

Entrepreneurship-Based Green Finance Model: Optimizing the Role of Regional-Owned Enterprises (BUMD) in Achieving Jakarta's Net Zero Emission 2060 Target

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Abstract

This study aims to examine and analyze the effects of willingness to innovate, proactive attitude, and risk-taking propensity on green finance and sustainability performance among Regional-Owned Enterprises (BUMD) in DKI Jakarta. The research employs a quantitative method using Structural Equation Modeling with Partial Least Squares (SEM-PLS) analysis, based on primary survey data collected from 23 BUMDs in Jakarta in 2025. The findings reveal that willingness to innovate and proactive attitude positively contribute to strengthening green finance; however, only the proactive attitude consistently enhances sustainability performance. Conversely, the willingness to take risks shows a negative effect on green finance and an insignificant impact on sustainability performance. Furthermore, green finance exerts a positive, though not yet significant, influence on sustainability performance. These findings underscore the need for operational strategies such as strengthening green innovation, establishing sustainability teams, implementing green risk management, and developing sustainability reports as integral components of transparent and accountable governance. Such strategies are essential to reinforce the strategic role of BUMDs in supporting the transition toward a green economy and achieving Jakarta's Net Zero Emission 2060 target.

Keywords

Green Finance, Innovativeness, Proactiveness, Risk-Taking, Sustainability Performance, BUMD

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1. INTRODUCTION

The global shift toward sustainability and carbon emission reduction has increasingly encouraged firms to integrate environmental considerations into their business strategies. Green finance has emerged as an important mechanism for aligning economic and environmental objectives by directing financial resources toward environmentally sustainable activities. Previous studies indicate that green finance can contribute to sustainable development by reducing carbon intensity, improving energy structures, enhancing productivity in high-polluting industries, strengthening corporate ESG performance, and supporting green technological innovation (Kwilinski et al., 2023; Zhang et al., 2022; Sun and Chen, 2022; Zhao et al., 2023; Xue et al., 2023; Feng et al., 2022).

This global development is particularly relevant to In-

donesia, which has committed to reducing greenhouse gas emissions and developing a low-carbon economy through the ratification of the Paris Agreement under Law No. 16 of 2016. The implementation of the Green Taxonomy by the Financial Services Authority (OJK), carbon trading policies, and Indonesia's Nationally Determined Contribution (NDC) further demonstrate the country's policy commitment to sustainable finance and the transition toward Net Zero Emission (NZE) by 2060. These developments require not only regulatory support but also stronger firm-level capabilities to integrate sustainability into strategic and financial decision-making.

Among internal organizational factors, Entrepreneurial Orientation (EO) provides an important foundation for understanding how firms respond to emerging sustainability opportunities. EO reflects organizational tendencies toward innovativeness, proactiveness, risk-taking, and com-

petitive aggressiveness (Covin and Lumpkin, 2011; Dickel and Eckardt, 2021). Prior research suggests that EO can stimulate innovation and long-term business development while creating opportunities for environmental value creation (Wiklund and Shepherd, 2005; Schaltegger and Wagner, 2011; Freudenreich et al., 2020). However, EO alone may not be sufficient to translate entrepreneurial capabilities into measurable sustainability outcomes. Financial mechanisms that support environmentally oriented investments may be necessary to connect entrepreneurial initiatives with sustainable performance.

This issue is particularly important for Regional-Owned Enterprises (BUMDs) in Jakarta, which play a strategic role in regional economic development and possess considerable potential to mobilize investment for sustainable infrastructure and services. Jakarta simultaneously faces urbanization, environmental degradation, and socioeconomic challenges, making the transformation of BUMDs increasingly important for achieving climate-resilient and inclusive development. Existing studies have examined green banking, capital structure, financial performance, and firm value, including within the BUMD context (Luvito et al., 2024). Other studies have highlighted the importance of innovative local financing mechanisms for sustainable development (Prabowo and Sartika, 2025). Nevertheless, the integration of entrepreneurial orientation and green finance as a mechanism for strengthening sustainability performance in BUMDs remains insufficiently explored.

The knowledge gap is further evident in the existing EO and Green Entrepreneurial Orientation (GEO) literature. Previous studies have primarily examined networking, strategy, organizational structure, organizational learning, performance, technology, operations, and product innovation as mechanisms linking entrepreneurial orientation to organizational outcomes (Wales et al., 2013; Amankwah and Sesen, 2021; Jiang et al., 2018; Fatoki, 2019). Although these studies provide important insights into the organizational and operational mechanisms underlying entrepreneurial orientation, the role of sustainable financial management, particularly green finance, as an integrative mechanism between entrepreneurial orientation and sustainability performance remains underexplored. This gap is particularly significant in the context of public-sector-related enterprises operating under regional sustainability and climate policy pressures.

This study introduces the Green Entrepreneurial Orientation Finance (GEOF) model. GEOF conceptualizes the integration of entrepreneurial orientation and green finance as a strategic mechanism for strengthening corporate sustainability performance. The model emphasizes the capacity of firms to pursue innovative and proactive environmental opportunities, assume calculated risks, and allocate financial resources toward activities that generate simultaneous economic, environmental, and social value (Prasetya, 2025). In this study, GEOF is positioned as a strategic framework for understanding how entrepreneurial capabilities can be

translated into sustainability outcomes through financial mechanisms.

The relevance of this framework is reinforced by the sustainability reporting practices of Jakarta's BUMDs. Publicly available corporate documents indicate that sustainability disclosure remains uneven, with some BUMDs providing separate sustainability reports, while others only incorporate limited sustainability information into annual or CSR reports. This condition suggests that the institutionalization of sustainability practices remains at different stages across BUMDs and highlights the need for stronger integration between organizational capabilities, financial innovation, and sustainability strategies.

