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Research Article

The Effect of Green Human Resource Management and Green Transformational Leadership on Environmental Performance Mediated by Green Innovation Among Employees of Renewable Energy Companies in the Greater Jakarta Area

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Abstract: Businesses today are no longer solely profit-oriented; they are also expected to emphasize environmental sustainability. Therefore, environmental performance has become an important aspect for companies to consider. This study aims to analyze the influence of Green Human Resource Management (GHRM) and Green Transformational Leadership (GTLS) on Environmental Performance (ENVP), mediated by Green Innovation (GRIV), in companies operating within the renewable energy sector. This research employed a quantitative approach using purposive sampling techniques targeting employees of renewable energy companies in Jakarta. The object of this study consisted of employees working in renewable energy companies in the Greater Jakarta area, with a total sample of 276 respondents. Data analysis was conducted using the Structural Equation Modeling (SEM) method. The findings indicate that the majority of respondents worked in the electric vehicle (EV) transportation and automotive industry at the entry-level management position, were predominantly male, and had 1–5 years of work experience. The hypothesis testing results revealed that the supported hypotheses were the influence of GHRM on ENVP and the influence of GHRM on GRIV. Meanwhile, the unsupported hypotheses included the influence of GTLS on ENVP, the influence of GRIV on ENVP, the influence of GTLS on GRIV, the influence of GHRM on ENVP through GRIV as a mediator, and the influence of GTLS on ENVP through GRIV as a mediator.

Keywords: Environmental Performance (ENVP); Green Human Resource Management (GHRM); Green Innovation (GRIV); Green Transformational Leadership (GTLS); Renewable Energy.

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1. Introduction

The primary objective of business is indeed to generate profit; however, sustainability has also become an important aspect that companies must consider in carrying out their operations. One indicator of sustainability is environmental performance, which refers to a company's ability to manage and minimize the negative environmental impacts of operational activities through emission control, waste management, energy efficiency, and sustainable resource utilization. In the context of modern business, environmental performance is not only a form of regulatory compliance but also reflects corporate social responsibility and competitiveness amid increasing global demands for environmentally friendly business practices. Improvements in environmental performance are influenced by various internal organizational factors, such as the implementation of Green Human Resource Management (GHRM), Green Transformational Leadership (GTLS), and green innovation. GHRM plays

a role in fostering environmentally responsible employee behavior through environmental-based training, recruitment, and reward systems, while GTLS encourages employee

motivation and commitment toward sustainability. Furthermore, green innovation serves as an important mechanism in developing environmentally friendly products, processes, and technologies that support operational efficiency while reducing the company's environmental impact. Therefore, the integration of green management practices, environmentally oriented leadership, and green innovation has become a key strategy for enhancing environmental performance and achieving sustainable development.

Green Transformational Leadership (GTLS) is a leadership style that integrates environmental values into the vision, inspiration, and behavior of leaders within organizations. Leaders adopting this approach not only focus on achieving organizational performance but also promote awareness and commitment toward environmental sustainability. Green transformational leaders are capable of inspiring employees to adopt environmentally friendly behaviors through the communication of a green vision, empowerment, and exemplary sustainable practices (Wang et al., 2024). The relationship between green transformational leadership and environmental performance lies in the leader's ability to influence employee attitudes and behaviors. Environmentally oriented leaders can strengthen organizational commitment to environmentally friendly practices and encourage the more effective implementation of green policies. Recent studies indicate that green transformational leadership has a positive and significant influence on environmental performance through increased employee engagement and environmental awareness (Aboramadan, 2020). In addition, green transformational leadership also contributes to the creation of an organizational culture that supports innovation and sustainability. Leaders who encourage creativity and innovative thinking facilitate the development of environmentally friendly solutions, such as energy efficiency and waste reduction. Studies have shown that green leadership can strengthen the relationship between organizational policies and the implementation of green innovation, ultimately improving environmental performance (Singh et al., 2020).

Green innovation serves as a mediating variable in the relationship between organizational practices and environmental performance because it bridges how internal policies or strategies are translated into tangible environmental outcomes. Theoretically, practices such as Green Human Resource Management or green transformational leadership do not directly improve environmental performance; rather, they do so through innovation processes involving the development of environmentally friendly products, processes, and technologies that reduce emissions, waste, and resource consumption. Recent studies demonstrate that green innovation strengthens the influence of organizational variables on environmental performance by enhancing operational efficiency and creating sustainable solutions with direct environmental impacts (Wang et al., 2024). Furthermore, global data indicate that companies adopting green innovation are able to significantly reduce carbon emissions and become more adaptive to sustainability regulations, making green innovation a key mechanism for achieving optimal environmental performance (United Nations Environment Programme, 2023).

