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The Impact of Green Human Resource Management and Green Supply Chain Management on Sustainable Performance

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Abstract

PT. Industri Jamu dan Farmasi Sido Muncul Tbk (Sido Muncul) is one of the companies that implementing the Green Productivity concept. Using indicators of Green Productivity, namely Green Human Resource Management (GHRM) and Green Supply Chain Management (GSCM), this study aims to investigate the influence of GHRM and GSCM on sustainable performance at Sido Muncul, specifically focusing on the aspect of environmental performance. The research utilizes data collected from 100 respondents, all of whom are employees of Sido Muncul, during December 2024 and January 2025. The data analysis technique applied is path analysis using the Structural Equation Model (SEM) Partial Least Squares (PLS) method with the assistance of SmartPLS 4.0 software. The results of the direct hypothesis testing show a significant and positive influence of each latent variable. These findings indicate that the implementation of environmentally friendly practices in human resource management and supply chain management leads to improved sustainable performance. Furthermore, the indirect hypothesis testing reveals that the latent variables have a significant and positive indirect influence. These results demonstrate that environmental performance significantly and positively mediates the relationship between GHRM and GSCM and sustainable performance. This research contributes to the expanding literature on sustainable performance studies by emphasizing the importance of GHRM and GSCM practices, with the mediating role of environmental performance. Additionally, it provides valuable insights for companies aiming to implement Green Productivity, which can positively impact sustainable performance enhancement.

Keywords: Green Productivity, Green Human Resource Management, Green Supply Chain Management, Sustainable Performance, Environmental Performance

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1. Introduction

1.1. Sustainable Performance

Sustainability is an effort to meet current limited needs without sacrificing the ability of future generations to meet their own needs (Barker, 2025). It has even become a critical factor in the development of green concepts (Hou & O'Connor, 2020: 1-17), making sustainability an essential principle in addressing global challenges such as environmental pollution caused by waste disposal activities (Poonia et al., 2024), climate change resulting from greenhouse gas emissions (Chaiya, 2025), and the depletion of non-renewable resources, such as the replacement of fossil fuels, including petroleum, natural gas, and coal, with non-fossil energy sources like solar, hydro, and wind energy (Zhang et al., 2024). These issues are often not the primary focus for companies because efforts to protect the environment typically involve increased costs at the initial implementation stage. However, in the long term, these efforts are believed to lead to cost savings and better performance (King & Lenox, 2002). To maintain sustainable corporate performance, the integration of three aspects—people, profit, and planet—into sustainability is required. This involves managing available resources to achieve common goals while preserving the environment without reducing performance, thus maintaining the company's profitability (Elkington, 1997: 79-92). Such efforts require companies to innovate to prevent environmental damage by utilizing human and material resources productively to create a competitive advantage (Porter & Van der Linde, 1995).

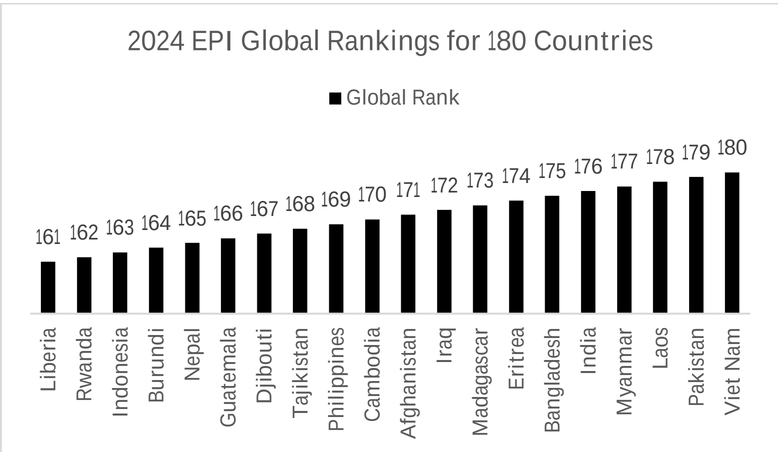

Figure 1. EPI Global Rangkings

Sumber: EPI (2024)

Environmental damage, such as air and water pollution and other related issues, often coincides with rapid economic growth (Saufi et al., 2016), creating a potential challenge for every country, including Indonesia. According to the 2024 Environmental Performance Index (EPI) data, as shown in Figure 1, Indonesia ranks 162nd out of 180 countries. Consequently, Indonesia is categorized as one of the least environmentally friendly countries in 2024, ranking 19th from the bottom. This outcome highlights one of the challenges Indonesia faces in creating a more environmentally friendly future.

