(RESEARCH ARTICLE)

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The influence of green human resource management and environmental strategy on environmental performance through green innovation as a mediation variable at pt Esperança Timor Oan in Timor Leste

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Abstract

This study is assessing the impact of Green Human Resource Management (GHRM) and Environmental Strategy on Environmental Performance with Green Innovation as a mediator in PT. Esperança Timor Oan (ETO) in Timor-Leste. This study is based on the growing awareness of sustainability issues to adopt the concept of green into their business strategy. PT ETO has initiated various policies based on environmental issues; however, the implementation is still in the administrative level and has not been felt in real terms. Theory of Resource-Based View (RBV) and Natural Resource-Based Theory (NRBV), which states that companies are able to attain sustainable competitive advantage through the use of resources that are considered valuable, scarce, difficult to imitate, and difficult to substitute. GHRM is designed to influence employee behavior towards the environment through the recruitment system, training and performance appraisal, and sustainability value-based rewards. Environmental Strategy is designed to represent the company's proactive strategies in resource management and environmental impact management. Quantitative method of path analysis using Partial Least Square (PLS) method with 76 respondents from PT ETO employee respondents. The result of the analysis showed that GHRM has no direct influence on Environmental Performance but has an indirect positive influence through Green Innovation as a mediating variable. Environmental Strategy has been proven to have a positive and significant influence on Environmental Performance, but its indirect influence through Green Innovation is not significant.

Keywords: Environmental Strategy; Green Innovation; Environmental Performance; Timor-Leste

1. Introduction

Global environmental issues such as climate change, pollution, and degradation of ecosystems have worsened. This has led to businesses engaging in activities that promote sustainability. The United Nations, in its Sustainable Development Goals, asserts that the success of development lies in the environmental protection and social welfare of the people rather than economic success. Thus, business success can be defined in terms of contributions to environmental protection such as energy efficiency, waste management, reduction of emissions, and innovation in green technology. [1] In Timor-Leste, sustainability is a major issue in the sense that resources are available, yet infrastructure is limited, and the level of green technology usage is low. According to,[2] business strategies that are proactive in environmental protection are important for cost efficiency, innovation in green technology, etc.

Esperança Timor Oan (ETO), in Timor Leste, is an energy sector company involved in gas fuel storage and distribution, with its location in Rua China Rate, Lehane Oriental, in Dili city, with an area of ±1,944 m². With the involvement of ±76 employees, it aims to satisfy the energy demands of the people while promoting economic growth in the country. As it

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is a high-risk business in terms of environmental impact, companies are expected to address the potential impacts of their business on the environment, such as air, noise, soil, and water pollution, as well as waste generated in their business processes. For this reason, PT Esperança Timor Oan (ETO) developed an Environmental Management Plan (EMP) in compliance with Law No.5/2011 and classified as a Category B Project by Autori Dade Nacional do Petróleo e Minerals (ANPM).[3] On the other hand, the implementation of Green Human Resource Management and environmental strategies is considered to improve organizational performance in terms of the environment, while promoting a healthy organizational culture through green innovation.

The phenomenon that occurs at PT Esperança Timor Oan (ETO) shows that there is a mismatch between policies and real implementation in sustainability practices. Implementation Green Human Resource Management It is still administrative, while the environmental strategy has not been fully integrated into the business plan of the company, and the implementation of green innovation has not yet reached the optimal level. This situation shows that there is a research gap that needs to be studied more deeply, especially regarding how the collaboration between Green Human Resource Management and Environmental Strategy can improve Environmental Performance through the role of mediation Green Innovation.[4]

The results obtained from the pre-survey at PT Esperança Timor Oan (ETO) showed that the implementation of environmental strategies did not effectively promote Green Innovation to enhance Environmental Performance. Of the total sample respondents, 39% responded with a "yes" answer, while 61% responded with a "no" answer. The majority negative responses from the sample respondents to the pre-survey questionnaire indicated that they had negative perceptions regarding the implementation of Environmental Performance practices. This is because the majority of the sample respondents' responses were "no" because they had a limited understanding and implementation of environmentally oriented GHRM practices such as green recruitment, training, and performance appraisal, [5,6] Thus, the study results showed that the sustainability strategies at ETO were not effectively translated to the operational level. Hence, the study provided the foundation to explore the research opportunity to investigate the research gap on the impact of the synergy between GHRM and environmental strategies to enhance Environmental Performance with Green Innovation.

