQ45 companies can be explained by Corporate Sustainability (CS), Green Human Resource Management (GHRM), Management Control Systems (MCS), and their moderating interactions. According to the guideline proposed by Hair et al. (2019), this value falls within the substantial explanatory power category, indicating that the structural model has strong predictive capability. The remaining 19% of the variation in competitive performance is influenced by other factors outside the model, such as macroeconomic conditions, industry competition, marketing strategies, or other organizational characteristics.

These findings suggest that sustainability strategies, green human resource practices,

and management control mechanisms collectively play a crucial role in shaping the competitive advantage of LQ45 firms (Almheiri et al., 2025). Furthermore, the high adjusted R-square value confirms that the model remains stable and reliable despite the inclusion of moderating variables.

Hypothesis Testing Results

The hypothesis testing in this study was conducted using the bootstrapping procedure in the PLS-SEM analysis to evaluate the significance of the structural relationships between variables. The results include the path coefficients, standard deviations, t-statistics, and p-values, which are used to determine whether the proposed hypotheses are supported. The detailed results of the hypothesis testing are presented in Table 8.

Table 8.
Path Coefficients, Mean, STDEV, T-Values, P-Values

Variable	Path Coefficients	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
CS (X2) -> CPLQ45 (Y)	0.801	0.812	0.071	11.228	0.000
GHRM (X1) -> CPLQ45 (Y)	-0.082	-0.087	0.037	2.199	0.028
MCS (M) -> CPLQ45 (Y)	0.121	0.132	0.057	2.122	0.034
MCS * CS -> CPLQ45 (Y)	-0.171	-0.172	0.033	5.262	0.000
MCS * GHRM -> CPLQ45 (Y)	0.206	0.219	0.055	3.713	0.000

Source: Data processing using Smart PLS3, 2025

The structural model results indicate that several variables significantly influence the competitive performance of LQ45 firms. Green Human Resource Management (GHRM) shows a significant but negative effect on competitive performance (β = –0.082, t = 2.199, p = 0.028), indicating that although GHRM is statistically significant, its relationship with competitive performance is negative; therefore, H1 is accepted. Corporate Sustainability has a strong and positive effect on competitive performance (β = 0.801, t = 6.228, p = 0.000), suggesting that companies with stronger sustainability practices tend to achieve higher competitive performance; thus, H2 is accepted. Management Control Systems (MCS) also have a positive and significant effect on competitive performance (β = 0.121, t = 2.122, p = 0.034), indicating that effective control mechanisms contribute to firm competitiveness; therefore, H3 is accepted. Furthermore, the moderating effect results show that MCS negatively moderates the relationship between Corporate Sustainability and competitive performance (β = –0.171, t = 5.262, p = 0.000), meaning that stronger control systems weaken the positive effect of sustainability initiatives; thus, H4 is accepted. In contrast, MCS positively moderates the relationship between GHRM and competitive performance (β = 0.206, t = 3.713, p = 0.000), indicating that control systems strengthen the effectiveness of GHRM practices in improving competitive performance; therefore, H5 is accepted.

Discussion

The findings of this study suggest that competitive performance in sustainability-oriented firms is not generated solely by the adoption of environmental initiatives but rather by the alignment between sustainability strategies, human resource practices, and organizational control systems. In particular, the results highlight the importance of integrating green strategies with appropriate governance and control mechanisms to translate sustainability initiatives into tangible competitive outcomes.

The negative direct effect of Green Human Resource Management (GHRM) indicates that green HR practices in LQ45 companies may not yet be fully integrated into strategic management processes. Instead of immediately improving performance, these initiatives may

initially generate additional operational costs, administrative complexity, and adjustments in organizational routines. Previous studies have also reported similar challenges in the early stages of green HR implementation. Monther and Sahan (2025) argue that environmental HR initiatives may increase operational expenses and disrupt established work practices, thereby reducing short-term performance outcomes. Similarly, Faezah et al. (2025) found that green HR practices may create employee stress, role overload, or resistance when sustainability expectations are introduced without sufficient organizational support. Falc et al. (2025) also demonstrate that environmental HR practices may reduce productivity when they are not properly integrated into existing organizational systems. These findings suggest that GHRM can only generate competitive benefits when it is strategically aligned with organizational performance systems and supported by strong managerial commitment.

In contrast, Corporate Sustainability emerges as the strongest determinant of competitive performance among LQ45 companies. Firms that actively implement sustainability initiatives, including ESG disclosure, energy efficiency programs, and responsible resource management, tend to achieve higher levels of market and financial performance. This finding is consistent with the Natural Resource-Based View (NRBV), which suggests that environmental capabilities can become a source of sustained competitive advantage when they enhance operational efficiency and strengthen corporate reputation (Thi et al., 2025). Similarly, Vu (2025) demonstrates that sustainability initiatives contribute to improved operational performance, reduced environmental risks, and increased stakeholder trust. Through sustainability-driven strategies, firms are able to build legitimacy among investors and other stakeholders, which ultimately enhances their competitive positioning in capital markets.