One of Indonesia's active roles in addressing environmental issues is its membership in the Asian Productivity Organization (APO), an intergovernmental organization with the Green Productivity (GP) program. GP is a strategy that leverages productivity to enhance environmental quality and improve corporate performance (APO, 2006: 1:11). Through GP, the concept of sustainability, which was previously only an idea, becomes a reality that can be implemented in companies. Ultimately, this provides investment value by quantifying the sustainable performance of a company, thereby creating mutual benefits for companies and investors while having a broader positive impact on a country's economy (APO, 2006: 1:17; 2:32-33).

The importance of GP's role in improving Indonesia's economy drives this study to examine the influence of the indicators that constitute GP on sustainable performance. However, due to research limitations, this study does not cover all GP indicators. Instead, it focuses on several indicators of GP implementation, namely Green Human Resource Management (GHRM) and Green Supply Chain Management (GSCM). The integration of GHRM and GSCM has significant potential in promoting sustainability concepts, encouraging more companies in Indonesia to adopt sustainability practices as part of the nation's efforts to become environmentally friendly. This concept is supported by previous research, which reveals that GHRM and GSCM enhance sustainable performance through the environmental performance approach (Ali et al., 2024). Thus, this study focuses on exploring the impact of GHRM and GSCM on sustainable performance, mediated by Environmental Performance, in a case study conducted at PT Industri Jamu dan Farmasi Sido Muncul Tbk (Sido Muncul), one of the companies in Indonesia that has implemented GP.

1.2. Green Human Resource Management (GHRM)

GHRM (Green Human Resource Management) is an effort to utilize available human resources to achieve desired goals in addressing global issues such as climate change. It involves adopting environmentally friendly concepts as part of a company's policy in sustainable human resource management by developing and maintaining an environmentally conscious workforce (Mondy & Martocchio, 2016:25; Renwick et al., 2012; Purnama & Nawangsari, 2019; Miah et al., 2024). Previous studies have revealed that the implementation of GHRM significantly influences the enhancement of awareness, strengthens commitment, and improves sustainable performance across various business sectors (Khan et al., 2021).

GHRM contributes to helping companies achieve balance in environmental, social, and economic sustainability, offering benefits such as creating competitive advantages, increasing employee satisfaction, and enhancing corporate reputation (Alzyoud, 2021). GHRM practices, such as green recruitment, green training, green performance appraisals, and green rewards and compensation, also positively impact a company's environmental performance (Isrososiawan et al., 2020).

In this study, GHRM will be measured using several indicators as defined by Adekoya et al. (2023:6-17), which include:1) Green job design and analysis; 2) Green human resource planning; 3) Green recruitment and selection; 4) Green training and development; 5) Green employee relations; 6) Green performance management; 7) Green rewards and compensation management; and 8) Green empowerment and involvement.

1.3. Green Supply Chain Management (GSCM)

GSCM is a new concept in supply chain management that uses an environmental approach, providing savings and efficiency for companies by involving the processes of designing, planning, implementing, and controlling the flow of goods, services, and information to reduce negative environmental impacts while simultaneously creating economic and social benefits (Yuniarti et al., 2018: 21; Ismail, 2022). According to Chin et al. (2015) and Hanumsari et al. (2020), the implementation of GSCM has a positive impact on improving sustainable performance in companies. It not only enhances efficiency and corporate reputation but also strengthens the company's commitment to responsibilities encompassing economic, social, and environmental aspects. Additionally, the application of GSCM, such as the use of sustainable raw materials, reduction of production waste, and recycling, can significantly reduce negative environmental impacts (Alifurrohman & Hasanah, 2024).

This study will measure GSCM using the indicators outlined by Sarkis et al. (2018: 21-91), which include: 1) eco-friendly design and supplier relations; 2) green procurement and purchasing; 3) green supplier development and collaboration; 4) green logistics and transportation; 5) closing the loop: reverse logistics and circular economy; 6) global and local relationships; and 7) green multi-tier supplier management.

1.4. Environmental Performance (EP)

Based on the Natural Resources Based View Theory introduced by Hart (1995), an organization can achieve long-term competitive advantage by addressing the challenges between environmental issues and available resources. Originating from this theory, environmental performance refers to the achievements of an organization's activities in its efforts to address environmental issues within the limitations of resources available in the company due to its operational activities. The implementation of environmental performance can improve the company's image and reputation, thereby significantly contributing to its growth (Chandra et al., 2024).

Theodore & Theodore (2010) explain that in implementing environmental performance, several indicators must be considered, namely: 1) air management; 2) water management; 3) solid waste management; 4) pollution prevention; and 5) environmental risk management. These indicators will be used in this study to measure environmental performance.