Research on the relationship between Green Human Resource Management (GHRM), Green Transformational Leadership, and Environmental Performance has been extensively conducted in recent years. Studies have shown that GHRM positively influences environmental performance through the enhancement of employees' environmentally friendly behavior and operational efficiency (Pham et al., 2020). In addition, green transformational leadership has also been proven to improve environmental performance by inspiring and motivating employees to participate in sustainability practices (Wang et al., 2024). Several studies have also begun to examine the role of mediating variables, such as green innovation and green motivation, in strengthening these relationships, indicating that psychological and innovative factors are important mechanisms for achieving optimal environmental performance (Liu et al., 2024). Nevertheless, this study offers novelty. Most previous studies only examined the influence of GHRM or green transformational leadership separately on environmental performance and predominantly used green innovation as a mediating variable. Research integrating both independent variables simultaneously with green motivation as a mediating variable remains limited, particularly within the context of

renewable energy companies in Indonesia. Therefore, this study offers a more comprehensive model by integrating managerial aspects (GHRM), leadership (green transformational leadership), and psychological aspects (green motivation) in explaining improvements in environmental performance. This study is expected to contribute both theoretically and practically to the development of sustainability strategies within the renewable energy sector.

The renewable energy sector was selected as the research object due to its crucial role in supporting energy transition and reducing greenhouse gas emissions. Indonesia possesses abundant geothermal potential that can be utilized as an energy source for electricity generation (Arafah et al., 2018). Although this sector is recognized as a solution to environmental problems, several studies indicate that its implementation still faces various challenges, including human resource management issues, as highlighted by Tiarapuspa et al. (2018), who emphasized the importance of human resource management in helping organizations achieve green objectives. Other challenges include technological efficiency, environmental impacts throughout the product life cycle, and organizational readiness in managing sustainability. A study by Aditya et al. (2025) confirmed that renewable energy development in Indonesia continues to face various obstacles; therefore, evaluating environmental performance is essential to ensure that implemented practices genuinely provide positive environmental impacts.

This study is important because it not only examines environmental performance as an indicator of sustainability but also places it within the context of the rapidly developing renewable energy sector, particularly in strategic regions such as Greater Jakarta. In addition to reinforcing the findings of previous studies, this research is expected to provide empirical contributions in understanding how renewable energy companies can optimally improve their environmental performance, thereby supporting the sustainable development agenda in Indonesia. Based on the foregoing explanation, this study is entitled: "The Influence of Green Human Resource Management and Green Transformational Leadership on Environmental Performance Mediated by Green Innovation among Employees of Renewable Energy Companies in Jakarta."

2. Method

This study employed a hypothesis-testing method using a quantitative approach and correlational research design to analyze the influence of Green Human Resource Management (GHRM), Green Transformational Leadership (GTLS), and Green Innovation on Environmental Performance among employees of renewable energy companies in the Greater Jakarta area. The study was conducted using a cross-sectional approach through the distribution of online questionnaires to employees working in renewable energy companies, including electric vehicle companies, EPC (Engineering, Procurement, and Construction) firms, energy storage manufacturers, renewable energy producers, carbon trading companies, and energy consulting firms. The sampling technique used was purposive sampling, involving a total of 276 respondents. The selection of the renewable energy sector was based on the high demand for sustainability practices and environmental performance within the industry (Singh et al., 2020).

The research variables consisted of GHRM and GTLS as independent variables, Green Innovation as the mediating variable, and Environmental Performance as the dependent variable. Data collection was conducted using a five-point Likert-scale questionnaire developed from previous studies. The GHRM indicators included green recruitment, green training, and green performance management, while GTLS focused on leaders' ability to inspire environmentally friendly behavior. The Green Innovation variable was measured through environmentally based product, process, and managerial innovation, whereas Environmental Performance was measured based on resource efficiency, waste reduction, and compliance with environmental regulations. All research instruments referred to previous studies with established validity and reliability (Amjad et al., 2021; Rana & Arya, 2024; Ledi et al., 2024).