This study aims to examine the relationship between entrepreneurial orientation, green finance, and sustainability performance and to develop a GEOF framework for BUMDs in Jakarta. The study specifically seeks to identify how entrepreneurial orientation can be translated into sustainability-oriented financial practices and how these practices contribute to long-term sustainability performance. The principal novelty lies in developing and empirically examining a GEOF framework tailored to the BUMD context, thereby connecting entrepreneurial orientation with green finance rather than treating them as separate dimensions of sustainability management. The framework is expected to provide both theoretical contributions to the sustainability and entrepreneurial orientation literature and practical implications for strengthening the strategic role of Jakarta's BUMDs in supporting the Jakarta Net Zero Emission 2060 agenda.

2. EXPERIMENTAL SECTION

2.1 Materials

This study was conducted within a positivist paradigm, employing an exploratory quantitative methodology characterized by logical reasoning, hypothesis formulation, and empirical verification. Primary survey data were collected from 23 regional government-owned enterprises (BUMDs) in DKI Jakarta. From the 23 regionally owned enterprises, 63 valid individuals were selected to be used as the units of analysis. The measurement of the research variables can be seen in Table 1.

2.2 Methods

The data in this study were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), a variance-based structural equation modeling approach designed to estimate complex relationships among latent constructs and their indicators. PLS-SEM was selected because the study emphasizes explanation and prediction, involves multiple latent variables, and employs a relatively complex conceptual framework linking Entrepreneurial Orientation, Green Finance, and Sustainability Performance. Compared with covariance-based SEM (CB-SEM), PLS-SEM is more suitable for prediction-oriented research and imposes fewer

Table 1. Measurement of Research Variables

Variable	Operational Definition	Dimension	Indicator
Sustainability Performance	The firm's ability to achieve long-term, continuous performance through efforts to maintain the economic, social, and environmental well-being of society (Triple Bottom Line – TBL).	- Environmental Performance - Social Performance - Economic Performance	- Commitment to legal compliance - Technological investment - Employee orientation - Community orientation - Financial growth - Financial responsibility and transparency - Shareholder and stakeholder value (<i>Formentini and Taticchi, 2016</i>)
Environmental Management Accounting (EMA)	A set of accounting methods and processes that collect, analyze, and communicate monetary and non-monetary environmental information for internal managerial use.	- Monetary - Physical	- Environmental costs - Environmental efficiency - Environmental regulations - Decision support - Environmental control - Environmental communication - Eco-friendly operations (<i>Burritt et al., 2002</i>)
Green Finance	Financial services provided to support economic activities that promote environmental improvement, climate change mitigation, and more efficient resource utilization.	- Economic - Environmental Improvement	- Green projects - Pollution prevention and control - Conservation and recycling - Climate change adaptation - Clean transportation - Clean energy (<i>Gilbert and Lihuan, 2012</i>)
Entrepreneurial Orientation (EO)	A multidimensional construct referring to a firm's strategic mindset and organizational culture that fosters entrepreneurial behaviors, including innovativeness, proactiveness, and risk-taking.	Innovativeness Proactiveness Risk-taking	- Pursuit of new ideas - Resource allocation for innovation - Experimentation and learning - Adaptability and flexibility - External collaboration (<i>Wang, 2008</i>) - Actively seeking opportunities - Taking initiative - Forward-thinking orientation (<i>Wang, 2008</i>) - Tolerance for failure - Speed of decision-making - Investment in research and development (<i>Wang, 2008</i>)

distributional assumptions, making it appropriate for empirical studies with non-normal data characteristics (*Hair et al., 2019; Sarstedt et al., 2022*). The analysis followed the two-stage procedure commonly recommended in PLS-SEM, consisting of measurement model (outer model) evaluation and structural model (inner model) evaluation (*Hair et al.,*

2019).

The analysis commenced with an evaluation of the measurement model to determine whether the latent variables demonstrated adequate reliability and validity. The quality of individual indicators was initially examined based on their outer loading coefficients. A loading of 0.70 or above is

generally regarded as evidence that an indicator provides a sufficiently strong representation of its underlying construct. Nevertheless, indicators showing lower loading values may still be maintained when their theoretical relevance is substantial and the construct continues to demonstrate satisfactory reliability (Hair et al., 2019). Convergent validity was subsequently assessed through the Average Variance Extracted (AVE). An AVE greater than 0.50 suggests that the latent construct accounts for more than 50% of the variance contained in its associated indicators. The consistency of the measurement items was further evaluated using Composite Reliability (CR) and Cronbach's Alpha. Coefficients above 0.70 are commonly interpreted as demonstrating an acceptable level of internal consistency (Hair et al., 2019; Sarstedt et al., 2022). The distinctiveness of the constructs was assessed through the Heterotrait–Monotrait (HTMT) ratio. This approach offers a more stringent assessment of discriminant validity than conventional procedures, including the Fornell–Larcker criterion and cross-loading analysis. When the HTMT coefficient remains below the prescribed threshold, it indicates that the constructs capture sufficiently different empirical concepts and can therefore be considered discriminant from one another (Henseler et al., 2015).

Once the measurement model had met the required quality criteria, the analysis proceeded to the structural model to determine whether the proposed theoretical relationships were supported by the empirical evidence. The model's explanatory capability was first evaluated through the coefficient of determination (R^2), which reflects the extent to which variations in an endogenous construct can be accounted for by its predictor constructs. Beyond explanatory power, the effect size (f^2) was considered to determine the practical contribution of individual predictors to the endogenous constructs. Predictive relevance was subsequently assessed using Stone–Geisser's Q^2 based on the blindfolding procedure (Hair et al., 2019). To provide additional evidence regarding predictive performance, the PLSpredict procedure was also considered. This procedure extends the assessment beyond in-sample explanatory power by examining the extent to which the PLS-SEM model can generate predictions for observations outside the estimation sample (Hair et al., 2019).