2. Research Method

This study employed a data collection method through the direct distribution of questionnaires to respondents at Sido Muncul during December 2024 and January 2025 to obtain relevant information for the research. A Likert scale technique based on Sugiyono (2013) was used. Data measurement was conducted using the Partial Least Squares (PLS) method with the SmartPLS 4.0 application. The analytical technique in this research utilized a path analysis approach, which can illustrate the causal relationships between variables. The following shows the conceptual framework used:

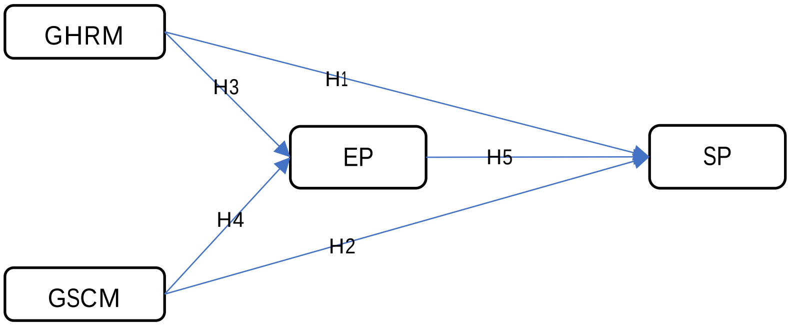

Figure 2. Conceptual Framework (GHRM: Green Human Resource Management; GSCM: Green Supply Chain Management; EP: Environmental Performance; SP: Sustainable Performance)
Source: Processed by the author

3. Results and Discussion

3.1. Demographic Characteristics of Respondents

The determination of the sample size in this study was carried out using the convenience sampling technique, calculated using the Slovin Formula (Maimunah et al., 2020). The total number of permanent employees at Sido Muncul is 2.576 people, and using the Slovin Formula, the required sample size for this study is 100 respondents. The sample size is set above the minimum threshold, ensuring that 100 respondents with a margin of error tolerance of 0.1 are sufficient to represent the overall population of employees at Sido Muncul.

As shown in the demographic characteristics in Table 1, the sample data is dominated by females (70%), indicating the distribution of data by gender. The majority of respondents are adults, with 50% aged between 26-35 years and 30% aged between 36-45 years. Many respondents in this study have higher education, with 44% holding a bachelor's degree and 5% holding a master's/doctoral degree. Respondents have varying lengths of work experience, with 24% having worked up to 3 years, 29% having worked 4-9 years, and 47% having worked for over 10 years.

Table 1. Demographic Characteristics (n=100)

Variable/ Item	Frequency	Percentage
Gender		
Male	30	30%
Female	70	70%
Total	100	100%
Age		
< 25 Years	11	11%
26 - 35 Years	50	50%
36 - 45 Years	30	30%
> 46	9	8%
Total	100	100%
Education Level		
Junior High School	1	1%
High School/Vocational School (SMA/SMK)	23	23%
Diploma (D1 - D3)	27	27%
Bachelor's Degree (S1)	44	43%
Master's/Doctorate (S2/S3)	5	19%
Total	100	100%
Work Experience		
< 1 Years	2	2%
1 - 3 Years	22	22%
4 - 6 Years	13	13%
7 - 9 Years	16	16%
>10 Years	47	47%
Total	100	100%

Source: Field Data (2025)

3.2. Prelimenary Analysis

Several preliminary analyses were conducted before analyzing the main hypotheses in this study. The first stage of the preliminary analysis involved examining the outer loadings of each indicator item used to measure each variable, with the results shown in Table 2 and Figure 3. In analyzing the influence of GHRM and GSCM on SP, with EP considered as a mediating variable, each variable had several measurement indicators.

Based on the structural model diagram, Table 2 indicates that EP has 10 indicators, GHRM has 10 indicators, GSCM has 10 indicators, and SP has 10 indicators. As shown in Table 2, each variable's indicator has a loading factor value above the minimum threshold of 0.7. These results demonstrate a significant contribution to the respective variables, indicating that each variable indicator used in this study is valid for measuring its construct.

Table 2. Outer Loadings

	EP	GHRM	GSCM	SP
Environmental Performance				
EP 1.1	0.908			
EP 1.2	0.897			
EP 2.1	0.881			
EP 2.2	0.902			
EP 3.1	0.920			
EP 3.2	0.933			
EP 4.1	0.890			
EP 4.2	0.935			
EP 5.1	0.923			
EP 5.2	0.896			
Green Human Resource Management				
GHRM1.1		0.873		
GHRM1.2		0.842		
GHRM2.1		0.796		
GHRM2.2		0.798		
GHRM3.1		0.805		
GHRM3.2		0.849		
GHRM4.1		0.835		
GHRM4.2		0.860		
GHRM5.1		0.821		
GHRM5.2		0.814		
GHRM6.1		0.754		
GHRM6.2		0.790		
Green Supply Chain Management				
GSCM 1.1			0.715	
GSCM 1.2			0.836	
GSCM 2.1			0.785	
GSCM 2.2			0.716	
GSCM 3.1			0.807	
GSCM 3.2			0.742	
GSCM 4.1			0.805	
GSCM 4.2			0.834	
GSCM 5.1			0.710	
GSCM 5.2			0.816	
Sustainable Performance				
SP 1.1				0.767