The variables identified in the study include the factors that influence GHRM and Environmental Performance. These factors include work facilities, employee relations, green culture, training programs, job satisfaction [7,8]. The research theory adopted in this study was the Resource-Based Theory (RBV), which argues that a firm can only attain sustained competitive advantage through the possession of rare, inimitable, and valuable resources. GHRM, Environmental Strategy, and Green Innovation are the resources that the theory addresses. GHRM entails the incorporation of environmental values in the activities of the human resource department, such as the recruitment, training, and appraisal of employees to motivate them to deliver in an environmentally friendly manner [9]. However, GHRM can only be effective if the top management of the organization is committed to the approach. GHRM must be innovative in approach, have the finance to support the approach, as well as have the reward system to motivate employees to deliver in an environmentally friendly manner [10]. Environmental strategy is the integration of environmental goals into the business process [11]. Environmental strategy is important in improving the efficiency of the business as well as improving compliance with environmental laws [12, 13]. GHRM is mediated by green innovation in linking with Environmental Strategy in the pursuit of superior Environmental Performance [14]. Empirical research has supported the link between GHRM/ES and Green innovation as being positively related [15]. It is thus the synergy between GHRM, ES, and green innovation that is the strategic approach to superior Environmental Performance.

2. Research Method

2.1. Approaches and Types of Research

This study adopted a quantitative explanatory research design with an objective of investigating causality in relation to Green Human Resource Management (GHRM), Environmental Strategy, Green Innovation, and Environmental Performance in PT Esperança Timor Oan (ETO).

2.2. Data Analysis Techniques

The research population includes all permanent employees and management staff who are actively involved in human resource management, implementation of environmental strategies, and operational activities in line with the company's sustainability goals, totaling 76 people. For a population of less than 100 people, the sampling method employed in this case is a census method, where the entire population is considered a sample. Data collection strategies employed in this case include three main strategies: (1) distribution of closed-ended questionnaires using a five-point

Likert scale, (2) interview strategies using key informants knowledgeable in the subject matter of this study, and (3) documentation strategies using internal company documents and relevant academic literature. Before the actual collection of the research data, all the research instruments were subject to validity and reliability testing to ensure the precision of the research measurement, internal consistency, and appropriateness of the research constructs. To conduct the analysis of the research data, the Partial Least Squares-Structural Equation Modeling (PLS-SEM) technique was adopted with the help of the SmartPLS3 software package, which is most appropriate for research models with mediating variables and small sample size. Descriptive analysis was adopted to conduct an empirical analysis of the research dataset's characteristics, while the inferential analysis included the evaluation of convergent validity, discriminant validity, construct reliability, and the structural model or inner model to evaluate the nature of the relationship between the variables. Additionally, the evaluation of the Mediating Effect for Green Innovation, Coefficient of Determination (R^2), Goodness of Fit (GoF), and Predictive Relevance (Q^2) were also carried out to evaluate the research model's ability to explain the research phenomenon and to predict the research phenomenon. It is expected that the application of a systematic methodological framework and instrument testing will provide the basis for the development of valid and reliable empirical findings for the study, which will contribute significantly to the development of theories as well as the advancement of environmentally-oriented human resource management practices in sustainable energy organizations such as PT Esperança Timor Oan (ETO).

2.3. Route diagram

This is based on theory and previous research that has been conducted on how GHRM is related to Environmental Strategy, Green Innovation, and Environmental Performance. However, the general idea is to demonstrate how GHRM implementation and the adoption of environmental strategies can affect environmental performance directly or indirectly through green innovation.
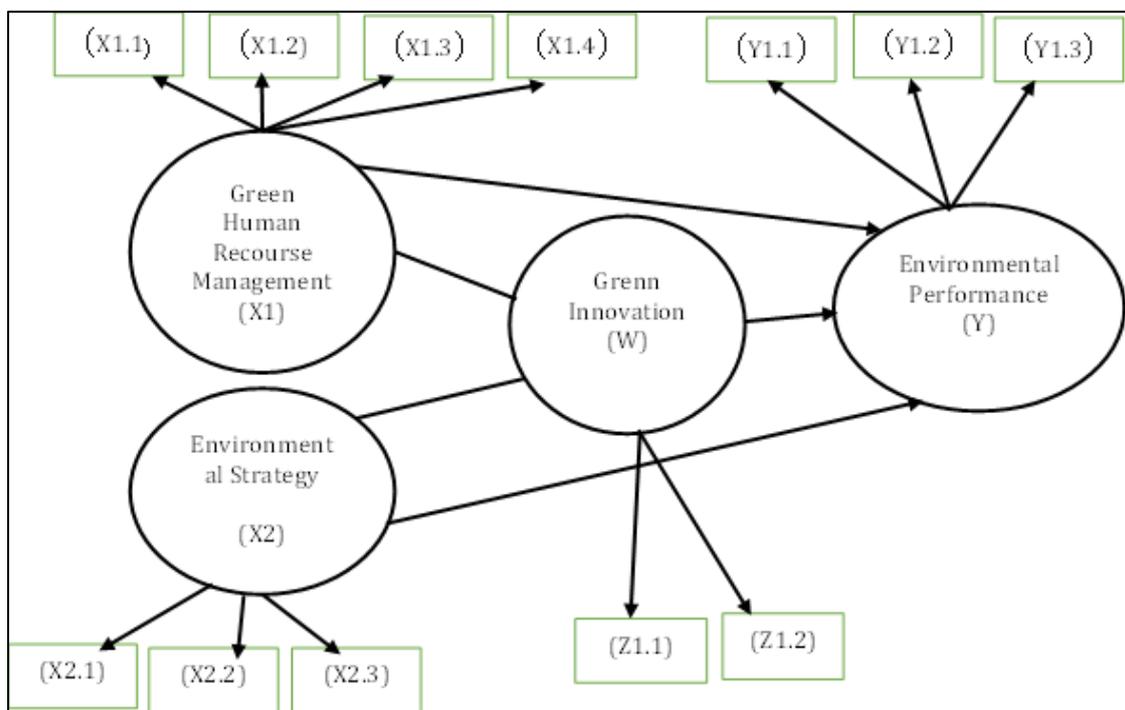

