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Responsible Innovation Practices, Green Human Resource Management, and Organizational Sustainability in Indonesia's Public Sector

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Abstract: Organizational sustainability has become a strategic priority for public-sector organizations, yet empirical evidence explaining how Responsible Innovation Practices (RIP) enhance sustainability through Green Human Resource Management (GHRM) remains limited, particularly in developing countries. This study analyzes the direct and indirect associations among RIP, GHRM, and Organizational Sustainability (OS) in the Indonesian public sector. To achieve this objective, the study adopted a quantitative explanatory research design and used survey responses from 300 civil servants and managers employed by the Provincial Government of Gorontalo. Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings show that Responsible Innovation Practices positively affect Green Human Resource Management and Organizational Sustainability. Furthermore, Green Human Resource Management significantly improves Organizational Sustainability while partially mediating the influence of Responsible Innovation Practices on sustainability outcomes. These findings extend Responsible Innovation Theory by demonstrating that the effectiveness of responsible innovation depends on organizational capabilities embedded in sustainability-oriented human resource practices. The study also supports Stakeholder Theory, the Ability-Motivation-Opportunity (AMO) framework, and the Natural Resource-Based View (NRBV) in explaining sustainability transformation in public-sector organizations. Practically, public institutions should integrate responsible innovation with sustainability-oriented human resource management to strengthen long-term organizational sustainability.

Keywords: *Responsible Innovation Practices, Green Human Resource Management, Organizational Sustainability, Public Sector, Sustainability Governance.*

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INTRODUCTION

The pursuit of organizational sustainability has become an increasingly important agenda for public institutions as governments are expected to respond simultaneously to environmental challenges, social expectations, and demands for accountable governance. Rather than being confined to environmental protection alone, sustainability is now understood as an organizational capability that enables institutions to preserve environmental integrity, generate social value, and maintain institutional resilience over time while continuing to deliver effective public services (Nonet et al., 2022; Valentinov, 2023). This broader perspective has shifted attention from isolated environmental initiatives to organizational systems that can consistently integrate sustainability into strategic and operational decision-making.

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Within this evolving landscape, Responsible Innovation Practices (RIP) have attracted growing scholarly attention because they encourage organizations to consider the broader consequences of innovation beyond technological or economic outcomes. Responsible Innovation Theory proposes that innovation should be developed through anticipatory thinking, stakeholder inclusion, reflexive evaluation, and responsiveness to societal concerns (Stilgoe et al., 2013). Consequently, innovation is no longer viewed merely as a mechanism for improving efficiency but also as a governance process that incorporates ethical reflection, environmental responsibility, and long-term public interests. Recent studies further suggest that organizations embedding these principles into innovation activities are better positioned to create sustainable value while strengthening organizational legitimacy and stakeholder confidence (Braun & Starkbaum, 2023; Lubberink et al., 2017; Lukkien et al., 2024). These considerations are particularly relevant in public-sector organizations, where innovation outcomes are closely tied to public trust, accountability, and institutional credibility (Bernal-Hernández et al., 2025; Biegelbauer et al., 2025).

The growing relevance of responsible innovation is equally evident in contemporary sustainability governance. Public policies increasingly encourage organizations to ensure that technological advancement is accompanied by environmental stewardship, ethical responsibility, and transparent decision-making processes (Brás & Robaina, 2024). Likewise, the World Economic Forum (2025) identifies responsible innovation as an essential governance capability for addressing complex sustainability challenges while enhancing institutional resilience. Collectively, these developments indicate that responsible innovation is evolving from a desirable organizational attribute into a strategic capability that supports long-term sustainability across public institutions.

Green Human Resource Management (GHRM) is widely recognized as a management approach that encourages integrating sustainability principles into employees' daily responsibilities and organizational processes. Rather than functioning solely as a human resource strategy, GHRM integrates environmental considerations throughout the employee lifecycle, encompassing recruitment, capability development, performance evaluation, reward systems, and opportunities for employee participation (Ahmad et al., 2025; Chowdhury et al., 2025). Through these practices, organizations cultivate environmental competencies while encouraging employees to contribute to sustainability objectives actively. Empirical evidence consistently indicates that GHRM strengthens pro-environmental behavior, reinforces sustainability-oriented organizational culture, and facilitates the institutionalization of sustainable practices across organizational functions (Fang et al., 2022; Liu et al., 2023; Papademetriou et al., 2025).