	EP	GHRM	GSCM	SP
SP 1.2				0.757
SP 2.1				0.818
SP 2.2				0.854
SP 3.1				0.851
SP 3.2				0.814
SP 4.1				0.787
SP 4.2				0.904

Source: Field Data (2025)

The next preliminary analysis involved testing reliability and convergent validity by examining the Construct Reliability and Validity of the variables used in this study, which were measured using four indices: Cronbach's Alpha, Composite Reliability (rho_A and rho_C), and Average Variance Extracted (AVE). Table 3 shows the results of the reliability and construct validity tests for the variables EP, GHRM, GSCM, and SP. Construct reliability was measured through Cronbach's Alpha and Composite Reliability (rho_A and rho_C), while construct validity was assessed using the AVE value.

The reliability test using Cronbach's Alpha was employed to measure the lower bound of a construct's reliability, while Composite Reliability was used to measure the true reliability value of a construct. For good reliability, the values of Cronbach's Alpha and Composite Reliability must exceed the minimum threshold of 0.7. All variables in this study have Cronbach's Alpha values above 0.7, indicating that each indicator item within the variables possesses a very high level of reliability. The Composite Reliability values (rho_A and rho_C) also exceed 0.7, signifying that all variables used in the study exhibit high reliability. Thus, all indicator items for the variables utilized in this study can be considered reliable.

The convergent validity test was conducted to examine the validity of the relationship between indicators and latent variables, ensuring that all indicators could represent their respective latent variables. An indicator is considered to meet convergent validity and possess a high level of validity when its outer loading value exceeds 0.7 and the AVE value exceeds 0.5. As shown in Figure 3, the outer loading values of each indicator for all variables are above 0.7. This indicates that all indicators meet the criteria for convergent validity and possess high validity. Furthermore, the AVE values for the variables EP, GHRM, GSCM, and SP are 0.826, 0.673, 0.605, and 0.673, respectively. All AVE values in this study exceed the minimum threshold of 0.5, demonstrating that each construct has adequate convergent validity. This implies that the indicators used for each variable effectively represent their respective constructs. The highest AVE value, found in the EP variable (0.826), also indicates that the EP indicators in this study have the strongest capability to explain their respective variable.

Table 3. Construct Reliability and Validity

	Cronbach's Alpha	Composite Reliability (rho_A)	Composite Reliability (rho_C)	Average Variance Extracted (AVE)	Mean	Standard Deviation
EP	0,977	0,977	0,979	0,826	0,829	0,032
GHRM	0,956	0,959	0,961	0,673	0,674	0,036
GSCM	0,929	0,941	0,939	0,605	0,603	0,048
SP	0,930	0,934	0,943	0,673	0,666	0,049

Source: Field Data (2025)

The estimation of mean and standard deviation values for each variable in this study are also presented in Table 3. The highest mean is found in the EP variable (0.829), indicating that respondents provided high ratings for environmental performance. Additionally, the standard deviation for all variables is relatively low, suggesting that respondents' perceptions tend to be more homogeneous.

Overall, as shown in Table 3, the estimation results for Construct Reliability and Validity indicate that all indicator and variable values exceed the established minimum thresholds. These results demonstrate that the research model has achieved Construct Reliability and Validity, making it appropriate for further analysis to examine the influence of GHRM and GSCM on SP, with EP as a mediating variable at Sido Muncul.

The analysis results in Figure 3 also show that GHRM and GSCM each have a positive influence on EP, with coefficients of 0.347 for GHRM and 0.396 for GSCM. Therefore, GSCM contributes slightly more than GHRM in enhancing EP. EP also has a significant positive effect on improving SP, with a coefficient value of 0.450. Based on these values, the improvement in EP can directly contribute to the enhancement of SP, indicating that EP can act as a mediating variable that strengthens the relationship between GHRM and GSCM on SP.