Data analysis was conducted using the Structural Equation Modeling (SEM) method with the assistance of SPSS and AMOS version 24 software, as this method is considered capable of testing complex relationships among variables and mediating effects simultaneously (Hair et al., 2021). Instrument testing included validity testing using factor

loading with a threshold value of ≥ 0.35 and reliability testing using Cronbach's Alpha ≥ 0.60. The results indicated that all research variables were valid and reliable after the elimination of one GTLS item with a low correlation value. In addition, the Goodness of Fit testing showed that the research model achieved a good fit category on several indicators, including an RMSEA value of 0.066 and a CMIN/DF value of 2.195, indicating that the model was appropriate for hypothesis testing (Hair Jr., 2019; Sekaran & Bougie, 2016.

3. Results and Discussion

Data Description

Based on the respondent characteristics, this study involved 276 respondents, predominantly male, with 170 individuals (61.6%), while female respondents totaled 106 individuals (38.4%). The majority of respondents were aged between 20–29 years, accounting for 162 individuals (58.7%), followed by those aged 30–39 years with 79 individuals (28.6%). In terms of work experience, most respondents had 1–5 years of experience, totaling 165 individuals (59.8%). Furthermore, based on job position, the majority occupied entry-level management positions, amounting to 224 individuals (81.2%). These findings indicate that the renewable energy sector is still dominated by a relatively young workforce with limited work experience but high adaptability toward change, including the implementation of sustainability practices and environmentally friendly technologies.

Based on business sector classification, the majority of respondents worked in the transportation and electric vehicle (EV) sector, totaling 173 respondents (62.7%), followed by the Engineering, Procurement, and Construction (EPC) sector with 31 respondents (11.2%), and the component manufacturing and energy storage sector at 9.1%. This distribution indicates that the study largely represents the perspectives of employees in industries directly associated with sustainability issues, clean energy transition, and carbon emission reduction. The dominance of the electric vehicle sector also reflects the industry's strong emphasis on implementing environmentally friendly practices and improving environmental performance in supporting sustainable development.

Descriptive Statistics

Descriptive statistics is a method related to data collection that provides descriptive information useful for researchers. The statistical results of the variables Green Human Resource Management (GHRM), Green Transformational Leadership (GTLS), Green Innovation (GRIV), and Environmental Performance (ENVP) are presented as follows:

Descriptive Analysis of GHRM

Table 1. Descriptive Analysis of GHRM

No.	GHRM Indicators	Mean
1	The company recruits prospective employees who care about environmental sustainability	4.420
2	The company uses environmentally friendly corporate branding to attract environmentally conscious applicants	4.257
3	The company recruits prospective employees who are concerned with green skill training and development	4.199
4	The company develops green training and environmental management programs to enhance employees' awareness, skills, and expertise regarding environmental sustainability	4.286
5	The company provides environmentally friendly training programs to promote green values among employees	4.268
6	The company has integrated green training to foster employees' emotional engagement with sustainability values	4.333
7	The company provides green training to develop employees' knowledge and skills required for their work	4.319

No.	GHRM Indicators	Mean
8	The company establishes environmental sustainability targets, objectives, and responsibilities for middle and entry-level management positions	4.355
9	The company incorporates environmental sustainability indicators in performance evaluation (e.g., the use of public transportation in KPI assessment)	4.304
10	The company considers employees' environmentally friendly behavior in promotion decisions and imposes consequences on employees who do not comply with sustainability values	4.283
11	The company provides incentives and compensation for environmentally friendly employee behavior in the workplace	4.308
12	The company provides environmentally friendly facilities and benefits (e.g., reusable tumblers to reduce plastic bottle usage)	4.322
13	The company has a clear vision to guide employees' actions toward environmental preservation	4.322
14	The company provides collaborative learning platforms to encourage environmentally friendly behavior and awareness within the organization (e.g., zero-waste training programs)	4.297
15	The company where I work has formal communication channels (e.g., social media) or informal channels (e.g., team building activities) to disseminate an environmentally friendly culture internally	4.337
16	The company involves employees in solving environmental issues at both local and national levels	4.319
17	The company offers engaging activities for employees to participate in environmental preservation (e.g., electric vehicle clubs)	4.348
	Overall Mean	**4.310**

Source: Processed SPSS Version 24 Output

Table 1 presents the descriptive statistical analysis results for the GHRM variable, showing an overall mean value of 4.310. This indicates that the majority of respondents held positive perceptions regarding the implementation of Green Human Resource Management in supporting the effectiveness of the company's environmental performance.