The contribution of GHRM extends beyond improving employees' environmental awareness. An expanding body of research demonstrates that environmentally oriented human resource practices stimulate green innovation, reinforce employees' commitment to sustainability, and enhance organizational capabilities that support long-term sustainable performance (Awwad Al-Shammari et al., 2022; Lawter & Garnjost, 2025). Furthermore, investments in green intellectual capital generated through GHRM enable organizations to build valuable strategic resources that strengthen environmental performance while improving organizational resilience and competitiveness over time (Yong et al., 2019). These findings suggest that GHRM is not merely an administrative

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function but a strategic capability that embeds sustainability initiatives within organizational systems.

The growing body of research on sustainability-oriented management has provided valuable findings, yet several key issues are still unresolved. Previous studies have generally focused on *Responsible Innovation Practices* (RIP) and *Green Human Resource Management* (GHRM) as independent predictors of *Organizational Sustainability*. Consequently, little attention has been given to understanding how responsible innovation is transformed into sustainable organizational outcomes through internal management mechanisms. Although GHRM has frequently been acknowledged as a sustainability-oriented management approach, empirical evidence regarding its mediating role between responsible innovation and organizational sustainability remains relatively scarce. This limitation is particularly evident in public-sector research, where most prior studies focus on private firms and manufacturing industries despite the unique institutional environment faced by public organizations, including bureaucratic governance, regulatory complexity, and accountability to multiple stakeholder groups (Senapathi & Strode, 2025; Tessema, 2025).

Indonesia offers a particularly relevant setting for examining these unresolved issues. In recent years, public-sector reform has increasingly emphasized sustainable governance to improve institutional accountability, environmental stewardship, and the quality of public service delivery. Even so, the extent to which sustainability principles have been embedded across public organizations remains uneven, largely because institutions differ in their organizational capabilities, managerial preparedness, and capacity to implement innovation. Against this background, investigating how Responsible Innovation Practices translate into Organizational Sustainability through Green Human Resource Management offers an opportunity to understand better the organizational processes that support adaptive and sustainable public governance.

This study develops an integrated conceptual framework to explain these relationships by drawing on *Responsible Innovation Theory*, *Stakeholder Theory*, the *Ability–Motivation–Opportunity* (AMO) framework, and the *Natural Resource-Based View* (NRBV). Within this framework, *Responsible Innovation Theory* explains why organizations seek innovation that balances ethical, social, and environmental considerations (Stilgoe et al., 2013). Stakeholder Theory complements this perspective by emphasizing that organizational decisions are shaped by the expectations and demands of multiple stakeholder groups (Nonet et al., 2022; Valentinov, 2023). Building upon these perspectives, the AMO framework explains how Green Human Resource Management enhances employees' environmental competencies, motivation, and opportunities to engage in sustainability-oriented practices (Bos-Nehles et al., 2023). From a strategic perspective, the NRBV further suggests that these organizational capabilities evolve into valuable resources that strengthen long-term Organizational Sustainability (Li et al., 2024; Zihan & Makhbul, 2024). Collectively, these theoretical perspectives position Green Human Resource Management as the organizational mechanism through which responsible innovation is transformed into sustainable organizational outcomes.

Building on the identified research gaps and the integrated theoretical perspective, this study investigates how *Responsible Innovation Practices* (RIP), *Green Human Resource Management* (GHRM), and *Organizational Sustainability* (OS) are related in the context of Indonesia's public sector. The study specifically examines whether *Responsible Innovation Practices* directly influence *Green Human Resource Management* and *Organizational*

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Sustainability. It further assesses the impact of *Green Human Resource Management* on *Organizational Sustainability* while examining its role as a mediator that links responsible innovation to sustainable organizational performance.

The findings of this study contribute to the sustainability and public management literature in three key ways. The first contribution is an integrated theoretical model that synthesizes *Responsible Innovation Theory*, *Stakeholder Theory*, the *Ability–Motivation–Opportunity* (AMO) framework, and the *Natural Resource-Based View* (NRBV) into a comprehensive framework explaining the link between responsible innovation and organizational sustainability. Second, this research expands previous empirical studies by assessing the mediating function of *Green Human Resource Management* (GHRM). As a result, it provides a clearer understanding of how internal organizational processes connect innovation with sustainability outcomes. Third, this study focuses on public-sector organizations in Indonesia, extending previous empirical research that has mainly concentrated on the private sector. In addition, it offers practical insights for policymakers and public managers interested in promoting sustainability through responsible innovation and green human resource practices.

Overall, the literature consistently indicates that Responsible Innovation Practices establish the strategic direction required for sustainability. In contrast, Green Human Resource Management operationalizes that direction by cultivating employees' environmental competencies and sustainability-oriented behaviors. Nevertheless, empirical evidence explaining this organizational pathway remains relatively limited, particularly in public-sector institutions. Addressing this gap is expected to strengthen both theoretical understanding and practical approaches to sustainability-oriented governance.