The significance of the hypothesized paths was assessed through bootstrapping, in which repeated resampling was used to obtain empirical estimates of standard errors and confidence intervals. Statistical support for a hypothesized relationship was established when the corresponding p-value was less than 0.05, representing a 95% confidence level. Nevertheless, statistical significance was not interpreted in isolation. The substantive meaning of each relationship was also determined by considering the sign and magnitude of the estimated path coefficient, thereby providing a more comprehensive interpretation of the empirical findings.

3. RESULTS AND DISCUSSION

The findings demonstrate that the Green Entrepreneurial Orientation Finance (GEOF) framework provides an integrated approach for explaining how entrepreneurial orientation can contribute to sustainability performance through green finance. The model incorporates innovativeness, proactiveness, and risk-taking as key dimensions of entrepreneurial orientation, while positioning green finance as a mediating mechanism between entrepreneurial capabilities and sustainability performance. This configuration extends previous research, which has generally examined organizational, technological, operational, or product related mechanisms in the relationship between entrepreneurial orientation and sustainability outcomes.

To position the present findings within the existing literature, Table 2 compares the main focus, mediating mechanisms, and research gaps identified in previous studies with the contribution of the present study.

The comparison in Table 2 indicates that previous studies have primarily emphasized organizational, technological, operational, and product-related mechanisms, whereas the present study introduces green finance as a sustainability oriented financial mechanism connecting entrepreneurial orientation with sustainability performance. This distinction represents the principal contribution of the GEOF framework. Rather than treating entrepreneurial orientation and green finance as independent aspects of sustainability management, the proposed framework integrates them into a strategic model that explains how entrepreneurial capabilities can be translated into sustainability-oriented financial practices.

The findings therefore extend the perspective of Wales et al. (2013), who identified several organizational mechanisms through which entrepreneurial orientation influences firm outcomes, by introducing green finance as a financial and sustainability-oriented mechanism. Similarly, the present findings complement research emphasizing technology, operations, and product innovation as mechanisms supporting green entrepreneurial outcomes (Amankwah and Sese, 2021; Jiang et al., 2018; Fatoki, 2019). In the context of Jakarta's BUMDs, the results suggest that entrepreneurial capabilities may generate stronger sustainability implications when accompanied by financial mechanisms capable of directing resources toward environmentally and socially responsible activities.

The conceptual model of Green Entrepreneurial Orientation Finance (GEOF) in the context of BUMDs illustrates both the direct and indirect effects of innovation (X1), proactiveness (X2), and risk-taking (X3) on sustainability performance (Z), with green finance (Y) serving as a mediating variable. This framework underscores the importance of integrating entrepreneurial behaviors with green financial practices to achieve superior sustainability outcomes. Table 3 presents the correlation coefficients among the variables.

Table 2. Comparison of Previous Studies and the Present GEOF Model

Study	Main Focus	Mediating/Explanatory Mechanism	Key Finding	Contribution of the Present Study
Wales et al. (2013)	Entrepreneurial Orientation (EO)	Networking, strategy, organizational structure, organizational learning, and performance	Identified major mediating mechanisms commonly examined in EO research.	Sustainability-oriented financial mechanisms were not specifically examined.
Amankwah and Sesen (2021)	Green Entrepreneurial Orientation (GEO)	Technology	Technology contributes to sustainability-oriented outcomes.	The role of green finance as a mechanism linking GEO and sustainability remains underexplored.
Jiang et al. (2018)	Green Entrepreneurial Orientation (GEO)	Operations	Operational capabilities contribute to sustainability performance.	Financial mechanisms were not a central component of the model.
Fatoki (2019)	Green Entrepreneurial Orientation (GEO)	Product innovation	Product-related innovation contributes to sustainability outcomes.	The integration of entrepreneurial orientation and sustainable finance was not addressed.
Present study	Green Entrepreneurial Orientation Finance (GEOF)	Green Finance	Green finance provides a financial mechanism linking entrepreneurial orientation with sustainability performance.	Extends previous research by integrating entrepreneurial orientation and green finance within the BUMD context.

Source: Authors' synthesis based on previous studies and the findings of the present study.

The correlation analysis indicates that innovation willingness has a positive and significant correlation with proactiveness (0.852). Innovation willingness also shows a positive but insignificant correlation with risk-taking (0.018). Moreover, innovation willingness demonstrates a positive and significant correlation with green finance (0.825), as well as with sustainability performance (0.863).

Additional findings reveal that proactiveness exhibits a negative and insignificant correlation with risk-taking (-0.083). Conversely, proactiveness shows a positive and significant correlation with green finance (0.807) and a positive and significant correlation with sustainability performance (0.887). Risk-taking is found to have a negative and insignificant correlation with green finance (-0.221) and likewise a negative and insignificant correlation with sustainability performance (-0.089). Meanwhile, green finance shows a positive and significant association with sustainability performance (0.833).

The CFA testing results for the innovative, proactive, risk-taking, green finance, and sustainable performance constructs all produced loading factor values greater than 0.5, indicating that the indicators used in these constructs are

convergently valid (the results of the analysis can be seen in Table 4). Furthermore, the results of the AVE, Composite Reliability, and Cronbach's Alpha analyses are presented in the following table: Based on the analysis results, the AVE values of all constructs are greater than 0.5, indicating that all constructs have good convergent validity, meaning that all indicators are sufficiently strong in representing their latent constructs. Furthermore, the CR values of all constructs are greater than 0.70, indicating that each construct has good internal reliability and is suitable for further analysis. This condition is reinforced by the test results showing that all constructs have Cronbach's Alpha values above 0.70. Therefore, all constructs are considered reliable because they demonstrate good internal consistency. The hypothesis testing results are presented in Table 5.