The indicator with the highest mean value of 4.420 was the statement, "The company recruits prospective employees who care about environmental sustainability," indicating that respondents perceived the company as recruiting individuals with strong environmental values and awareness.

Meanwhile, the indicator with the lowest mean value of 4.199 appeared in the statement, "The company recruits prospective employees who are concerned with green skill training and development," suggesting that although the company recruits environmentally conscious employees, concern for green skill training and development is not yet dominant among recruited employees.

Descriptive Analysis of GTLS

Table 2. Descriptive Analysis of GTLS

No.	GTLS Indicators	Mean
1	Supervisors motivate subordinates by communicating and presenting a vision of environmental sustainability	4.380
2	Supervisors provide subordinates with a clear vision of environmental sustainability	4.348
3	Supervisors encourage subordinates to work in accordance with the environmental sustainability vision	4.257
4	Supervisors encourage employees to achieve targets related to the environmental sustainability vision	4.348
5	My supervisor considers employees' environmental beliefs (e.g., respecting vegan employees by not consuming animal products in front of them)	4.243

No.	GTLS Indicators	Mean
6	In my company, supervisors encourage subordinates to think about and share ideas related to environmental preservation	4.370
	Overall Mean	**4.324**

Source: Processed SPSS Version 24 Output

Table 2 presents the descriptive statistical analysis results for the GTLS variable, showing an overall mean value of 4.324. This indicates that the majority of respondents had positive perceptions of the Green Transformational Leadership style in supporting the effectiveness of the company's environmental performance.

The indicator with the highest mean value of 4.380 was the statement, "Supervisors motivate subordinates by communicating and presenting a vision of environmental sustainability," indicating that respondents perceived their supervisors as motivating employees and clearly communicating the vision of environmental sustainability, thereby enhancing employees' understanding and motivation.

Meanwhile, the indicator with the lowest mean value of 4.243 appeared in the statement, "My supervisor considers employees' environmental beliefs," suggesting that although supervisors take employees' environmental beliefs into consideration, some respondents still perceived insufficient respect or consideration from their supervisors regarding personal environmental values.

Descriptive Analysis of GRIV

Table 3. Descriptive Analysis of GRIV

No.	GRIV Indicators	Mean
1	The company uses materials that are non-toxic and environmentally friendly	4.417
2	The company develops and designs environmentally friendly products for both existing and new products	4.319
3	The company conducts recycling activities	4.101
4	The company uses environmentally friendly labels on its products	4.341
5	The company reduces water, electricity, gas, and fuel consumption during production, usage, and disposal processes	4.257
6	The company implements recycling, reuse, and repair practices to reduce waste products	4.348
7	The company uses cleaner or renewable technologies to conserve resources, such as renewable energy, water recycling, and waste reduction	4.272
8	The company redesigns production and operational processes to improve environmental efficiency	4.257
9	The company improves products or services to meet environmental criteria such as ESG (Environmental, Social, and Governance) standards	4.388
10	The company uses materials that generate minimal pollution	4.330
11	The company uses environmentally friendly materials in production	4.264
12	The company uses materials that are easily recyclable, reusable, and biodegradable	4.362
13	The company's production processes effectively reduce hazardous material usage and waste	4.373
14	The company's production processes effectively reduce fossil energy consumption	4.333
	Overall Mean	**4.311**

Source: Processed SPSS Version 24 Output

Table 3 presents the descriptive statistical analysis results for the GRIV variable, indicating an overall mean value of 4.311. This demonstrates that the majority of respondents had positive perceptions regarding the implementation of green innovation as a corporate innovation strategy to achieve environmental sustainability.

The indicator with the highest mean value of 4.417 was the statement, "The company uses materials that are non-toxic and environmentally friendly," indicating that respondents perceived the company as using environmentally safe materials.

Meanwhile, the indicator with the lowest mean value of 4.101 appeared in the statement, "The company conducts recycling activities," suggesting that although recycling practices have been implemented within business processes, employees still perceived that such practices had not yet been fully optimized.