RESEARCH METHODS

Research Design

This study used a quantitative explanatory approach to analyze the relationships between *Responsible Innovation Practices* (RIP), *Green Human Resource Management* (GHRM), and *Organizational Sustainability* (OS) within Indonesia's public sector. The primary objective was to empirically evaluate the proposed structural relationships while determining whether Green Human Resource Management functions as a mediating mechanism through which Responsible Innovation Practices contribute to Organizational Sustainability.

The proposed research framework integrates Responsible Innovation Theory, Stakeholder Theory, the Ability–Motivation–Opportunity (AMO) framework, and the Natural Resource-Based View (NRBV). Within the proposed research model, *Responsible Innovation Practices* (RIP) function as the exogenous construct, while *Green Human Resource Management* (GHRM) serves as the mediating construct and *Organizational Sustainability* (OS) acts as the endogenous construct. This model enables the simultaneous assessment of direct and indirect relationships between the variables.

To examine the proposed conceptual model, the study applied *Partial Least Squares Structural Equation Modeling* (PLS-SEM) using SmartPLS 4. This technique was considered suitable because it can effectively analyze models with multiple latent variables, mediating effects, and prediction-based objectives. It also allows simultaneous evaluation of measurement validity and estimation of structural relationships within the same analytical framework (Hair et al., 2021).

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Research Context and Population

The empirical investigation was conducted within the Provincial Government of Gorontalo, Indonesia. This institutional setting was selected because provincial government agencies have increasingly incorporated bureaucratic reform, organizational accountability, and sustainability-oriented governance into their strategic agenda. Consequently, the context provides an appropriate environment for examining how responsible innovation and environmentally oriented human resource practices contribute to organizational sustainability.

The study population consisted of civil servants and managerial personnel employed across government agencies under the Provincial Government of Gorontalo. These employees were considered suitable respondents because they actively participate in implementing organizational policies, human resource management practices, innovation initiatives, and sustainability-related programs. Accordingly, individual employees served as the unit of analysis, as the study focused on their perceptions of Responsible Innovation Practices, Green Human Resource Management, and Organizational Sustainability within their respective organizations.

Sampling Technique and Respondents

A proportionate stratified random sampling technique was adopted to ensure that respondents from different government agencies and employee categories were represented in proportion to their distribution. Given the organizational diversity and functional heterogeneity of public institutions, this sampling approach was considered appropriate for improving representativeness while minimizing sampling bias.

After completing the data screening process, 300 valid questionnaires remained for analysis. This sample size met and exceeded the recommended minimum for *PLS-SEM*, allowing the proposed structural model to be estimated and the hypothesized relationships to be tested with sufficient statistical power (Hair et al., 2021)

To describe the sample characteristics, demographic information, including gender, age, educational attainment, organizational position, and years of service, was collected from all respondents. A detailed summary of these characteristics is presented in the Results section.

Data Collection Method

Primary data were obtained through a structured questionnaire distributed to civil servants and managerial officials working within government agencies of the Provincial Government of Gorontalo, Indonesia. Data collection was carried out between February and April 2026 using a combination of face-to-face distribution and online survey administration. Before responding to the questionnaire, participants were informed about the research objectives, and participation was voluntary. Throughout data collection, the confidentiality and anonymity of respondents were protected to promote honest and objective responses.

Each construct in this study was measured using a five-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The questionnaire items were adapted from established and validated measurement scales reported in previous studies and modified to suit the context of Indonesian public-sector organizations without changing the underlying meaning of the constructs.

Since all study variables were collected through self-reported questionnaires, the researchers implemented several procedural strategies to reduce the potential for

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common method bias (Podsakoff et al., 2003). Questionnaire items were written in clear, straightforward language, and indicators representing different constructs were organized separately to discourage respondents from inferring causal relationships while completing the questionnaire. These procedural safeguards were incorporated to improve response quality and reduce potential bias associated with the data collection method.

Measurement of Variables

Responsible Innovation Practices

Responsible Innovation Practices were measured using indicators related to anticipation, inclusion, reflexivity, and responsiveness. The measurement items were adapted from previous responsible innovation studies (Lubberink et al., 2017; Lukkien et al., 2024; Stilgoe et al., 2013). These indicators reflected the extent to which organizations integrate ethical, social, and environmental considerations into innovation and governance practices.

Green Human Resource Management

The measurement of *Green Human Resource Management* (GHRM) included indicators related to green recruitment, environmental training, green performance appraisal, green reward systems, and employee participation. The questionnaire items were adapted from earlier GHRM research (Ahmad et al., 2025; Chowdhury et al., 2025; Fang et al., 2022). Together, these indicators describe the incorporation of environmental sustainability principles into human resource management practices.