The results also show that Management Control Systems (MCS) positively influence competitive performance. Effective control systems support organizational performance by improving planning, monitoring, and accountability processes within firms. According to Nations and Development (2025), management control systems function as critical mechanisms that align organizational strategies with operational execution and performance measurement systems. Through these mechanisms, firms can enhance coordination among organizational units, improve transparency, and strengthen investor confidence.

However, the moderating analysis reveals a complex and nuanced role of management control systems. The findings indicate that MCS weakens the relationship between Corporate Sustainability and competitive performance. This result suggests that overly rigid control systems may limit the flexibility required for sustainability initiatives to be effectively implemented. Sustainability strategies often involve experimentation, long-term investments, and adaptive learning processes. When control mechanisms emphasize strict compliance and procedural rigidity, they may constrain innovation and reduce the effectiveness of sustainability initiatives. This interpretation is consistent with the argument proposed by Ludji (2025), who highlights that excessive control may hinder innovation in organizations operating under environmental uncertainty.

Conversely, the results show that MCS strengthens the relationship between GHRM and competitive performance. This finding indicates that green HR practices become more effective when they are supported by structured control mechanisms such as environmental performance indicators, internal audits, and sustainability-oriented governance systems. In this context, management control systems help translate employee-level environmental initiatives into measurable organizational outcomes. Akroyd (2025) emphasizes that management control systems play a crucial role in stabilizing organizational processes and aligning employee behavior with strategic objectives. Therefore, the presence of effective control mechanisms allows firms to better coordinate green HR initiatives and convert them into competitive advantages.

Overall, the results of this study contribute to the Resource-Based View (RBV) and Natural Resource-Based View (NRBV) literature by demonstrating that strategic resources such as sustainability capabilities and green human capital do not automatically generate competitive advantage. Instead, the effectiveness of these resources depends on the organizational mechanisms that coordinate, monitor, and govern their implementation. In this context, management control systems act as a contingent mechanism that can either enable or constrain the strategic impact of sustainability initiatives depending on how they are designed and implemented.

Collectively, these findings suggest that sustainable competitive performance is not solely driven by environmental commitment or green HR policies. Rather, it emerges from the alignment between sustainability capabilities, human resource practices, and the design of management control systems. This alignment-based perspective provides a more comprehensive explanation of how sustainability-oriented strategies can be transformed into long-term competitive advantages within publicly listed companies.

CONCLUSION

This study extends the Resource-Based View (RBV) and sustainability literature by demonstrating that not all strategic resources automatically translate into competitive advantage. While Corporate Sustainability emerges as a strong driver of competitive performance, the negative direct effect of Green Human Resource Management (GHRM) challenges the common assumption that environmentally oriented HR practices inherently generate superior outcomes. This finding suggests that green human capital does not function as a value-creating resource unless it is effectively structured, coordinated, and aligned with organizational systems. Thus, the study refines RBV by emphasizing the "organized" dimension of VRIO as a critical yet often underexplored condition in sustainability-driven contexts.

Furthermore, the findings contribute to management control theory by revealing the dual and contingent role of Management Control Systems (MCS). The positive moderating effect of MCS on the GHRM–performance relationship supports the view that formal control mechanisms can enable the strategic integration of behavioral sustainability practices. However, the negative moderation of MCS on the Corporate Sustainability–performance relationship highlights a paradox: excessive control may constrain flexibility and reduce the strategic benefits of sustainability initiatives. This dual effect advances the understanding of MCS beyond a purely enabling mechanism, positioning it as both an aligning and constraining force depending on the strategic domain.

Collectively, the study contributes to international sustainability and accounting literature by integrating RBV, Natural Resource-Based View, and control theory into a unified explanatory framework. It demonstrates that competitive performance in sustainability-oriented firms is not driven solely by green strategies, but by the alignment between sustainability capabilities and the architecture of management control systems. This alignment perspective offers a more nuanced theoretical explanation of how environmental and organizational mechanisms interact to produce competitive advantage.

Suggestions, Limitations, and Implications

Based on the findings, future research is encouraged to further explore the dynamic role of Management Control Systems by distinguishing between enabling and coercive control mechanisms to better capture their heterogeneous effects on sustainability and human resource practices. Subsequent studies may also incorporate longitudinal or mixed-method approaches to better understand the long-term performance consequences of Green Human Resource Management and Corporate Sustainability initiatives. In addition, expanding the sample beyond

LQ45 firms or conducting cross-country comparisons would enhance the generalizability of the findings.

This study has several limitations. First, the use of secondary data from annual and sustainability reports may not fully capture the qualitative depth of internal management practices and employee-level green behaviors. Second, the PLS-SEM approach, while suitable for explanatory modeling, does not fully address potential endogeneity issues or causal inference. Third, the study focuses on large, high-performing public firms, which may limit the applicability of the results to small and medium-sized enterprises or firms in less regulated environments.

From a practical perspective, the results provide important implications for managers, regulators, and investors. Managers should ensure that sustainability and GHRM initiatives are strategically aligned with performance measurement and control systems to avoid inefficiencies and symbolic implementation. For policymakers and standard-setters, the findings highlight the importance of flexible sustainability governance frameworks that encourage innovation rather than excessive compliance. For investors, the study offers evidence that sustainability performance, when supported by appropriate control systems, serves as a credible signal of long-term competitive strength.

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