Figure 1 Research model

The path coefficient and associated p-value are calculated for SEM-PLS hypothesis testing in order to assess the test's significance. If the variables' association is significant at a 95% confidence interval, or α = 0.05, the hypothesis would be accepted. For hypothesis testing, the usual rule of thumb is that if the p-value is less than 0.05, there is a relationship, suggesting a substantial impact; if the p-value is greater than 0.05, there is no association. Additionally, t-statistics are used in the test to validate the findings. The general criteria are t > 1.96, which indicates that the hypothesis is accepted, or t < 1.96, which indicates that the hypothesis is rejected, at a 5% significance level.

3. Research Results

3.1. Evaluation of measurement models (outer Model)

Outer model is a component of the path model that contains the association of indicators and the research variables. According to,[16] the steps of evaluating the measurement model include convergent validity, discriminative validity, and reliability, and they are explained as follows:

3.1.1. Convergent Validity

It is considered valid based on the criteria of the outer loading value of > 0.7 [17] and the result of the test is presented in table

Table 1 Outer Loading Results

	EP Y	ES X2	GHRM X1_	GI Z
X1.1			0.745	
X1.2			0.754	
X1.3			0.627	
X1.4			0.779	
X2.1		0.829		
X2.2		0.821		
X2.3		0.845		
Y1.1	0.796			
Y1.2	0.680			
Y1.3	0.752			
Z1.1				0.854
Z1.2				0.869

Source: (data processed by PT. ETO (2025)

As can be seen from table 1 above, all the indicators have an outer loading of >0.7, which shows that the Average Variance Extracted (AVE) value [17] also supports the value of Convergent Validity, and all the indicators are >0.6, which is valid according to [18]'s recommendations.

Table 2 Average Variance Extracted (AVE) Results

	Cronbach's Alpha	Rho A	Composite Reliability	Average Variance Extracted (AVE)
EP Y	0.593	0.597	0.787	0.553
ES X2	0.777	0.778	0.871	0.692
GHRM X1_	0.704	0.716	0.818	0.531
GI Z	0.652	0.653	0.852	0.742

Source: (data processed by PT. ETO (2025)

Additionally, each variable's Average Variance Extracted (AVE) is greater than 0.5, indicating the validity of the study's data [19].

Table 3 Fornell-Larcker Criterion for Discriminant Validity

	EP Y	ES X2	GHRM X1_	GI Z
Environmental Performance (EP/Y)	0.744			
Environmental Strategy (ES/X2)	0.721	0.832		
Green Human Resource Management (GHRM/X1)	0.595	0.519	0.729	
Green Innovation (GI/Z)	0.700	0.567	0.677	0.861

Source: (data processed by PT. ETO (2025)

Based on the application of the Fornell Larcker Criterion, it is evident from the results obtained from the data in Table 3 above that each construct is correlated with a square root of the AVE, which is greater than the correlations obtained for each of the constructs relative to the other constructs. For example, GHRM = 0.729, GI = 0.861, ES = 0.832, and EP = 0.744. This is consistent with the Fornell Larcker Criterion, thereby supporting the argument that the AVE is greater than the correlations obtained relative to the constructs, as claimed in [20].