Organizational Sustainability

Organizational sustainability was measured using indicators related to environmental, institutional, and social sustainability. The measurement items were adapted from sustainability and organizational capability studies (Li et al., 2024; Pratiwi et al., 2025; Zihan & Makhbul, 2024a). These indicators reflected the organization's capability to maintain sustainability-oriented governance and long-term institutional effectiveness.

Table 1. Measurement Instrument

Construct	Dimension	Indicator Code	Description	Sources
Responsible Innovation Practices (RIP)	Anticipation	RIP1	The organization's ability to anticipate the potential social and environmental consequences of innovation.	(Lubberink et al., 2017; Lukkien et al., 2024; Stilgoe et al., 2013)
	Inclusion	RIP2	The involvement of relevant stakeholders in organizational innovation processes.	(Lubberink et al., 2017; Lukkien et al., 2024; Stilgoe et al., 2013)
	Reflexivity	RIP3	The organization's capability to critically reflect on the ethical and societal implications of innovation.	(Lubberink et al., 2017; Lukkien et al., 2024; Stilgoe et al., 2013)
	Responsiveness	RIP4	The organization's responsiveness in adapting innovation	(Lubberink et al., 2017; Lukkien et

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Construct	Dimension	Indicator Code	Description	Sources
			according to stakeholder expectations and sustainability challenges.	al., 2024; Stilgoe et al., 2013)
Green Human Resource Management (GHRM)	Green Recruitment	GHRM1	Environmental sustainability considerations are integrated into employee recruitment and selection.	(Ahmad et al., 2025; Chowdhury et al., 2025; Fang et al., 2022)
	Environmental Training	GHRM2	Employees receive environmental education and sustainability-related training.	(Ahmad et al., 2025; Chowdhury et al., 2025; Fang et al., 2022)
	Green Performance Appraisal	GHRM3	Employee performance evaluations incorporate environmental performance criteria.	(Ahmad et al., 2025; Chowdhury et al., 2025; Fang et al., 2022)
	Employee Participation in Environmental Management*	GHRM4	Employees are encouraged to participate actively in environmental and sustainability initiatives.	(Ahmad et al., 2025; Chowdhury et al., 2025; Fang et al., 2022)
Organizational Sustainability (OS)	Environmental Sustainability	OS1	The organization continuously improves its environmental sustainability performance.	(Li et al., 2024; Pratiwi et al., 2025; Zihan & Makhbul, 2024)
	Institutional Sustainability	OS2	The organization maintains long-term institutional effectiveness and governance resilience.	(Li et al., 2024; Pratiwi et al., 2025; Zihan & Makhbul, 2024)
	Social Sustainability	OS3	The organization creates sustainable social value through responsible governance and public service.	(Li et al., 2024; Pratiwi et al., 2025; Zihan & Makhbul, 2024)

Note: All constructs were measured using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Measurement items were adapted from previously validated instruments and contextualized for the Indonesian public-sector setting.

Instrument Validity and Reliability

The measurement model was evaluated following standard guidelines for reflective constructs in *PLS-SEM*. Indicator reliability was initially examined through outer loading values, with standardized loadings of at least 0.70 indicating satisfactory reliability. Indicators with loadings slightly below this threshold were kept only when they helped preserve construct validity and theoretical consistency.

Internal consistency reliability was evaluated using both Cronbach's Alpha and Composite Reliability (CR). A value above the recommended threshold of 0.70 indicates that the measurement scales consistently capture the intended latent constructs. In this

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study, *Composite Reliability* was regarded as the main measure of internal consistency because it accounts for differences in indicator loadings.

Convergent validity was assessed using the *Average Variance Extracted* (AVE). An AVE value greater than 0.50 showed that each construct accounted for more than 50 percent of the variance in its indicators. To evaluate *discriminant validity*, the *Heterotrait–Monotrait Ratio* (HTMT) was used, and values below the accepted threshold confirmed that the latent constructs were adequately differentiated (Hair et al., 2021).

Taken together, these evaluation procedures confirmed that the measurement model met the required standards of reliability and construct validity before the structural model was analyzed.

Data Analysis Technique

Data analysis was carried out using SmartPLS 4, following the two-stage approach widely used in *Partial Least Squares Structural Equation Modeling* (*PLS-SEM*). The initial stage assessed the measurement model quality, followed by an evaluation of the structural relationships specified in the conceptual framework.

We evaluated the measurement model by assessing indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Once the model met these evaluation criteria, we analyzed the structural model using collinearity testing, path coefficient estimation, coefficients of determination (R^2), effect sizes (f^2), predictive relevance (Q^2), and predictive performance.