Table 5 shows that the effect of innovativeness on green finance has a regression coefficient (β) of 0.563 and a t-statistic of 4.951. The p-value (0.000) is smaller than the alpha level (0.05), indicating a statistically significant effect of innovativeness on green finance (H_0 rejected). The effect of innovativeness on sustainability performance shows a regression coefficient of 0.307 and a t-statistic of 1.929. The

Table 3. Correlation Coefficient Results

		Innovativeness	Proactiveness	Risk Taking	Green Finance	Sustainability Performance
Innovativeness	<i>Pearson Correlation</i>	1				
	<i>Sig. (2-tailed)</i>					
	<i>N</i>	63				
Proactiveness	<i>Pearson Correlation</i>	.852**	1			
	<i>Sig. (2-tailed)</i>	.000				
	<i>N</i>	63	63			
Risk Taking	<i>Pearson Correlation</i>	.018	-.083	1		
	<i>Sig. (2-tailed)</i>	.889	.519			
	<i>N</i>	63	63	63		
Green Finance	<i>Pearson Correlation</i>	.825**	.807**	-.221	1	
	<i>Sig. (2-tailed)</i>	.000	.000	.082		
	<i>N</i>	63	63	63	63	
Sustainability Performance	<i>Pearson Correlation</i>	.863*	.887**	-.089	.833**	1
	<i>Sig. (2-tailed)</i>	.000	.000	.486	.000	
	<i>N</i>	63	63	63	63	63

Table 4. Measurement Model Testing

	Cronbach's Alpha	rho_A	Composite Reliability (CR)	Average Variance Extracted (AVE)
Innovativeness	0.926	0.930	0.943	0.734
Proactiveness	0.935	0.937	0.949	0.755
Risk Taking	0.916	0.935	0.936	0.747
Green Finance	0.959	0.960	0.971	0.893
Sustainability Performance	0.917	0.918	0.937	0.750

Table 5. Summary of Hypothesis Testing Results

	Direct Effect		Estimate	S.E.	C.R.	p-Value	Conclusion
H1:Innovativeness	→	Green finance	0.563	0.114	4.951	0.000*	Accepted
H2:Innovativeness	→	Sustainability performance	0.307	0.159	1.929	0.054	Rejected
H3:Proactiveness	→	Green finance	0.308	0.118	2.607	0.009*	Accepted
H4:Proactiveness	→	Sustainability performance	0.465	0.163	2.849	0.005*	Accepted
H5:Risk taking	→	Green finance	-0.194	0.071	2.733	0.006*	Accepted
H6:Risk taking	→	Sustainability performance	-0.011	0.051	0.214	0.830	Rejected
H7:Green finance	→	Sustainability performance	0.198	0.116	1.703	0.089	Rejected
H8:Innovativeness →	Green finance →	Sustainability performance	0.111	0.070	1.600	0.110	Rejected
H9:Proactiveness →	Green finance →	Sustainability performance	0.061	0.045	1.359	0.175	Rejected
H10:Risk taking →	Green finance →	Sustainability performance	-0.038	0.030	1.285	0.199	Rejected

p -value (0.054) is greater than the alpha level, indicating that innovativeness does not have a statistically significant

effect on sustainability performance (H_0 accepted). The hypothesis testing for the effect of proactiveness on green fi-

nance shows a regression coefficient of 0.308 and a t-statistic of 2.607. The p -value (0.009) is smaller than alpha, indicating a statistically significant effect of proactiveness on green finance (H_0 rejected). The effect of proactiveness on sustainability performance has a regression coefficient of 0.465 and a t-statistic of 2.849. The p -value (0.005) is also smaller than alpha, indicating a statistically significant effect of proactiveness on sustainability performance (H_0 rejected).

The effect of risk-taking on green finance shows a regression coefficient of -0.194 and a t-statistic of 2.733. The p -value (0.006) is smaller than alpha, indicating a statistically significant effect of risk-taking on green finance (H_0 rejected). The effect of risk-taking on sustainability performance has a regression coefficient of -0.011 and a t-statistic of 0.214. The p -value (0.824) is greater than alpha, indicating that risk-taking does not have a statistically significant effect on sustainability performance (H_0 accepted). The effect of green finance on sustainability performance shows a regression coefficient of 0.198 and a t-statistic of 1.703. The p -value (0.089) is greater than the alpha level, indicating that green finance does not have a statistically significant effect on sustainability performance (H_0 accepted).

The test of the indirect effect of innovativeness on sustainability performance through green finance produced an estimated coefficient of 0.111, with a standard error of 0.070, a critical ratio (C.R.) of 1.600, and a p -value of 0.110. Since the p -value is greater than the 5% significance level, the indirect effect is not statistically significant. Therefore, H_8 is rejected, indicating that green finance does not significantly mediate the relationship between innovativeness and sustainability performance.

This finding is also consistent with the direct-effect results. Innovativeness has a positive and significant effect on green finance ($\beta = 0.563$; $p < 0.001$), but its direct effect on sustainability performance is positive but not statistically significant ($\beta = 0.307$; $p = 0.054$). In addition, the effect of green finance on sustainability performance is not statistically significant ($\beta = 0.198$; $p = 0.089$). As shown in the Figure 1, the insignificant indirect effect confirms that the proposed mediating role of green finance in the relationship between innovativeness and sustainability performance is not supported.