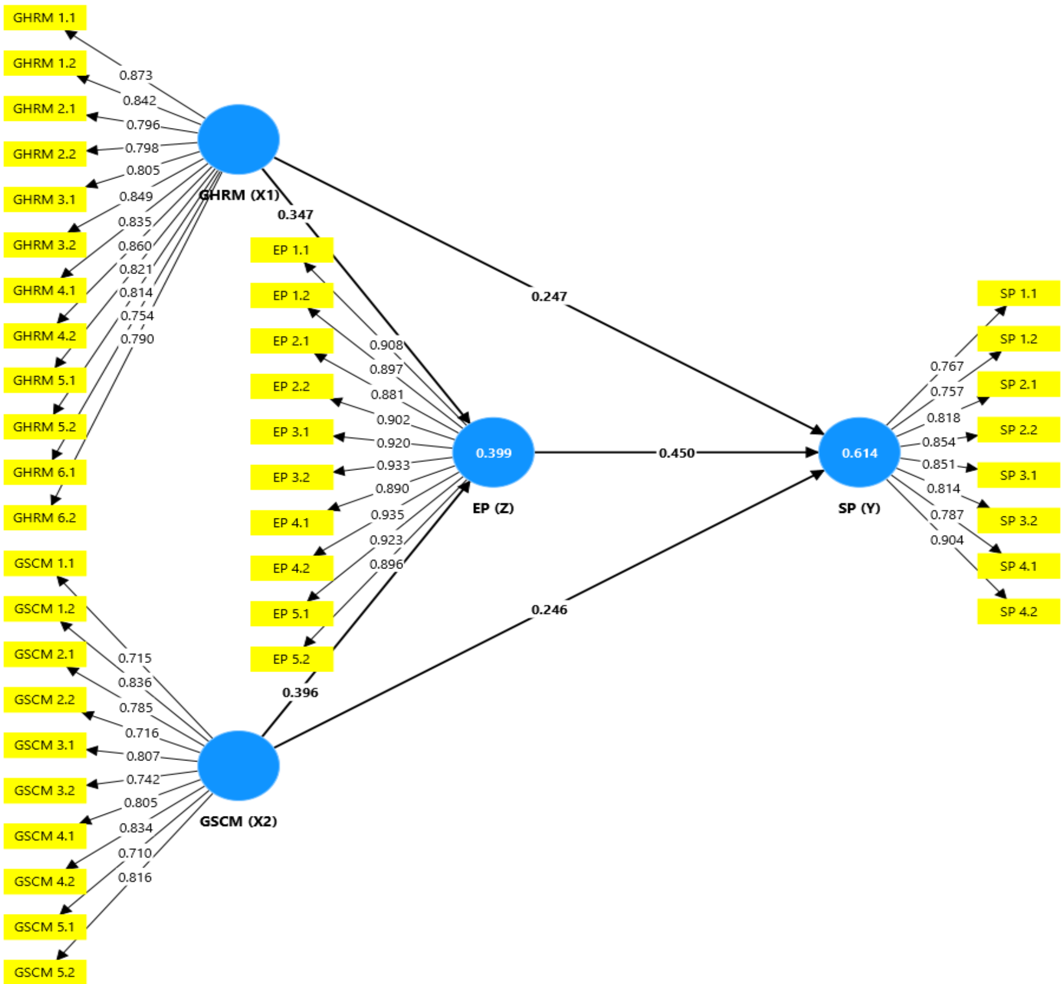

Figure 3. Item Loading For Each Variable Of The Study
Source: Field Data (2025)

3.3. Discriminant Validity

The next analysis to be conducted is examining the discriminant validity within the research model. This analysis is performed by comparing the correlations between variables with the square root of AVE (√AVE). A measurement model is considered to have good discriminant validity if the √AVE of each variable is greater than the correlation between variables. The √AVE values can be obtained from the Fornell-Larcker Criterion and Heterotrait-Monotrait Ratio (HTMT) outputs, with the results presented in Table 4.

Table 4 presents the results of the Fornell-Larcker Criterion and Heterotrait-Monotrait Ratio (HTMT) analyses, used to measure discriminant validity for the variables EP, GHRM, GSCM, and SP in this study. Based on the discriminant validity test using the Fornell-Larcker Criterion, the diagonal values represent the √AVE of each variable, all of which are greater than the correlations between variables. For instance, the √AVE value for EP is 0.909, which is higher than its correlation with GHRM (0.522), GSCM (0.549), and SP (0.714). Similarly, the √AVE for each of the other variables is greater than the correlations between variables. Thus, each construct is stronger in measuring itself compared to other variables, satisfying the criteria for discriminant validity.

Table 4. Fornel-Larcker Criterion and Heterotrait-Monotrait Ratio (HTMT)

	EP	GHRM	GSCM	SP
Fornel-Larcker Criterion				
EP	0.909			
GHRM	0.522	0.820		
GSCM	0.549	0.440	0.778	
SP	0.714	0.590	0.602	0.820
Heterotrait-Monotrait Ratio (HTMT)				
EP				
GHRM	0.530			
GSCM	0.549	0.424		
SP	0.746	0.608	0.609	

Source: Field Data (2025)

The discriminant validity test using HTMT shows that all values between variables are below the threshold of 0.85. The HTMT value between EP and GHRM is 0.530, and between EP and GSCM is 0.549. These results indicate that the constructs in this study possess good discriminant validity, with each variable sufficiently distinct from the others. Therefore, the PLS-SEM model developed to analyze the influence of GSCM and GHRM on SP through the mediation of EP has achieved discriminant validity.