Descriptive Analysis of ENVP

Table 4. Descriptive Analysis of ENVP

No.	ENVP Indicators	Mean
1	The company has significantly reduced total operational costs	4.457
2	The company has significantly improved production time efficiency	4.243
3	The company has significantly improved product and process quality	4.159
4	The company has significantly enhanced its reputation	4.406
5	The company has significantly reduced waste across all business processes, from production to sales	4.203
6	The company has significantly reduced hazardous waste and emissions	4.322
7	The company has significantly reduced the use of resources such as energy, water, electricity, gas, and fuel	4.384
8	The company complies with both local and national environmental regulations	4.359
	Overall Mean	**4.880**

Source: Processed SPSS Version 24 Output

Table 4 presents the descriptive statistical analysis results for the ENVP variable, showing an overall mean value of 4.880. This indicates that companies have made considerable efforts to optimize resource utilization, ensuring that organizational performance aligns with environmental sustainability values.

The indicator with the highest mean value of 4.457 was the statement, "The company has significantly reduced total operational costs," indicating that respondents perceived the company as achieving efficiency in its business processes, thereby not only supporting environmental sustainability but also improving cost efficiency.

Meanwhile, the indicator with the lowest mean value of 4.159 appeared in the statement, "The company has significantly improved product and process quality," suggesting that although companies have demonstrated strong environmental performance within their business processes, improvements in product quality may not yet be perceived as highly significant.

Hypothesis Testing Results

This hypothesis testing aimed to examine whether there were influences among Green Human Resource Management (GHRM), Green Transformational Leadership (GTLS), Green Innovation (GRIV), and Environmental Performance (ENVP). The analysis was conducted using the Structural Equation Modeling (SEM) method with the assistance of SPSS version 24 and AMOS version 24 software. Hypothesis testing was performed by comparing the p-value with the significance level (alpha) of 0.05.

The decision criteria were as follows: 1) If the p-value ≤ 0.05, the hypothesis was supported, indicating a significant effect. 2) If the p-value > 0.05, the hypothesis was not supported, indicating a non-significant effect.

The following table presents the hypothesis testing results.

Hypothesis Testing Results for Hypothesis 1

Hypothesis 1 aimed to examine the effect of Green Human Resource Management on Environmental Performance. The null hypothesis (H0) and alternative hypothesis (Ha) are stated as follows:

H01: Green Human Resource Management does not have a positive effect on Environmental Performance.

Ha1: Green Human Resource Management has a positive effect on Environmental Performance.

Table 5. Hypothesis Testing Results for Hypothesis 1

Hypothesis Description	Estimate (β)	P-Value (<0.05)	Decision
Green Human Resource Management has a positive effect on Environmental Performance	1.197	0.050	Hypothesis Accepted

Source: Processed AMOS Version 24 Output

Based on Table 5, the results indicate that Green Human Resource Management positively affects Environmental Performance with an estimated coefficient (β) of 1.197, implying that the higher the implementation of green human resource management practices, the greater the company's performance in achieving sustainable environmental outcomes. The p-value of 0.050, which falls within the borderline significance level, indicates that the effect remains statistically significant. Therefore, Ha is accepted and H0 is rejected.

Hypothesis Testing Results for Hypothesis 2

Hypothesis 2 aimed to examine the effect of Green Transformational Leadership on Environmental Performance. The null hypothesis (H0) and alternative hypothesis (Ha) are stated as follows:

H02: Green Transformational Leadership does not have a positive effect on Environmental Performance.

Ha2: Green Transformational Leadership has a positive effect on Environmental Performance.

Table 6. Hypothesis Testing Results for Hypothesis 2

Hypothesis Description	Estimate (β)	P-Value (<0.05)	Decision
Green Transformational Leadership has a positive effect on Environmental Performance	-0.572	0.354	Hypothesis Rejected

Source: Processed AMOS Version 24 Output

Based on Table 6, the results indicate that Green Transformational Leadership has a negative effect on Environmental Performance with an estimated coefficient (β) of -0.572, implying that the stronger the implementation of green transformational leadership, the lower the company's performance in achieving sustainable environmental outcomes. The p-value of 0.354, which is greater than 0.05, indicates that the effect is not statistically significant. Therefore, Ha is rejected and H0 is accepted**.**

Hypothesis Testing Results for Hypothesis 3

Hypothesis 3 aimed to examine the effect of Green Human Resource Management on Green Innovation. The null hypothesis (H0) and alternative hypothesis (Ha) are stated as follows:

H03: Green Human Resource Management does not have a positive effect on Green Innovation.