The test of the indirect effect of proactiveness on sustainability performance through green finance produced an estimated coefficient of 0.061, with a standard error of 0.045, a critical ratio (C.R.) of 1.359, and a p -value of 0.175. Because the p -value exceeds the 5% significance level, the indirect effect is not statistically significant. Therefore, H_9 is rejected, indicating that green finance does not significantly mediate the relationship between proactiveness and sustainability performance.

The direct effect results show that proactiveness has a positive and significant effect on green finance ($\beta = 0.308$; $p = 0.009$) and a positive and significant direct effect on

sustainability performance ($\beta = 0.465$; $p = 0.005$). Nevertheless, the indirect effect through green finance is not statistically significant. Thus, despite the significant direct relationships involving proactiveness, the evidence does not support green finance as a significant mediating mechanism between proactiveness and sustainability performance, as shown in the Figure 2.

The test of the indirect effect of risk-taking on sustainability performance through green finance produced an estimated coefficient of -0.038, with a standard error of 0.030, a critical ratio (C.R.) of 1.285, and a p -value of 0.199. Since the p -value is greater than the 5% significance level, the indirect effect is not statistically significant. Therefore, H_{10} is rejected, indicating that green finance does not significantly mediate the relationship between risk-taking and sustainability performance.

The direct effect results indicate that risk-taking has a negative and significant effect on green finance ($\beta = -0.194$; $p = 0.006$), whereas its direct effect on sustainability performance is negative but statistically insignificant ($\beta = -0.011$; $p = 0.830$). Furthermore, the effect of green finance on sustainability performance is statistically insignificant at the 5% level ($\beta = 0.198$; $p = 0.089$). The insignificant indirect effect therefore provides no empirical evidence that green finance functions as a mediator between risk-taking and sustainability performance, as illustrated in Figure 3.

3.1 Q-Square Relevance Test

The Stone Geisser Q^2 statistic was used to evaluate the predictive relevance of the endogenous constructs in the PLS-SEM model. A Q^2 value greater than zero indicates that the model has predictive relevance for the corresponding endogenous construct, meaning that the model demonstrates predictive capability beyond simply reproducing the observed data (Hair et al., 2019; Sarstedt et al., 2022). The Q^2 values obtained from the predictive relevance assessment are presented in Table 6.

As reported in Table 6, the Green Finance construct has a Q^2 value of 0.585, which is greater than zero, indicating that the structural model demonstrates predictive relevance for Green Finance. Similarly, Sustainability Performance has a Q^2 value of 0.612, also exceeding zero and confirming predictive relevance for this endogenous construct. The Q^2 value for Sustainability Performance is higher than that for Green Finance, indicating relatively stronger predictive relevance for Sustainability Performance within the estimated model. These results provide empirical support for the predictive relevance of the proposed structural model for both endogenous constructs.

The practical relevance of the structural relationships was further examined through the effect size (f^2). This measure indicates how strongly an exogenous construct contributes to the explanatory capability of an endogenous construct. The assessment is based on the change in the R^2 value that occurs when a specific predictor is excluded

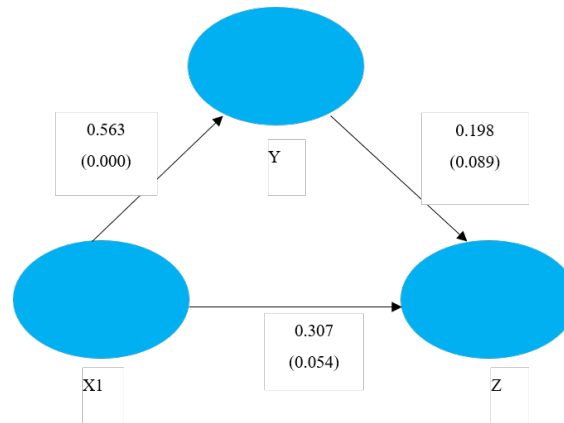


Figure 1. Non-Significant Mediation of Green Finance between Innovativeness and Sustainability Performance

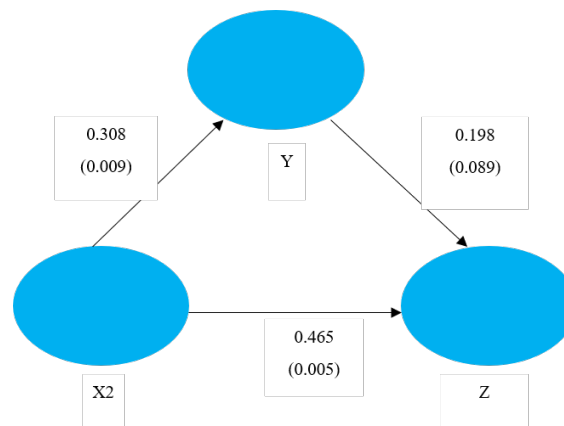


Figure 2. Non-Significant Mediation of Green Finance between Proactiveness and Sustainability Performance

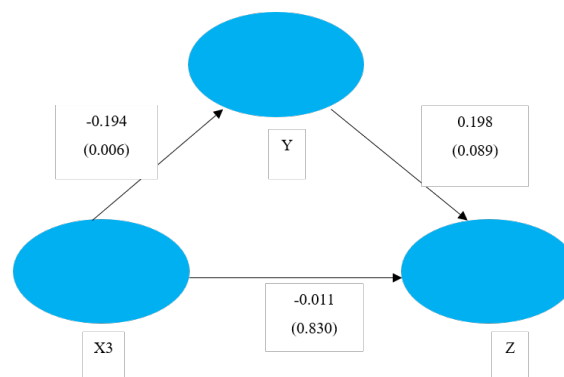


Figure 3. Non-Significant Mediation of Green Finance between Risk-Taking and Sustainability Performance