3.4. Collinearity Statistics

The final preliminary analysis conducted for this study was to examine multicollinearity using the inner variance inflated factor (VIF). Table 5 presents the VIF values used to analyze statistical collinearity in the research model involving the variables EP, GHRM, GSCM, and SP. VIF is used to measure the degree of multicollinearity among variables in the model. According to the table, all VIF values are below the threshold of 5. This indicates that there is no multicollinearity issue in the research model. The highest VIF value is found in the relationship between EP and SP, at 1.664, while other values, such as the relationship between GHRM and EP and between GSCM and EP, are 1.240 each, demonstrating healthy relationships without redundancy among variables.

Table 5. Inner VIF values of VIF

	EP	GHRM	GSCM	SP
EP				1.664
GHRM	1.240			1.441
GSCM	1.240			1.502
SP				

Source: Field Data (2025)

The VIF results in this study indicate that each independent variable (GHRM and GSCM) and the mediating variable (EP) has a unique contribution to the dependent variable (SP) without significant overlap. With no multicollinearity present, the research model can be deemed valid for proceeding with inferential analysis, namely testing the relationships between variables through path analysis or SEM. Thus, it can be concluded that this research model has a strong statistical foundation for explaining the causal relationships between variables in analyzing the influence of GSCM and GHRM on SP through the mediation of EP.

3.5. Path Analysis for The Hypotheses Testing

The path analysis results are used to determine the analysis outcomes in estimating the causal relationships between the variables tested in this study, as shown in Table 6. Based on the hypothesis testing results, both direct and indirect hypothesis tests indicate that all hypotheses for each variable have P-values below 0.05. Therefore, all hypotheses in this study are supported and accepted.

H1: The direct effect of EP on SP

The path analysis results in this study reveal that EP is significantly related to SP ($\beta = 0.450$, $t = 5.226$, $p = 0.000$), supporting the first hypothesis. The first hypothesis indicates that EP is significantly associated with SP. This finding means that every percentage increase in efforts to improve environmental performance will result in an enhancement of sustainable performance. By incorporating environmental considerations into its operations, Sido Muncul demonstrates a commitment to fulfilling social responsibility while strengthening long-term performance to support sustainability. This finding aligns with Pertiwi & Wijayana (2022), who assert that strong environmental performance plays a significant role in improving a company's sustainable performance.

Table 6. Path Coefficients

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values	Confidence Intervals	
						2.5%	97.5%
EP -> SP	0,450	0,440	0,086	5,226	0,000	0,276	0,614
GHRM -> EP	0,347	0,346	0,088	3,931	0,000	0,170	0,517
GHRM -> SP	0,247	0,257	0,093	2,640	0,008	0,077	0,447
GSCM -> EP	0,396	0,389	0,096	4,138	0,000	0,196	0,564
GSCM -> SP	0,246	0,239	0,089	2,778	0,005	0,062	0,408
GHRM -> EP -> SP	0,156	0,152	0,049	3,181	0,001	0,65	0,257
GSCM -> EP -> SP	0,178	0,173	0,061	2,914	0,004	0,067	0,304

Source: Field Data (2025)

H2: The direct effect of GHRM on EP

For the second hypothesis, there is a significant relationship between GHRM and EP (β = 0.347, t = 3.931, p = 0.000). The second hypothesis demonstrates a significant relationship between GHRM and EP. The findings of this study indicate that efforts to integrate human resource management activities at Sido Muncul must be rooted in environmentally friendly practices, which result in improved environmental performance. Similarly with this, Valenia (2023) also found that GHRM can enhance environmental awareness and foster environmentally conscious behavior.

H3: The direct effect of GHRM on SP

The third hypothesis shows that GHRM is significantly related to SP (β = 0.247, t = 2.640, p = 0.008). This hypothesis reveals a significant relationship between GHRM and SP. The findings indicate that implementing environmentally principled human resource management at Sido Muncul can have long-term effects, also enhancing sustainable performance. By incorporating green strategies in recruitment, training, performance management, and compensation, GHRM helps the company achieve sustainability balance across environmental, social, and economic aspects, aligning with the findings of Alzyoud (2021).

H4: The direct effect of GSCM on EP

The fourth hypothesis demonstrates that GSCM is significantly related to EP (β = 0.396, t = 4.138, p = 0.000). This hypothesis also shows a significant relationship between GSCM and EP. The findings indicate that every percentage increase in ensuring that supply chain activities align with environmentally friendly concepts will result in a corresponding percentage increase in the success of environmental performance at Sido Muncul. Similarly, Rohdayatin & Handayani (2024) found that better GSCM management leads to increased corporate awareness and care for the surrounding environment.