Table 4 Heterograft- Monorail for Discriminant Validity

	EP Y	ES X2	GHRM X1_	GI Z
EP Y				
ES X2	1.057			
GHRM X1_	0.914	0.695		
GI Z	1.131	0.798	0.992	

Source: (data processed by PT. ETO (2025)

According to the HTMT view, based on [21] criteria, an indicator is valid when the HTMT result is < 0.90. Table 4. indicates that all indicators were valid since only two of the indicators, (ES/X2) and (GI/Z), were higher than 0.90. All indicators were considered valid.

3.1.2. Reliability

A latent variable can be said to have good realism if the composite reliability value is greater than 0.7 and the Cronbach alpha value is greater than 0.7 [22]. The results of this test can be seen in table.

Table 5 CA, CR for Reliability and AVE for Convergent Validity Test

	Cronbach's Alpha	Rho A	Composite Reliability	Average Variance Extracted (AVE)
EP Y	0.593	0.597	0.787	0.553
ES X2	0.777	0.778	0.871	0.692
GHRM X1_	0.704	0.716	0.818	0.531
GI Z	0.652	0.653	0.852	0.742

Source: (data processed by PT. ETO (2025)

For reliability testing, there are two measurements: Cronbach's Alpha (CA) and Composite Reliability (CR). An indicator is said to be reliable if its CA and CR are above 0.6. Based on Table 5, there are only two indicators that are reliable, as their values are above 0.6 for both CA and CR, as recommended by [23]. These indicators can then undergo inner model testing.

3.2. Evaluation of the measurement model (inner model)

Evaluation of the inner model is done by determining the variance explained for the dependent variable, employing the R^2 value, as well as the application of the Stone-Geisser Q-square test. Moreover, the value of the path coefficients is also used [24].

3.2.1. Coefficient of determination (R2)

According to,[25] the R2 value shows the level of predictive power in the sample data. The higher the R2 value, the better the predictive power of the structural model in predicting the endogenous variables. The results are presented in Table 6.

Table 6 R2 Test Results

	R Square	R Square Adjusted
EP Y	0.651	0.636
GI Z	0.522	0.508

Source: (data processed by PT. ETO (2025)

As indicated in the results presented in Table 6. above, the R^2 for Environmental Performance (EP/Y) was noted at 0.651. This simply means that approximately 65.1% of the variation in environmental performance can be explained by the predictors Green Human Resource Management (GHRM/X1) and Environmental Strategy (ES/X2). The remaining percentage, which is approximately 34.9%, can be attributed to other factors not considered in this study. The Adjusted R^2, which considers the number of predictors as well as sample size, was noted at 0.636. This simply implies that the model remains robust and consistent in explaining the dependent variable. In relation to Green Innovation (GI/Z), the R^2 was noted at 0.522. This simply implies that approximately 52.2% of the variation in green innovation can be explained by the exogenous variables Green Human Resource Management (GHRM/X1) and Environmental Strategy (ES/X2). The Adjusted R^2 for Green Innovation (GI/Z) was noted at 0.508. This simply implies that after adjusting for sample size, the model has a moderate capacity to account for the influence on green innovation. In terms of its representativeness as a model from an academic perspective, R^2 values ranging from 0.5 to 0.7 can be considered good explanatory values [26]. This model can therefore be considered fairly representative of the relationship between the variables.

3.2.2. Cross validated Reduce (Q2)

Cross validated Reduce (Q2) or Q-square test is used to assess predictive relevance The value of Q2 > 0 indicates that the model has an accurate predictive relevance to a particular construct, while the value of Q2 < 0 indicates that the model has predictive relevance [27], the elaboration of the results can be reviewed in Table

Table 7 Q2 test results

	SSO	SSE	Q^2 (=1-SSE/SSO)
EP Y	228.00	159.46	0.30
ES X2	228.00	228.00	
GHRM X1_	304.00	304.00	
GI Z	152.00	99.26	0.35

Source: (data processed by PT. ETO (2025)

Using the Q2 values from the Table 7, the Q2 value of the variables EP/Y and GI/Z is found to be 0.30. The constructs ES/X2 and GHRM/X1 do not have Q2 values because these two constructs were considered exogenous variables, not affected by the other variables of the model. According to, [28,29] the value of Q2, when it is positive, represents the predictive relevance of the model's variables. In general, when the value of Q2 is found to be 0.02, it is considered small, when it is found to be 0.15, it is considered medium, and when it is found to be 0.35, it is considered large. Thus, the value of Q2 of the model, when it is found to be 0.30, represents the range from moderate to high.