We examined the significance of both direct and indirect effects through a bootstrapping procedure with 5,000 resamples. We used a 95% confidence level to determine statistical significance, based on *t*-statistics, *p*-values, and bias-corrected confidence intervals. We assessed the mediating effect of *Green Human Resource Management* (GHRM) by examining the significance of the indirect effects and the size of the direct effects to determine whether the mediation was partial or complete.

To strengthen the robustness of the findings, predictive assessment was also undertaken using the PLSpredict procedure. This complementary analysis provides additional evidence regarding the model's capability to predict observations beyond the estimation sample, thereby enhancing the practical relevance of the proposed structural model.

Overall, the selected analytical procedures offer a systematic framework for examining the relationships among *Responsible Innovation Practices* (RIP), *Green Human Resource Management* (GHRM), and *Organizational Sustainability* (OS). They also ensure that the results are statistically robust and theoretically meaningful.

RESULTS AND DISCUSSION

Measurement Model Evaluation

The measurement model evaluation included tests of indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. These assessments ensured that each construct satisfied the required psychometric criteria before proceeding with the structural model evaluation (Hair et al., 2021).

Indicator Reliability

Indicator reliability was assessed using outer loading values. According to Hair et al. (2021), outer loading values should exceed 0.70 to indicate satisfactory reliability.

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Table 2. Indicator Reliability Assessment (Outer Loadings)

Construct	Indicator	Outer Loading
Green Human Resource Management (GHRM)	GHRM1	0.808
	GHRM2	0.857
	GHRM3	0.862
	GHRM4	0.801
Organizational Sustainability (OS)	OS1	0.847
	OS2	0.854
	OS3	0.890
Responsible Innovation Practices (RIP)	RIP1	0.782
	RIP2	0.837
	RIP3	0.830
	RIP4	0.839

Note: Indicator reliability is considered acceptable when outer loading values exceed 0.70 (Hair et al., 2021).

Indicator reliability was examined through the outer loading values of all measurement items. Following the recommendation of Hair et al. (2021), outer loadings higher than 0.70 demonstrate that an indicator appropriately represents the latent construct it is intended to measure. As reported in Table 2, every indicator exceeded this threshold, indicating a strong contribution to the measurement of its corresponding construct. The results suggest that the indicators reliably measure the dimensions of *Responsible Innovation Practices* (RIP), *Green Human Resource Management* (GHRM), and *Organizational Sustainability* (OS). As a result, the measurement model shows satisfactory indicator reliability and supports the subsequent evaluation of construct reliability and validity.

Internal Consistency Reliability and Convergent Validity

Internal consistency reliability was assessed using *Cronbach's alpha* and *Composite Reliability*, while convergent validity was examined using the *Average Variance Extracted* (AVE). Hair et al. (2021) recommend that both *Cronbach's alpha* and *Composite Reliability* exceed 0.70, with AVE values higher than 0.50 to demonstrate adequate convergent validity.

Table 3. Internal Consistency Reliability and Convergent Validity Assessment

Construct	Cronbach's Alpha	Composite Reliability (ρA)	Composite Reliability (ρC)	Average Variance Extracted (AVE)
Green Human Resource Management (GHRM)	0.852	0.858	0.900	0.693
Organizational Sustainability (OS)	0.830	0.831	0.898	0.746
Responsible Innovation Practices (RIP)	0.841	0.844	0.893	0.676

Note: Cronbach's Alpha and Composite Reliability values above 0.70 indicate satisfactory internal consistency reliability, while AVE values above 0.50 indicate adequate convergent validity (Hair et al., 2021).

To evaluate internal consistency reliability, this study employed *Cronbach's Alpha* and *Composite Reliability* (*ρA* and *ρC*). Convergent validity was assessed using the *Average Variance Extracted* (AVE). (Hair et al., 2021) suggested that reliability values should be above 0.70 and AVE values should exceed 0.50 to indicate an adequate level of measurement quality. Table 3 shows that all constructs satisfied the recommended criteria, demonstrating that the measurement items reliably represented their respective

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latent constructs while accounting for a considerable proportion of the variance in the indicators. Overall, these findings show that the measurement model has achieved acceptable levels of internal consistency reliability and convergent validity, providing a solid basis for the next stage of structural model analysis.

Discriminant Validity

To evaluate *discriminant validity*, this study applied the *Heterotrait–Monotrait Ratio* (HTMT). Following Henseler et al. (2015), HTMT values below 0.90 indicate that the latent constructs are sufficiently distinct from one another.

Table 4. Discriminant Validity Assessment Using the Heterotrait–Monotrait Ratio (HTMT)

Construct	GHRM	OS	RIP
Green Human Resource Management (GHRM)	—		
Organizational Sustainability (OS)	0.820	—	
Responsible Innovation Practices (RIP)	0.768	0.860	—

Note: HTMT values below 0.90 indicate satisfactory discriminant validity (Hair et al., 2021; Henseler et al., 2015).