H5: The direct effect of GSCM on SP

The fifth hypothesis shows that GSCM has a significant relationship with SP (β = 0.246, t = 2.778, p = 0.005). This hypothesis reveals that GSCM significantly influences SP. Based on this hypothesis, innovations in supply chain management from upstream to downstream at Sido Muncul can enhance sustainable performance. These findings align with the results of Chin et al. (2015), which state that integrating supply chain management strengthens sustainable performance, encompassing economic, social, and environmental aspects.

H6: The indirect effect of GHRM on SP through the mediation of EP

The sixth hypothesis indicates that through the mediation of EP, GSCM forms a significant relationship with SP (β = 0.156, t = 3.181, p = 0.001). This hypothesis reveals that EP plays a significant role in analyzing the influence of GSCM on SP at Sido Muncul. These findings align with Ali et al. (2024), who found that EP significantly influences the indirect relationship between GSCM and SP.

H7: The indirect effect of GSCM on SP through the mediation of EP

The seventh hypothesis shows that through the mediation of EP, GSCM forms a significant relationship with SP (β = 0.178, t = 2.914, p = 0.004). Based on the estimation results, the seventh hypothesis confirms that GSCM has an indirect significant influence on SP at Sido Muncul through the mediation of EP. Ali et al. (2024) similarly found that EP significantly mediates the indirect relationship between GSCM and SP. This hypothesis testing is supported by the bootstrapping analysis results from the research model, which examines the influence of GHRM and GSCM on SP through the mediation of EP at Sido Muncul, as shown in Figure 4. Bootstrapping analysis was conducted to test the significance of the pathways between variables in the research model. The results are displayed using T-statistics values for each pathway, where values above 1.96 indicate significance at a 95% confidence level.

As shown in Figure 4, the relationship between GHRM and EP has a T-statistics value of 3.931, indicating that GHRM significantly influences EP. The relationship between GSCM and EP has a T-statistics value of 4.138, suggesting that GSCM has a positive and significant influence on EP. The relationship between EP and SP has the highest T-statistics value of 5.226, demonstrating that EP makes a highly significant contribution to SP. Additionally, the direct relationships between GHRM and SP and between GSCM and SP have T-statistics values of 2.640 and 2.778, respectively, indicating significant but smaller influences compared to the relationships mediated by EP.

The bootstrapping analysis results further emphasize the critical role of EP as a mediator in the relationship between GHRM and GSCM with SP. Thus, GHRM and GSCM positively influence SP through the implementation of EP. Figure 7 also demonstrates the consistency of the research model. This indicates that the empirical data from the indicators of each variable significantly contribute to their constructs, as reflected by the high loading values. Overall, the bootstrapping analysis in this study supports the hypothesis testing, confirming that GHRM and GSCM have both direct and indirect effects on SP through EP at Sido Muncul.