3.3. Goodness of fit model (GOF)

The Goodness of Fit (GOF) tests can also be used to assess the general effectiveness of the model. The GOF values are based on a combination of AVE and R^2, along with the Standardized Root Mean Square Residual (SRMR) and the Normed Fit Index (NFI). A good model can be said to have an SRMR of up to 0.08 and an NFI close to 1.

Table 8 GOF Test Results

	Saturated Model	Estimated Model
SRMR	0.100	0.100

Source: (data processed by PT. ETO (2025)

As indicated by the findings presented in table 8. the saturated model and the estimated model both have a Standardized Root Mean Square Residual (SRMR) of 0.100. SRMR is the extent to which the model's predictions of the covariances differ, on average, from the actual covariances found in the data. According to,[30] when the SRMR ≤ 0.10, the model fits well. In essence, the value of 0.100 obtained from the study indicates that the model fits well, with no notable difference between the actual data collected and the predictions of the model. In other words, the structure of the model tested is capable of capturing the relationship between the variables with a low error rate, implying that it is suitable for the next stage of the study.

3.4. Hypothesis Test

Hypothesis testing was carried out using T (T-statistical) and P (P-value) values on the path coefficient. This study uses a level of significant or a significant level of 0.05 or 5%. A variable is considered to have a significant influence on another variable if the T-statistic > 1.96 and the P-value.

Table 9 T and P Values for Hypothesis Test

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
ES X2 -> EP Y	0.456	0.457	0.101	4.525	0.000
GHRM X1_ -> EP Y	0.110	0.110	0.107	1.027	0.305

Source: (data processed by PT. ETO (2025)

Hypothesis 1 (H1): Green Human Resource Management (X1) does not significantly influence Environmental Performance (Y). The statistical results are quite conclusive: T = 1.027 (far from 1.96) and P = 0.305 (far from 0.05). Thus, it seems that the implementation of environment-based HR practices does not result in any positive influence on environmental performance. However, GHRM is a critical aspect in sustainability; its implementation in practice needs to be worked upon to influence environmental performance. Conclusion: H1 is not accepted because Green Human Resource Management does not show any significant influence over Environmental Performance.

Hypothesis 2 (H2): Environmental Strategy (X2) positively and significantly influences Environmental Performance (Y). The results are quite conclusive: T = 4.525 (far from 1.96) and P = 0.000 (far from 0.05). Thus, it seems that environmental strategy can significantly influence environmental performance. The environmental strategy includes energy-saving policies, sustainable waste management practices, and the implementation of eco-friendly technologies in support of sustainability. Conclusion: H2 is accepted because Environmental Strategy shows a positive and significant influence over Environmental Performance.

**Table 10** T and P Values for Hypothesis Test

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
ES X2 -> GI Z -> EP Y	0.108	0.104	0.062	1.739	0.083
GHRM X1_ -> GI Z -> EP Y	0.192	0.190	0.083	2.306	0.022

Source: (data processed by PT. ETO (2025)

Hypothesis 3 (H3) states: Green Human Resource Management (X1) positively and significantly influences Environmental Performance (Y) through Green Innovation (Z). The statistics revealed a t-value equal to 2.306 (greater than 1.96) and a p-value equal to 0.022 (less than 0.05), which means the relationship between Green Human Resource Management and Environmental Performance through Green Innovation is statistically significant. This supports the

assumption that Green Innovation partially mediates the relationship between Green Human Resource Management and Environmental Performance. In other words, using Green Human Resource Management practices can lead to green innovations, which can be exemplified by using green materials, increasing resource efficiency, and implementing green production processes to enhance overall environmental performance. Thus, H3 is accepted: Green Human Resource Management Influences Environmental Performance through Green Innovation.