The study assessed *discriminant validity* using the *Heterotrait–Monotrait Ratio* (HTMT), which determines whether the latent constructs are sufficiently different from one another. Based on the recommendations of Henseler et al. (2015) and Hair et al. (2021), HTMT values below 0.90 indicate satisfactory *discriminant validity*. As reported in Table 4, all HTMT values met this criterion, demonstrating that *Responsible Innovation Practices* (RIP), *Green Human Resource Management* (GHRM), and *Organizational Sustainability* (OS) represent separate theoretical constructs despite their conceptual connections. The results suggest that each construct represents a different dimension of sustainability-oriented organizational management. This further supports the validity of the proposed structural model.

Collinearity Assessment

A collinearity assessment was conducted before analyzing the structural relationships among the latent constructs to determine whether excessive multicollinearity existed within the measurement indicators. When multicollinearity is too high, it can increase standard errors and make parameter estimates less stable, which may influence the reliability of the measurement model. As part of the collinearity assessment, the *Variance Inflation Factor* (VIF) was evaluated for each indicator. According to Hair et al. (2021), VIF values below the recommended threshold provide evidence that multicollinearity is not a major concern.

Table 5. Collinearity Assessment Using Variance Inflation Factor (VIF)

Construct	Indicator	VIF
Responsible Innovation Practices	RIP1	1.932
	RIP2	2.146
	RIP3	2.082
	RIP4	2.224
Green Human Resource Management	GHRM1	1.998
	GHRM2	2.331
	GHRM3	2.312
	GHRM4	1.935
Organizational Sustainability	OS1	1.877
	OS2	1.787
	OS3	2.252

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Note: Variance Inflation Factor (VIF) values below 3.0 indicate that multicollinearity is unlikely to affect measurement model estimation (Hair et al., 2021).

To evaluate collinearity, the *Variance Inflation Factor* (VIF) was calculated for the measurement indicators. This assessment determined whether multicollinearity could reduce the stability of the parameter estimates. Based on Hair et al. (2021), VIF values below the recommended threshold suggest that collinearity does not pose a serious concern. Table 5 shows that all VIF values were lower than the recommended cut-off, confirming that *multicollinearity* was not a concern among the measurement indicators. This indicates that each indicator contributes distinct information to its corresponding construct and supports the stability of the parameter estimates used in the structural model analysis.

Structural Model Evaluation

Once the measurement model fulfilled the required standards of reliability and validity, the structural model was analyzed using *Partial Least Squares Structural Equation Modeling* (*PLS-SEM*). This analysis investigated the relationships among *Responsible Innovation Practices* (RIP), *Green Human Resource Management* (GHRM), and *Organizational Sustainability* (OS).