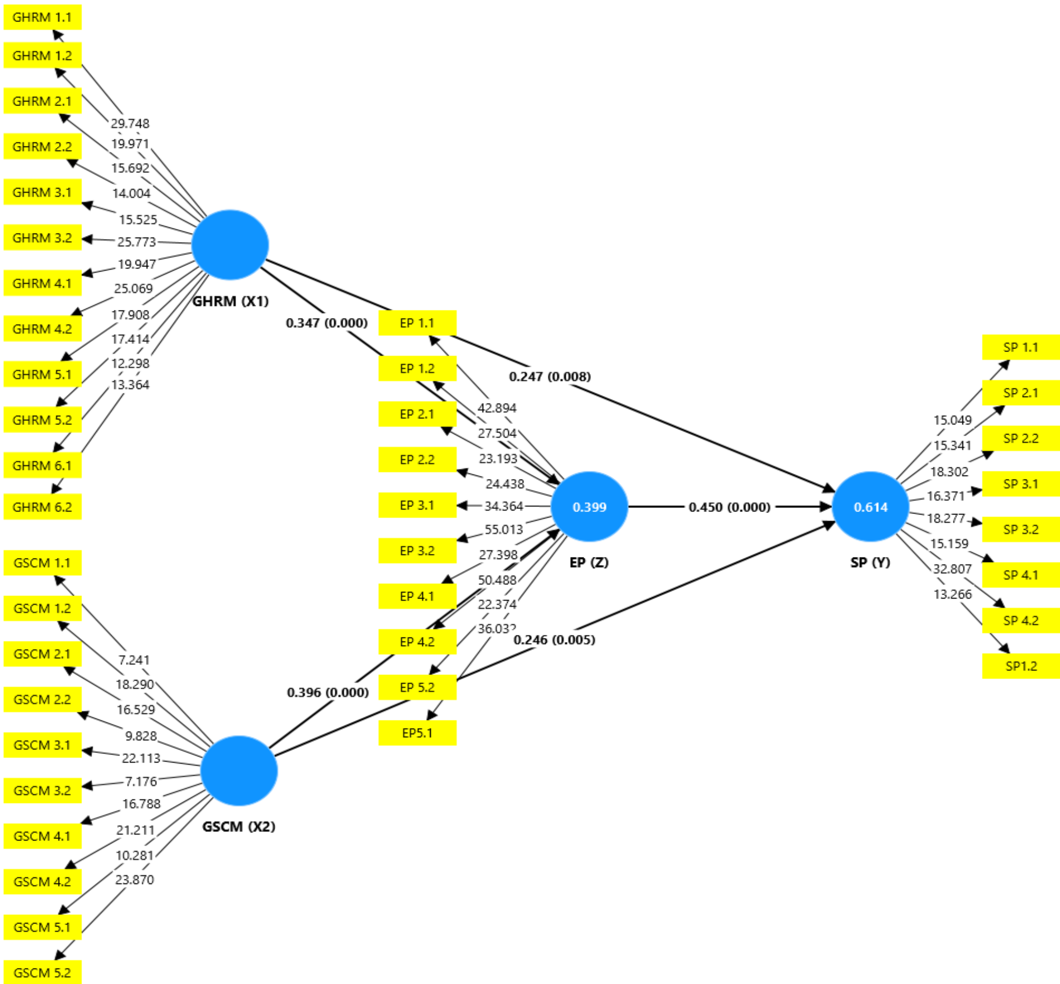

Figure 4. Bootstrapping
Source: Field Data (2025)

Table 7 presents the results of the R Square and Adjusted R Square analyses, which illustrate how well the independent variables (GHRM and GSCM) explain the variation in the mediating variable (EP) and the dependent variable (SP). According to Table 7, the R Square value for the EP variable is 0.399, indicating that 39.9% of the variation in environmental performance can be explained by GHRM and GSCM. Meanwhile, the Adjusted R Square value for EP is 0.387, which adjusts the R Square value by considering the number of independent variables and the sample size used in the study. This indicates that the contribution of the independent variables to EP is quite strong.

Table 7. Variance Explained By The Model

	R Square	R Square Adjusted
EP (Z)	0,399	0,387
SP (Y)	0,614	0,602

Source: Field Data (2025)

The estimated R Square value for the SP variable is 0.614, meaning that 61.4% of the variation in SP can be explained by EP, GHRM, and GSCM. The Adjusted R Square value of 0.602 indicates that this adjustment still reflects a significant and substantial effect. Overall, this model demonstrates that the mediating variable, EP, plays a critical role in explaining sustainable performance, strengthening the relationship between the independent variables (GHRM and GSCM) and the dependent variable (SP). These results support the conclusion that the research model has a reasonably good predictive capability.

4. Conclusion and Recommendations

This study shows that GHRM and GSCM have a positive effect on SP, both directly and through the mediation of EP. The main quantitative results indicate that GHRM and GSCM have the most significant influence on EP, which in turn strengthens the company's sustainable performance. Statistically, all causal paths in the research model are significant, with p-values < 0.05, and the R-square values indicate a strong model contribution in explaining endogenous variables.

Theoretically, this research reinforces the theory of the importance of integrating environmentally friendly practices into human resource and supply chain management to promote corporate sustainability. The findings also contribute to the existing literature by confirming the mediating role of environmental performance within the GHRM and GSCM framework. From a managerial perspective, the results provide empirical support for management to develop HR and operational policies that align with sustainability principles. The implementation of GHRM and GSCM should not be limited to related departments, but instead become a cross-functional commitment throughout the organization.

In implementing GHRM, the company still needs to improve several key aspects such as Green Training and Development and Green Employee Relations. Employee engagement and awareness regarding sustainability issues can be enhanced through more intensive training and a recruitment process that prioritizes environmental orientation among candidates. Meanwhile, in GSCM, aspects such as Green Supplier Development and Collaboration and Green Multitier Supplier Management still require improvement, particularly in supplier training and environmental audits. In the context of sustainable performance, the company also needs to increase its investment in research that supports sustainability and expand the dissemination of information about eco-friendly products that have been developed. This is important so that employees and the wider community are more aware of the company's sustainable performance efforts. Regarding EP practices, especially water management, there remains a gap in understanding and implementing water efficiency policies. Therefore, periodic internal audits and more in-depth education for all employees are needed to enhance the effectiveness of these policies.

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