Ha3: Green Human Resource Management has a positive effect on Green Innovation.

Table 7. Hypothesis Testing Results for Hypothesis 3

Hypothesis Description	Estimate (β)	P-Value (<0.05)	Decision
Green Human Resource Management has a positive effect on Green Innovation	1.020	0.002	Hypothesis Accepted

Source: Processed AMOS Version 24 Output

Based on Table 7, the results indicate that Green Human Resource Management positively affects Green Innovation with an estimated coefficient (β) of 1.020, implying that the greater the implementation of green human resource management practices, the higher the level of sustainable environmental innovation. The p-value of 0.002, which is below 0.05, indicates that the effect is statistically significant. Therefore, Ha is accepted and H0 is rejected.

Hypothesis Testing Results for Hypothesis 4

Hypothesis 4 aimed to examine the effect of Green Transformational Leadership on Green Innovation. The null hypothesis (H0) and alternative hypothesis (Ha) are stated as follows:

H04: Green Transformational Leadership does not have a positive effect on Green Innovation.

Ha4: Green Transformational Leadership has a positive effect on Green Innovation.

Table 8. Hypothesis Testing Results for Hypothesis 4

Hypothesis Description	Estimate (β)	P-Value (<0.05)	Decision
Green Transformational Leadership has a positive effect on Green Innovation	0.326	0.992	Hypothesis Rejected

Source: Processed AMOS Version 24 Output

Based on Table 8, the results indicate that Green Transformational Leadership positively affects Green Innovation with an estimated coefficient (β) of 0.326, implying that stronger implementation of green transformational leadership may increase sustainable environmental innovation. However, the p-value of 0.992, which is greater than 0.05, indicates that the effect is not statistically significant. Therefore, Ha is rejected and H0 is accepted.

Hypothesis Testing Results for Hypothesis 5

Hypothesis 5 aimed to examine the effect of Green Innovation on Environmental Performance. The null hypothesis (H0) and alternative hypothesis (Ha) are stated as follows:

H05: Green Innovation does not have a positive effect on Environmental Performance.

Ha5: Green Innovation has a positive effect on Environmental Performance.

Table 9. Hypothesis Testing Results for Hypothesis 5

Hypothesis Description	Estimate (β)	P-Value (<0.05)	Decision
Green Innovation has a positive effect on Environmental Performance	0.287	0.056	Hypothesis Rejected

Source: Processed AMOS Version 24 Output

Based on Table 9, the results indicate that Green Innovation positively affects Environmental Performance with an estimated coefficient (β) of 0.287, implying that higher levels of green innovation within companies are associated with better environmental sustainability performance. However, the p-value of 0.056, which exceeds the significance threshold of 0.05, indicates that the effect is not statistically significant. Therefore, Ha is rejected and H0 is accepted.

Hypothesis Testing Results for Hypothesis 6

Hypothesis 6 aimed to examine the effect of Green Human Resource Management on Environmental Performance mediated by Green Innovation. The null hypothesis (H0) and alternative hypothesis (Ha) are stated as follows:

H06: Green Human Resource Management does not have a positive effect on Environmental Performance mediated by Green Innovation.

Ha6: Green Human Resource Management has a positive effect on Environmental Performance mediated by Green Innovation.

Table 10. Hypothesis Testing Results for Hypothesis 6

Hypothesis Description	Estimate (β)	P-Value (<0.05)	Decision
Green Human Resource Management has a positive effect on Environmental Performance mediated by Green Innovation	1.020 × 0.287 = 0.292	0.062	Hypothesis Rejected

Source: Data Processed Using AMOS Version 24

Based on the regression analysis and mediation testing using the Sobel Test, an analysis was conducted to examine the effect of Green Human Resource Management on Environmental Performance through the mediating role of Green Innovation, as stated in the sixth hypothesis. The calculation results showed an estimated value of 0.292 with a p-value of 0.103, which is greater than the significance level of 0.05. These findings indicate that individuals' perceptions of green innovation were not considered sufficiently important as a mediating mechanism in the relationship between green human resource management and environmental sustainability performance within companies. In other words, when individuals perceive that Green Innovation does not significantly contribute to improving environmental performance, the mediating effect becomes insignificant. Based on these findings, the sixth hypothesis was rejected because, although the mediation effect was positive, it was not statistically significant. Therefore, Ha is rejected and H0 is accepted.