Table 6. Predictive Relevance (Q^2) of the Endogenous Constructs

Endogenous Construct	Q^2 Value	Predictive Relevance
Green Finance	0.585	Yes
Sustainability Performance	0.612	Yes

from the structural model. Consequently, f^2 complements hypothesis significance testing by showing whether a sta-

tistically supported relationship also makes a meaningful contribution to the model's explanatory performance. For the interpretation of the results, the commonly applied PLS-SEM benchmarks were adopted. An f^2 value of 0.02 represents a small effect, whereas values around 0.15 and 0.35 indicate medium and large effects, respectively. Values lower than 0.02 suggest that the predictor makes only a negligible contribution to the endogenous construct (Hair et al., 2019). The f^2 estimates obtained for the hypothesized structural relationships are reported in Table 7.

As shown in Table 7, Innovativeness has the largest effect on Green Finance, with an f^2 value of 0.341, indicating a relatively strong substantive contribution that approaches the threshold for a large effect. Risk Taking has an f^2 value of 0.149, indicating a small effect that is close to the medium-effect threshold, whereas Proactiveness has a smaller effect on Green Finance, with an f^2 value of 0.101.

3.2 Goodness-of-Fit Testing

The Goodness-of-Fit (GOF) test is used to determine whether the statistical model employed aligns with the actual distribution of the data. Figure 4 illustrates the structural model.

The results presented in Table 8 indicate that the Standardized Root Mean Square Residual (SRMR) serves as a measure of residual error within the model. A lower SRMR value (approaching zero) reflects a better fit between the model and the observed data. In this study, an SRMR value of 0.066 was obtained, which is considered acceptable. Indicating that the research model has a good goodness of fit. This shows that the model is able to represent the empirical data well. The Delta Unweighted Least Squares (d_ULS) assesses the discrepancy between the theoretical covariance matrix generated by the model and the empirical covariance matrix derived from the data. Lower d_ULS values indicate better model fit. The model produced a d_ULS value of 1.518, which suggests a reasonably good level of fit. Gamma Hat (d_G) represents a similar measure to d_ULS, where lower values also indicate stronger model fit. The obtained d_G value of 1.923 demonstrates a relatively high level of model adequacy.

The model evaluation using the Chi-square (χ^2) statistic assesses whether the estimated model adequately fits the data. The obtained Chi-square value of approximately 514.325 indicates that the model exhibits a relatively poor fit to the data. The Normed Fit Index (NFI) measures the extent to which the model represents the data more effectively than a null model (i.e., a model with no relationships among variables). NFI values range between 0 and 1, with higher values indicating better model fit. The analysis produced an NFI value of 0.755, suggesting that the model demonstrates an acceptable level of fit in representing the data.

Furthermore, to avoid potential bias, testing was conducted using the full collinearity VIF approach, and the

results are presented in the following Table 9.

The test results indicate that all predictor variables have VIF values below 5. Therefore, the research model is free from multicollinearity problems in the structural model.

3.3 Robustness Test

To examine the stability of the empirical findings, a robustness analysis was performed by substituting the Green Finance construct with Environmental Management Accounting (EMA) as an alternative explanatory variable. The use of EMA as a robustness proxy is theoretically justified by its potential contribution to corporate sustainability outcomes. Firms that systematically incorporate environmental considerations into their accounting and reporting processes are better positioned to monitor environmental costs, evaluate resource utilization, and integrate environmental information into managerial decision-making.

Through the application of EMA, organizations can obtain more comprehensive information regarding environmental expenditures and operational impacts. Such information may support efforts to minimize waste, improve the efficiency of resource utilization, control operational costs over the longer term, and facilitate compliance with applicable environmental requirements. In addition, more transparent environmental management may contribute to corporate reputation and competitive positioning. Accordingly, EMA provides a theoretically relevant alternative specification for examining whether the relationship between environmental-oriented financial practices and sustainability performance remains consistent under a different measurement approach. The results of the robustness analysis based on the EMA specification are presented in Table 10.

The robustness test results show that the SRMR value is 0.071, indicating that the model overall fits the observed data. The Chi-square value of 398.333 suggests that a relatively high Chi-square value reflects remaining discrepancies between the observed data and the expected model. Meanwhile, the Normed Fit Index (NFI) value of 0.750 indicates that the statistical model demonstrates a reasonably high level of fit with the data. Overall, based on these indices, it can be concluded that the statistical model exhibits an acceptable level of fit with the observed data, thereby confirming that the results remain robust.

In response to the increasing demands for sustainable development, Regional Government-Owned Enterprises (BUMDs) in DKI Jakarta are expected not only to pursue economic objectives but also to demonstrate measurable contributions to social welfare and environmental sustainability. Within this context, sustainability performance becomes a multi-dimensional construct shaped by organizational strategic orientations and supporting financial mechanisms. Drawing upon the entrepreneurial orientation perspective and sustainability transition theory, this study examines how innovativeness, proactiveness, and risk-taking as dimensions of Green Entrepreneurial Orientation influence sustainability

Table 7. Effect Size (f^2) of Exogenous Constructs on Endogenous Constructs

Exogenous Construct	Green Finance (f^2)	Effect Interpretation	Sustainability Performance (f^2)	Effect Interpretation
Innovativeness	0.341	Medium effect	0.118	Small effect
Proactiveness	0.101	Small effect	0.329	Medium effect
Risk Taking	0.149	Small effect	0.001	Negligible effect
Green Finance	—	—	0.062	Small effect