Hypothesis 4 (H4) states: Environmental Strategy (X2) has no effect on Environmental Performance (Y) through Green Innovation (Z). The result revealed a t-value equal to 1.739 (greater than 1.96) and a p-value equal to 0.083 (less than 0.05), which means there is no significant relationship between Environmental Strategy and Environmental Performance through Green Innovation. Although green innovations can be developed through using environmental strategies, these strategies are not yet strong enough to enhance overall environmental performance through green innovations. Consequently, Green Innovation is not a mediator between Environmental Strategy and Environmental Performance. The decision is to reject H4: Environmental Strategy directly influences Environmental Performance but not significantly through Green Innovation.
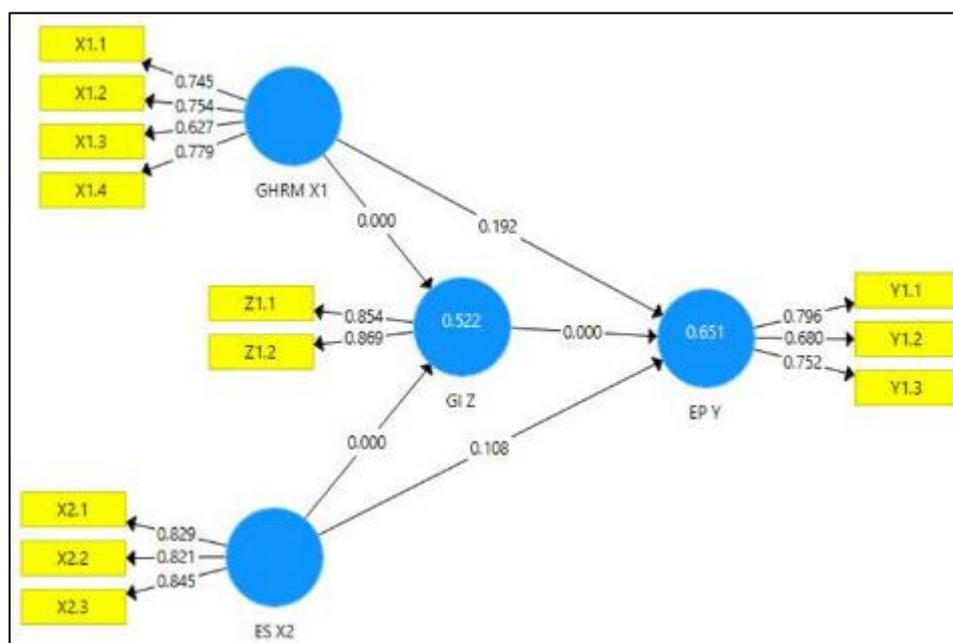
Source: (PLS Algorithm)

Figure 2 Loading factor

Inferential analysis consists of measurement models or outer models (convergent and discriminant validity, composite reliability) and structural models or inner models (R square, Q square, Goodness of fit model and hypothesis test).

For the discriminatory validity test, the Fornell-Lancker criteria and the Heterotrait - Mon trait (HTMT) were applied. From the Fornell-Lancker criteria, the results presented in table 4. show that all the values of the indicators have met the recommendations of,[31] and therefore, the values can be considered valid.

4. Discussion

This study describes what each variable means and how they are related to each other, whether directly or indirectly. The discussion is based on theory and backed by previous research that supports these relations.

4.1. The Effect of Green Human Recourse Management (GHRM) on Environmental Performance (EP)

Research has indicated that GHRM is not making any significant contribution to the direct improvement of Environmental Performance (EP) at Esperansa Timor Oan Unipersonal Lda. (ETO). In fact, despite the implementation of several GHRM practices by ETO, like green recruitment, green training, and green reward systems, these practices remain at the managerial level without any impact on employees' behavior and culture.

This study confirms the findings of [32,33] on the influence of GHRM on EP, which is highly dependent on internal factors like a pro-environmental culture, commitment to green HRM by the leadership, and innovativeness [34,35] and support the idea that GHRM might influence EP indirectly through green innovation and green strategies, which could have a positive impact on overall performance.

From a theoretical point of view, the findings of the above studies support the Resource-Based View theory (RBV), according to which green human capital can be a source of competitive advantage provided it is managed properly to support the general business strategy.

Furthermore, it is also necessary to understand from a theoretical point of view that the implementation of GHRM is largely dependent on the linkage between HR practices, green innovation, and leadership commitment to green HRM, as discussed in [36,37].

On the other hand, it is clear from the study results that the GHRM practices of PT. ETO do not contribute to the improvement of the environmental performance of the organization directly. It is essential to establish a link between the GHRM practices, green innovation, and green strategies for ETO to improve the environmental performance of the organization for the achievement of the Sustainable Development Goals (SDGs).

4.2. The Influence of Environmental Strategy (ES/X2) on Environmental Performance (EP/Y)

The study found that the ES has a positive and significant impact on the Environmental Performance (EP) of PT. ETO. It is therefore evident that well-designed environmental strategies can have a positive impact in achieving better environmental outcomes. Leadership is crucial in ensuring sustainability as well as the efficient use of resources.

This is consistent with the Porter Hypothesis, which argues that good environmental strategies can lead to innovation, efficiency, and competitiveness. In the case of PT. ETO, waste management, renewable energy, emission reduction, and clean technologies are effective strategies for operational efficiency with environmental sustainability.

The results are consistent with the Natural-Resource-Based View (NRBV) concept, which suggests that environmental strategy is a valuable and difficult-to-imitate resource that can create a sustainable competitive advantage.