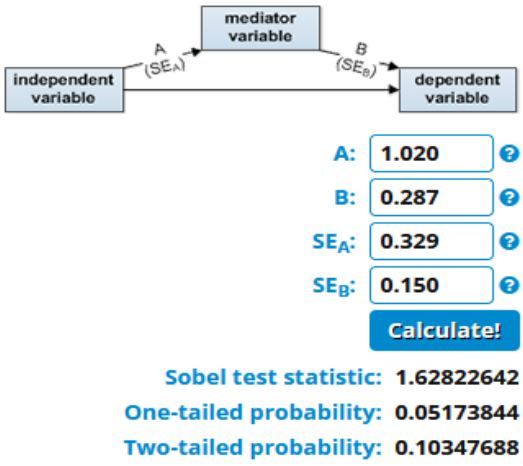


Figure 1. Sobel Test

Hypothesis Testing Results for Hypothesis 7

Hypothesis 7 aimed to examine the effect of Green Transformational Leadership on Environmental Performance mediated by Green Innovation. The null hypothesis (H0) and alternative hypothesis (Ha) are stated as follows:

H07: Green Transformational Leadership does not have a positive effect on Environmental Performance mediated by Green Innovation.

Ha7: Green Transformational Leadership has a positive effect on Environmental Performance mediated by Green Innovation.

Table 11. Hypothesis Testing Results for Hypothesis 7

Hypothesis Description	Estimate (β)	P-Value (<0.05)	Decision
Green Transformational Leadership has a positive effect on Environmental Performance mediated by Green Innovation	0.326 × 0.287 = 0.093	0.378	Hypothesis Rejected

Source: Data Processed Using AMOS Version 23

Based on the regression analysis and mediation testing using the Sobel Test, an analysis was conducted to examine the effect of Green Transformational Leadership on Environmental Performance through the mediating role of Green Innovation, as stated in the seventh hypothesis. The calculation results showed an estimated value of 0.093 with a p-value of 0.378, which is greater than the significance level of 0.05. These findings indicate that individuals' perceptions regarding transformational leadership innovation based on environmental sustainability values were not considered important as a mediating mechanism in the relationship between Green Transformational Leadership and environmental sustainability performance within companies. In other words, when individuals perceive that Green Transformational Leadership does not significantly contribute to improving environmental performance, the mediation effect of Green Innovation becomes insignificant.

Based on these findings, the seventh hypothesis was rejected because, although the mediation effect was positive, it was not statistically significant. Therefore, Ha is rejected and H0 is accepted.

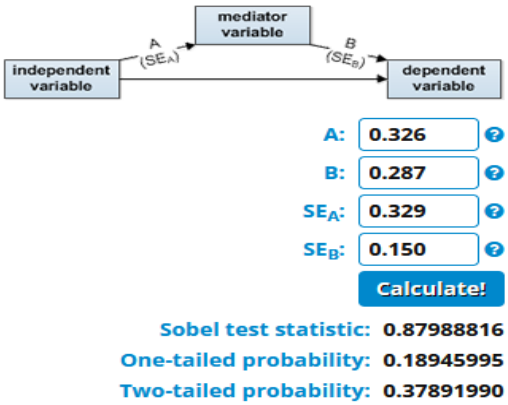


Figure 2. Sobel Test

Discussion

The results of this study indicate that Green Human Resource Management (GHRM) has a positive and significant effect on both Environmental Performance and Green Innovation. These findings confirm that environmentally based human resource management practices, such as green recruitment, green training, green performance management, and green reward systems, are capable of enhancing employees' environmental awareness, pro-environmental behavior, and creativity in supporting corporate sustainability. The majority of respondents, who were employed in the electric vehicle (EV) sector, aged 20–29 years, and possessed 1–5 years of work experience, further strengthened the effectiveness of GHRM implementation, as younger employees tend to be more adaptive toward innovation and environmentally friendly workplace cultures. These findings are consistent with previous studies stating that GHRM plays an important role in improving environmental performance and encouraging the creation of green innovation within organizations.