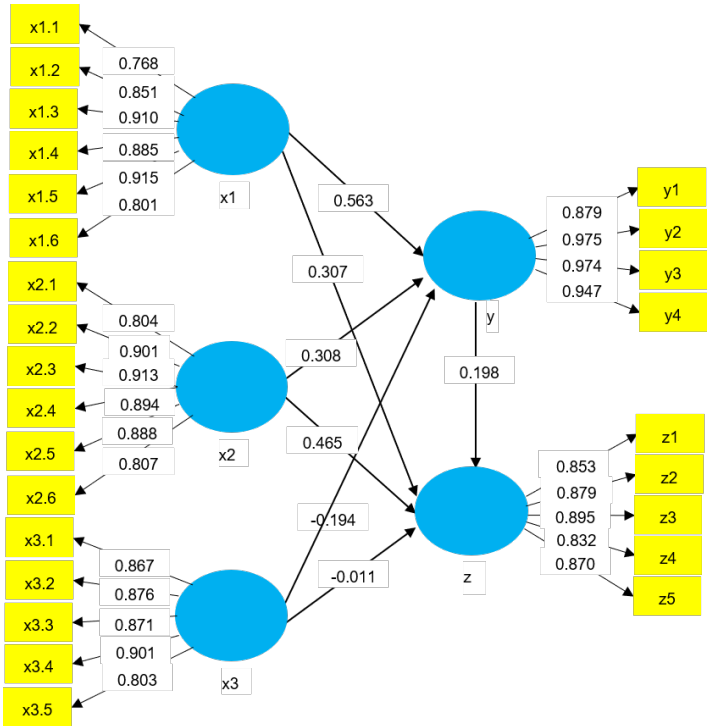


Figure 4. Structural Model

Table 8. Goodness of Fit Model Test

	Saturated Model	Estimated Model
SRMR	0.066	0.066
d_ ULS	1.518	1.518
d_ G	1.923	1.923
Chi-Square	514.325	514.325
NFI	0.755	0.755

Table 9. Collinearity Statistics (VIF) Values

	Green Finance	Sustainability Performance
Innovativeness	3.819	4.722
Proactiveness	3.860	4.251
Risk Taking	1.043	1.199
Green Finance		4.116
Sustainability Performance		

performance, both directly and through the mediating role of green finance. The importance of integrating organizational orientation with sustainability mechanisms has increasingly been emphasized in sustainability and governance literature, particularly in emerging economies and public-sector organizations (Prasetya, 2025; Putri et al., 2026).

The findings reveal that innovativeness has a positive but statistically unaccepted effect on sustainability performance. Although BUMDs that encourage experimentation, technological adaptation, and new service models tend to show better sustainability outcomes, the effect remains insufficiently strong to generate a statistically significant impact. From a theoretical perspective, this finding suggests that innovativeness alone may not be adequate to drive sustainability outcomes unless supported by institutional readiness and implementation capacity. Consistent with the resource-based view and eco-innovation theory, innovativeness can enhance organizational competitiveness by improving resource efficiency and reducing environmental externalities

Table 10. Robustness Test Results of the Structural Model

Direct Effect			<i>Estimate</i>	<i>S.E.</i>	<i>C.R.</i>	<i>p-Value</i>	Conclusion
Innovativeness	→	EMA	0.413	0.160	2.579	0.010*	Accepted
Innovativeness	→	Sustainability performance	0.060	0.185	0.325	0.745	Rejected
Proactiveness	→	EMA	0.457	0.170	2.680	0.008*	Accepted
Proactiveness	→	Sustainability performance	0.584	0.184	3.178	0.002*	Accepted
Risk taking	→	EMA	-0.047	0.056	0.847	0.397	Accepted
Risk taking	→	Sustainability performance	-0.053	0.166	0.319	0.750	Rejected
EMA	→	Sustainability performance	0.117	0.079	1.437	0.141	Rejected
<i>SRMR</i>			0.071				
<i>Chi-Square</i>			398.333				
<i>NFI</i>			0.750				

through cleaner technologies, circular business practices, and sustainable operational systems (De Marchi, 2012). As emphasized by De Marchi (2012), innovative capabilities enable organizations to adopt environmentally responsible solutions that contribute to long-term sustainability. In the context of BUMDs, innovativeness may manifest in public service digitalization, smart utility systems, or renewable energy utilization. However, the statistically unaccepted effect indicates the presence of institutional barriers such as budget limitations, fragmented governance structures, and insufficient technical expertise that prevent innovation from being systematically translated into sustainability outcomes. This finding contributes theoretically by suggesting that within public-sector enterprises, innovativeness requires organizational and policy alignment before it can significantly influence sustainability performance, particularly in organizations where sustainability financing systems remain underdeveloped (Prasetya, 2025).

Proactiveness demonstrates a strong and statistically accepted influence on both green finance and sustainability performance, making it the most dominant dimension of Green Entrepreneurial Orientation in this study. This finding reinforces strategic management theory, which argues that organizations capable of anticipating environmental change and responding ahead of competitors tend to achieve superior long-term performance. Proactive BUMDs appear more capable of identifying sustainability-related opportunities, securing environmentally oriented financing, and aligning their strategic initiatives with regional sustainability agendas established by the Jakarta Provincial Government. In line with Al Hubaishi (2023), proactive organizations possess stronger adaptive capacities to environmental uncertainty and sustainability risks. Theoretically, proactiveness reflects the internalization of ESG-oriented governance practices that encourage strategic partnerships, improve institutional legitimacy, and strengthen stakeholder trust. Previous stud-

ies have also highlighted the importance of governance and leadership in improving sustainability-oriented financing systems and organizational performance (Prasetya, 2025). Interestingly, this study finds that green finance does not mediate the relationship between proactiveness and sustainability performance. This result suggests that proactive organizational behavior contributes directly to sustainability outcomes, independent of the maturity of green financial mechanisms. Conceptually, this finding advances the GEO model by indicating that strategic orientation may exert stronger direct effects than financial enablers within public-sector sustainability transitions.