Furthermore, ETO promotes sustainability through its Environmental, Social, and Governance (ESG) strategy, green investments, and Green Human Resource Management (GHRM), all of which are designed to improve environmental performance. Consistent with the Dynamic Capability Theory, PT. ETO's environmental strategy is a dynamic capability to cope with the changing regulations of the government, overcome environmental challenges, and develop green innovation in Timor-Leste.

Empirical evidence demonstrates that firms with effective environmental strategies can improve their energy efficiency, better manage their wastes, increase their level of compliance with environmental laws and regulations, and improve their corporate image. Research studies mentioned in [38,39] clearly demonstrate that environmental strategies can improve economic and environmental performance by reducing greenhouse gases, improving energy efficiency, and promoting green innovation.

The point to note is that a well-designed environmental strategy that is innovative and sustainability-focused is the key to improving environmental performance. For PT. ETO, the environmental approach that the company takes goes beyond the optimization of the business processes to harmonize the environment; it also improves the business's competitiveness while moving the Sustainable Development Goals (SDGs) forward.

4.3. The Effect of Green Human Resource Management (GHRM) on Environmental Performance (EP/Y) through Green Innovation (GI) as a Mediation Variable.

This study revealed that GHRM does not have a direct effect on Environmental Performance (EP) at PT. ETO. However, GHRM affects EP through the mediator variable of Green Innovation (GI). To put it simply, the effectiveness of GHRM is seen through the power of innovation it generates. GI bridges the gap between GHRM and EP.

Practices like Green Human Resource Management's hiring, training, rewarding, and work policies improve employees' awareness and willingness to innovate through their skills and preparedness to contribute to innovation. This helps to create an innovation-oriented culture, especially with regard to environmental performance.

This is in line with earlier studies [40,41] that found GHRM improves organizational performance in the environment not directly, but through enhancing organizational innovativeness. Similarly, studies [42,43] have found Green Innovation makes GHRM translate into actual organizational sustainability in terms of increased efficiency, reduced CO2 emissions, and increased stakeholder trust.

In theory, the study validates the Resource-Based View (RBV) and the extension of it, the Natural Resource-Based View (NRBV). This is because it proposes that green human resources and innovation are valuable, rare, and difficult to imitate, thereby creating sustainable competitive advantage for the organization. At PT. ETO, this is exemplified through the development of clean energy technology, production processes, and the implementation of the ESG-based management system.

Moreover, Dynamic Capability Theory supports these findings by demonstrating that green HRM can create adaptive and innovative capabilities that can assist organizations in dealing with environmental challenges and remain flexible during sustainability transitions.

Green Innovation is crucial to determining the impact of GHRM on Environmental Performance. PT. ETO's improved environmental performance not only results from green HR policies but also from the firm's ability to adopt the values of sustainability through a well-organized system of collaborative innovation. Improving the relationship between GHRM and Green Innovation can help PT. ETO attain economic efficiency, social responsibility, and environmental sustainability, as espoused by the Sustainable Development Goals.

4.4. The Influence of Environmental Strategy (ES) on Environmental Performance (EP) through Green Innovation (GI).

The study revealed that Environmental Strategy (ES) does not demonstrate a substantial indirect effect on Environmental Performance (EP) through Green Innovation (GI) in PT. ETO. Environmental strategies in PT. ETO have generated some green innovation initiatives; however, these initiatives do not seem to play a substantial mediating effect on environmental performance. In other words, Green Innovation has not yet reached its full potential in mediating between Environmental Strategy and Environmental Performance.

The weak role of the mediator is due to a number of reasons: the environmental strategies are not well integrated with the innovation within the strategic management system; the innovation process is not radical but rather incremental; and finally, there are limitations to the financial, technological, and management capabilities. Most of the environmental contributions are direct and are derived from the environmental strategies, which include reduction, waste, and energy.

These findings imply that Environmental Strategy has a stronger direct impact on Environmental Performance than its indirect impact through Green Innovation. This result is in line with the Porter Hypothesis, which asserts that a strong and well-executed environmental strategy will positively impact competitiveness and efficiency, and also in line with the Natural Resource-Based View (NRBV), where an organization's environmental strategy can be used as a strategic resource to positively impact environmental performance.

The results are consistent with the Dynamic Capability Theory, implying that true innovation breakthroughs occur among firms with high adaptive and reconfiguring skills. However, it is still important for PT. ETO to develop such skills.

Therefore, the general conclusion here is that the environmental strategy is being implemented effectively towards improving environmental performance, but the mediating effect is not significant with respect to Green Innovation. It is only when there is a synergetic mix between environmental strategies, green HR practices, and innovation systems that real success can be achieved in environmental performance. Hence, PT. ETO should focus more on improving its innovation system by empowering people and developing a culture that allows Green Innovation to effectively mediate towards improving environmental performance in the future and in line with the SDGs.