Conversely, Green Transformational Leadership (GTLS) did not demonstrate a positive and significant effect on either Environmental Performance or Green Innovation. These results indicate that green transformational leadership has not yet been able to directly improve environmental performance and green innovation within renewable energy companies. This condition may be influenced by the fact that the majority of respondents occupied entry-level management positions and were more involved in operational activities rather than strategic decision-making processes. Furthermore, the electric vehicle sector, which dominated the respondent profile, tends to focus more on technological development and achieving operational targets rather than on the direct influence of leadership style on corporate sustainability.

The results also revealed that Green Innovation did not have a positive and significant effect on Environmental Performance. These findings suggest that the green innovations implemented by renewable energy companies have not yet been able to provide a direct impact on improving environmental performance. This may occur because the implementation of green innovation is still in the developmental stage and is more directed toward business efficiency and strengthening technological competitiveness rather than directly achieving environmental outcomes. Therefore, although companies have implemented various environmentally friendly innovations, their impact on environmental performance has not yet been perceived as significantly effective.

Furthermore, the mediation hypothesis testing results demonstrated that Green Innovation was not able to mediate the relationship between either GHRM or GTLS and Environmental Performance. These findings indicate that the presence of green innovation alone is insufficient to bridge green human resource management practices and green leadership in improving corporate environmental performance. This condition is influenced by the lack of optimal integration among green human resource practices, organizational

culture, technological readiness, and the implementation of environmental innovation within the operational activities of renewable energy companies. Consequently, the indirect effect through green innovation has not yet been significantly realized.

From a theoretical perspective, this study emphasizes that the success of environmental performance in renewable energy companies is determined not only by technology and innovation but also by organizational readiness in establishing a green work culture through effective GHRM practices. Meanwhile, green leadership and green innovation require organizational support, technological investment, and employee involvement in order to provide optimal contributions to corporate sustainability. Therefore, renewable energy companies need to strengthen the integration between green human resource practices, environmentally oriented leadership, and innovation strategies to achieve sustainable development goals more effectively.

4. Conclusions

This study was conducted to examine the influence of Green Human Resource Management and Green Transformational Leadership on Environmental Performance mediated by Green Innovation, involving 276 employees from companies operating in the renewable energy sector within the Greater Jakarta area. The majority of respondents were male, aged 20–29 years, possessed 1–5 years of work experience, and worked in the transportation and electric vehicle (EV) industry. In this study, two hypotheses were supported, while five hypotheses were not supported.

The results of the descriptive statistical analysis for each variable indicate that, on average, renewable energy sector employees in Greater Jakarta perceived that Green HRM had been optimally implemented within their companies. On average, renewable energy sector employees in Greater Jakarta also perceived that Green Transformational Leadership had been effectively demonstrated by supervisors and implemented optimally. Furthermore, they perceived that Green Innovation had been implemented effectively, indicating that companies prioritize environmental sustainability principles. In addition, renewable energy sector employees in Greater Jakarta perceived that the Environmental Performance of renewable energy companies had improved significantly and reflected strong environmental sustainability values.

This study demonstrates that Green Human Resource Management positively affects Environmental Performance in renewable energy companies in Greater Jakarta. The higher the implementation of Green HRM, the better the company's environmental performance. This study also demonstrates that Green Transformational Leadership negatively affects Environmental Performance in renewable energy companies in Greater Jakarta. Green transformational leadership styles were perceived as not necessarily effective in improving corporate environmental sustainability performance. Furthermore, this study demonstrates that Green Innovation positively affects Environmental Performance in renewable energy companies. The perception of green innovation within companies was considered capable of improving environmental sustainability performance.

This study further demonstrates that Green HRM positively affects Green Innovation in renewable energy companies in Greater Jakarta. This perception suggests that stronger green human resource management practices are considered capable of enhancing corporate green innovation. In addition, Green Transformational Leadership positively affects Green Innovation in renewable energy companies. This perception suggests that the stronger the implementation of green transformational leadership, the greater the level of corporate green innovation.

Finally, this study demonstrates that Green HRM positively affects Environmental Performance mediated by Green Innovation in renewable energy companies in Greater Jakarta. The influence of green human resource management on corporate environmental sustainability performance does not occur solely through human resource management practices, but also through the company's green innovation, which is considered capable of improving environmental performance. Likewise, this study demonstrates that Green Transformational Leadership positively affects Environmental Performance mediated by Green Innovation in renewable energy companies in Greater Jakarta. The influence of green transformational leadership on corporate environmental sustainability performance does not

occur solely through leadership style, but also through the company's green innovation, which is considered capable of improving environmental performance.

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