Regarding risk-taking, the findings indicate a negative influence on both green finance and sustainability performance, although the effect on sustainability performance is statistically unaccepted. This result provides an important theoretical insight into the unique characteristics of BUMDs, which operate within a highly regulated public-sector environment where excessive risk exposure may conflict with institutional accountability and public legitimacy. While entrepreneurial orientation theory generally views calculated risk-taking as beneficial for innovation and growth, sustainability-oriented organizations require a balance between experimentation and governance stability. As argued by He et al. (2023), aggressive strategic behavior may undermine sustainability objectives when environmental projects face technological uncertainty or regulatory ambiguity. Similarly, Wheelen and Hunger (2012) emphasize that high-risk organizational decisions without sufficient managerial control can weaken long-term strategic commitments, including investments in sustainable financing instruments. This finding is also consistent with Prasetya (2025), who demonstrate that risk-taking behavior may weaken the effectiveness of green finance when not accompanied by adequate governance and sustainability alignment. Thus, this study highlights that in the BUMD context, risk-taking should be inter-

preted as strategic and controlled risk management rather than aggressive uncertainty-seeking behavior. This finding enriches green entrepreneurship literature by emphasizing contextual differences between private entrepreneurial firms and publicly governed organizations.

With respect to green finance, the findings indicate a positive but statistically unaccepted effect on sustainability performance. This result suggests that green finance within BUMDs in DKI Jakarta remains relatively underdeveloped and may function more as an administrative or symbolic commitment rather than an effective financing instrument capable of generating measurable sustainability outcomes. From an institutional theory perspective, organizations may adopt sustainability-related financial practices primarily to gain legitimacy without fully embedding them operationally. According to [Höhne et al. \(2012\)](#), green finance possesses substantial potential to accelerate sustainability transitions through investments in renewable energy, clean transportation, efficient water systems, and emissions reduction, provided that governance quality, transparency, and ESG integration are sufficiently robust. This condition may also be associated with the heterogeneity of sustainability disclosure practices among BUMDs in DKI Jakarta, reflecting different levels of institutional readiness and sustainability reporting maturity. In this study, BUMDs were classified into three categories: those issuing a separate sustainability report, those disclosing sustainability information within annual reports or CSR/TJSL reports, and those with no detectable sustainability reporting. Such classification is academically justified because not all BUMDs are formally required to publish standalone sustainability reports, resulting in sustainability-related disclosures often being fragmented across annual reports, corporate websites, and social responsibility documents. Consequently, differences in the quality, consistency, and comprehensiveness of sustainability disclosures may partially explain the statistically unaccepted contribution of green finance to sustainability performance. BUMDs with more structured sustainability reporting are likely to possess stronger ESG integration, greater transparency, and better organizational capacity to transform green financial initiatives into measurable sustainability outcomes, whereas organizations with limited sustainability disclosures may experience implementation gaps despite having sustainability intentions. This finding indicates that sustainability reporting maturity may function as an enabling institutional condition in strengthening the effectiveness of green finance within public-sector organizations. However, the absence of significant mediation effects in this study demonstrates that green finance does not yet effectively bridge the relationship between Green Entrepreneurial Orientation dimensions and sustainability performance. This finding is supported by [Prasetya \(2025\)](#), who argues that green finance implementation in Indonesia remains multidimensional and institutionally fragmented, reducing its effectiveness in organizational sustainability

transformation. Furthermore, sustainability governance and climate-oriented responsibility have also been recognized as important antecedents for improving organizational sustainability outcomes ([Putri et al., 2026](#)). This finding indicates the existence of a structural gap between internal organizational readiness and the external green financing ecosystem, including regulatory frameworks, financing accessibility, reporting mechanisms, and institutional support.

This study contributes conceptually by strengthening the Green Entrepreneurial Orientation Framework (GEOF) within the context of public-sector enterprises. The findings demonstrate that not all entrepreneurial orientation dimensions contribute equally to sustainability performance. Proactiveness emerges as the strongest predictor, while innovativeness and risk-taking appear contingent upon institutional readiness and governance quality. Furthermore, the limited mediating role of green finance suggests that sustainability performance in BUMDs depends not only on financial instruments but also on organizational capability, policy alignment, and institutional support systems. Consequently, this study extends the sustainability performance and green entrepreneurship literature by providing empirical evidence from Regional Government-Owned Enterprises, a context that remains underexplored compared to private-sector organizations, while highlighting the importance of contextualizing entrepreneurial orientation within public governance environments and strengthening sustainability governance mechanisms ([Prasetya, 2025](#); [Putri et al., 2026](#)).

4. CONCLUSIONS

This study finds that innovativeness and proactiveness positively strengthen green finance, while only proactiveness has a statistically significant direct effect on sustainability performance. Risk-taking has a statistically significant negative effect on green finance but no statistically significant effect on sustainability performance, while green finance itself has a positive but statistically insignificant effect on sustainability performance. The indirect effects of innovativeness, proactiveness, and risk-taking on sustainability performance through green finance are also statistically insignificant. Overall, the findings indicate that strengthening proactiveness and innovation, together with more structured green-finance governance, is more important for advancing sustainability performance among Jakarta BUMDs than relying on higher risk-taking.

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