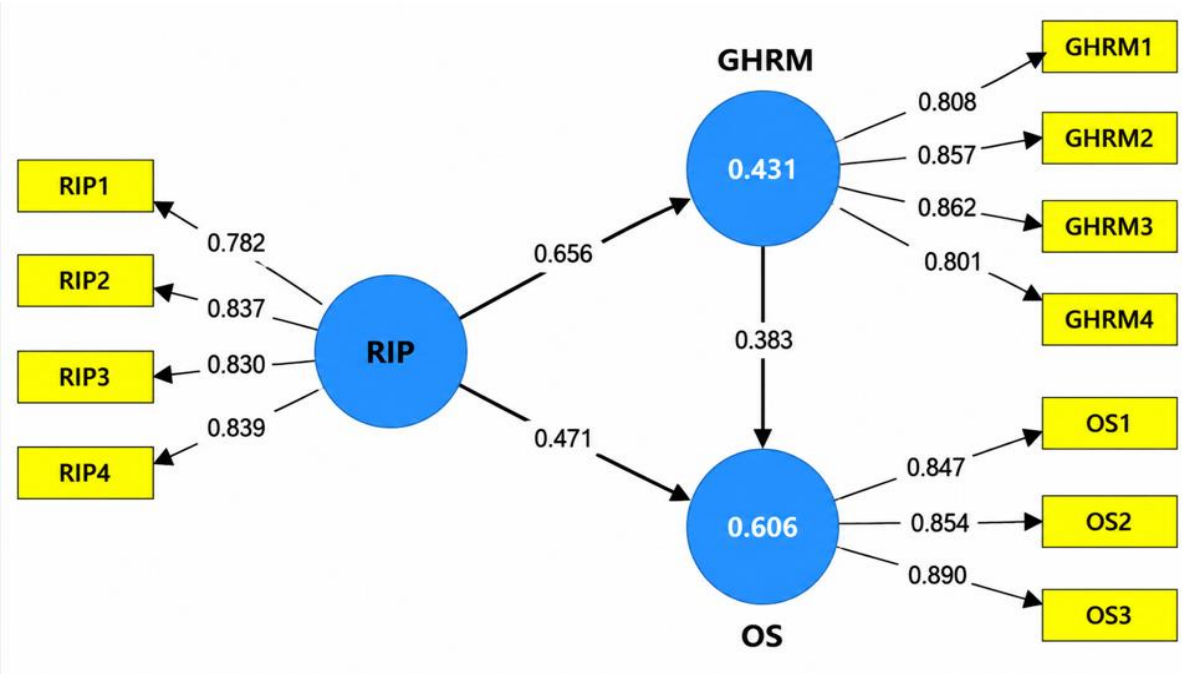

Figure 1. PLS-SEM Structural Model Results

Figure 1 presents the estimated PLS-SEM structural model illustrating the relationships among Responsible Innovation Practices (RIP), Green Human Resource Management (GHRM), and Organizational Sustainability (OS). The model indicates that Responsible Innovation Practices influence Organizational Sustainability through both direct and indirect pathways, with Green Human Resource Management acting as an organizational mechanism linking responsible innovation to sustainability outcomes. This structural configuration supports the proposed conceptual framework by demonstrating that sustainability-oriented human resource practices strengthen the implementation of responsible innovation within public-sector organizations.

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From the perspective of the Indonesian public sector, these findings suggest that organizational sustainability cannot be achieved solely through innovation-oriented policies. Rather than relying on responsible innovation alone, organizations need to embed it in daily operations through *Green Human Resource Management* (GHRM). This can be achieved through employee development, environmental performance assessment, and active employee participation in sustainability initiatives. The findings demonstrate that GHRM plays an important strategic role in converting responsible innovation into sustainable organizational practices, which strengthens the long-term sustainability of public-sector organizations.

Coefficient of Determination (R^2)

To evaluate the explanatory capability of the structural model, the coefficient of determination (R^2) was examined. Hair et al. (2021) suggested that higher R^2 values reflect stronger predictive accuracy of the endogenous constructs.

Table 5. Coefficient of Determination (R^2) of the Endogenous Constructs

Endogenous Construct	R^2	Adjusted R^2
Green Human Resource Management (GHRM)	0.431	0.429
Organizational Sustainability (OS)	0.606	0.603

Note: Higher R^2 values indicate greater explanatory power of the structural model. According to Hair et al. (2021), R^2 values of approximately 0.25, 0.50, and 0.75 may be interpreted as weak, moderate, and substantial explanatory power, respectively.

The study assessed the coefficient of determination (R^2) to evaluate how well the structural model explained the endogenous constructs. Specifically, R^2 measures the proportion of variance in each endogenous construct that is explained by its predictor variables (Hair et al., 2021).

As presented in Table 5, Responsible Innovation Practices explained a substantial proportion of the variance in Green Human Resource Management, indicating that responsible innovation constitutes an important organizational driver of sustainability-oriented human resource practices. Meanwhile, Responsible Innovation Practices and Green Human Resource Management jointly explained a moderate to substantial proportion of the variance in Organizational Sustainability, demonstrating that the proposed model provides meaningful explanatory power for sustainability outcomes in Indonesian public-sector organizations.

Although the model explains a considerable proportion of organizational sustainability, the remaining unexplained variance suggests that broader organizational and institutional factors also shape sustainability performance, such as leadership commitment, organizational culture, regulatory support, and resource availability. Therefore, organizational sustainability should be viewed as the result of multiple complementary capabilities rather than a single managerial intervention.

Effect Size (f^2)

To evaluate the influence of each exogenous construct on the endogenous constructs, we conducted an *effect size* analysis. Based on Cohen's criteria, f^2 values of 0.02, 0.15, and 0.35 indicate small, moderate, and large effects, respectively.

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Table 6. Effect Size (f^2) of the Structural Relationships

Relationship	f^2	Effect Size
RIP → GHRM	0.757	Large
RIP → OS	0.320	Medium
GHRM → OS	0.212	Medium

Note: According to Hair et al. (2021), f^2 values of 0.02, 0.15, and 0.35 indicate small, medium, and large effect sizes, respectively.

The study evaluated *effect size* (f^2) to determine how much each exogenous construct contributed to explaining the endogenous constructs. Hair et al. (2021) stated that larger f^2 values reflect a stronger contribution of a predictor to the explained variance of the dependent construct.