5. Conclusion

Based on the analysis and discussion that we have done, there are a few key findings that can be identified from this study

In fact, the impact of Green Human Resource Management (GHRM) on Environmental Performance (EP) is not direct. In other words, the implementation of green HR practices such as green recruiting, environmental training programs, performance evaluation with respect to the green factor, and reward systems for green behavior do not necessarily

enhance organizational environmental performance. This fact also supports the findings of various research studies [33,34] that the success of GHRM depends on the organizational culture, managers' support for GHRM implementation, and the ability of the firm to encourage green innovations.

Environmental Strategy (ES) has a positive impact on Environmental Performance (EP) to a significant extent. As indicated by the study, the adoption of a planned environmental strategy that is integrated into the organization's strategy has a positive impact on Environmental Performance. For example, the adoption of efficient waste management strategies, the adoption of renewable energy, and the use of green technology not only improve Environmental Performance but also enhance the competitiveness of the organization. This is supported by the views of sources [44, 45], which indicate that a good environmental strategy is essential for balancing economic and environmental performance.

Green Human Resource Management's (GHRM's) influence on Environmental Performance (EP) is mainly mediated by Green Innovation (GI) as a mediator or link between GHRM and EP. GHRM's contribution to improved environmental performance is not direct push but rather the energizing effect on GI as a link to EP. As GHRM is implemented in an organization through training programs, environmental awards, and environmental-friendly policies at the workplaceit influences employees' environmental awareness, their innovative capabilities, and their behavior towards environmental protection. This is consistent with research evidence [38, 41] indicating that GHRM can positively influence environmental performance by improving an organization's innovation capabilities.

Environmental Strategy (ES), however, does not have a significant impact on Environmental Performance (EP) through Green Innovation (GI) as a mediator. To summarize, ES helps to facilitate green innovation, but the indirect effect on environmental performance is not substantial enough to have a noticeable impact on the overall environmental performance of the organization. This might be due to the fact that green innovation might not have yet been integrated into the environmental strategy of the organization, as it is still being implemented incrementally on a day-to-day basis.

As such, the direct effect of Environmental Strategy on Environmental Performance seems to be greater than the mediated effect through green innovation. However, the study findings also suggest the importance of aligning environmental strategy with green HR policies to foster green innovation that can holistically improve the environmental performance of the organization.

Suggestions

Practical Advice

- PT. ETO can enhance the link between GHRM and sustainability plans. This will involve the development of visionary leadership, management commitment, and a green culture. GHRM will be concerned with the development of the competencies of employees, green innovation, performance measurement, and motivating employees to develop a green culture. With the incorporation of GHRM, green innovation, and green strategies, PT. ETO will enhance its Environmental Performance sustainably.
- In order to improve the sustainability rating of PT. ETO, it is also important to ensure that a planned and sustainable approach is integrated into the environmental strategy. It is not enough to simply comply with various environmental laws; the environment should be a key component of a business strategy. This includes waste management, using renewable energy sources, green technology, and using environmentally friendly processes in production. In this case, it becomes clear that the environmental strategy is a key component in ensuring that an adaptive, innovative, and competitive organization is developed.
- So, in order to enhance the effectiveness of green innovation as a bridge between HRM and Environmental Performance (EP), PT. ETO should focus more on Green Human Resource Management (GHRM). PT. ETO should foster innovation among employees through continuous environmental training, rewarding employees for their initiatives in the field of green innovation, and through work practices to foster green innovation. By utilizing the synergy effect of GHRM and green innovation, the company could achieve sustainable improvement in Environmental Performance (EP), thus gaining a competitive advantage in a world going towards sustainability.

Academic Advice

- Future research design for this topic is suggested to include the mediation or moderating variables of green organizational culture, top management's commitment to green issues, and sustainable leadership to enhance the understanding of the relationship between GHRM, green innovation, and environmental performance, [34].

- Future research design for this particular topic is also recommended to include a longitudinal research design to track the changes and the long-term effects of green innovation on environmental performance [1]. Long-term research analysis for this particular topic is more appropriate for assessing the effectiveness of sustainability strategies since the result of environmental innovations is a gradual process.
- It is also important to expand the scope of the research to various industries and geographical locations so that the results of the research could be generalized. As mentioned by [37] that the organizational setting and external environment also play an important role in ensuring the success of the implementation of green strategies. Therefore, the research carried out at various industries and geographical locations could be useful for the literature on sustainability management as well as for the formulation of international environmental policies.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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