As presented in Table 6, Responsible Innovation Practices made the greatest contribution to the implementation of Green Human Resource Management, indicating that responsible innovation serves as the primary organizational driver for embedding sustainability principles into human resource practices. In addition, both Responsible Innovation Practices and Green Human Resource Management contributed meaningfully to Organizational Sustainability, suggesting that sustainability outcomes are achieved through the combined influence of strategic innovation and sustainability-oriented human resource management rather than a single organizational capability.

These findings imply that strengthening organizational sustainability in Indonesian public-sector organizations requires not only adopting responsible innovation but also institutionalizing environmental values through recruitment, employee development, performance evaluation, and employee participation. Accordingly, Green Human Resource Management complements responsible innovation by translating sustainability-oriented policies into routine organizational practices.

Predictive Relevance (Q^2)

The study assessed *predictive relevance* by applying the Q^2*_predict* procedure. Hair et al. (2021) stated that Q^2 values above 0 provide evidence that the model has predictive relevance.

Table 7. Predictive Relevance Assessment (Q^2predict)

Indicator	Q^2predict
GHRM1	0.193
GHRM2	0.300
GHRM3	0.368
GHRM4	0.297
OS1	0.344
OS2	0.433
OS3	0.365

Note: Q^2predict values greater than zero indicate that the model has predictive relevance for the endogenous indicators (Hair et al., 2021).

To evaluate the model's predictive capability, the Q^2*predict* procedure was used to examine how well the structural model predicts the observed values of the endogenous constructs. Based on Hair et al. (2021), Q^2*predict* values greater than 0 provide evidence of predictive relevance.

Table 7 shows that all Q^2*predict* values exceeded 0, confirming that the proposed model demonstrates adequate predictive capability for the endogenous constructs. These findings indicate that the relationships among Responsible Innovation Practices, Green

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Human Resource Management, and Organizational Sustainability are not only statistically supported but also demonstrate acceptable predictive performance.

From a practical perspective, the model provides useful insights for understanding how responsible innovation and sustainability-oriented human resource management contribute to organizational sustainability in Indonesian public-sector organizations. This predictive capability suggests that the proposed model may serve as a relevant analytical framework for supporting sustainability-oriented organizational decision-making and public-sector management.

Hypothesis Testing Results

The study tested the hypotheses using the *bootstrapping* procedure within the *PLS-SEM* approach. The results were evaluated based on the *path coefficients*, *t-statistics*, and *p-values*. A hypothesis was accepted when the *t-statistic* exceeded 1.96, and the *p-value* was below 0.05 (Hair et al., 2021).

Table 8. Results of Structural Path and Hypothesis Testing

Hypothesis	Structural Path	β	Std. Error	t-value	p-value	Decision
H1	RIP → GHRM	0.656	0.045	14.657	<0.001	Supported
H2	RIP → OS	0.471	0.080	5.884	<0.001	Supported
H3	GHRM → OS	0.383	0.078	4.919	<0.001	Supported

Note: A hypothesis is supported when t > 1.96 and p < 0.05 (Hair et al., 2021).

The proposed hypotheses were examined through the *bootstrapping* procedure in *PLS-SEM*, with the significance of structural relationships assessed using standardized *path coefficients* (β), *t-values*, and *p-values* (Hair et al., 2021). Table 8 shows that all hypotheses proposed in this study were accepted.

A positive and significant relationship was found between *Responsible Innovation Practices* (RIP) and *Green Human Resource Management* (GHRM). The findings imply that organizations that apply responsible innovation are better able to embed sustainability principles into their human resource management systems. RIP also positively influenced Organizational Sustainability (OS), suggesting that responsible innovation directly contributes to strengthening organizational sustainability. Furthermore, Green Human Resource Management positively affected Organizational Sustainability, showing that sustainability-oriented human resource practices support long-term organizational sustainability.

Overall, these findings confirm that Responsible Innovation Practices and Green Human Resource Management jointly contribute to improving organizational sustainability in Indonesian public-sector organizations.

Mediation Analysis

The mediation analysis examined the indirect effect of Responsible Innovation Practices on Organizational Sustainability through Green Human Resource Management.

Table 9. Mediation Analysis Results (Specific Indirect Effects)

Hypothesis	Indirect Path	β	Std. Error	t-value	p-value	Decision
H4	RIP → GHRM → OS	0.252	0.055	4.596	<0.001	Supported

Note: Indirect effects are considered significant when t > 1.96 and p < 0.05 (Hair et al., 2021).

Mediation testing was carried out to determine the indirect influence of *Responsible Innovation Practices* (RIP) on *Organizational Sustainability* (OS) through *Green Human Resource Management* (GHRM). Table 9 shows a positive and significant indirect effect, indicating that GHRM partially mediates the relationship between RIP and OS.

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The results suggest that responsible innovation strengthens organizational sustainability through both direct pathways and indirect mechanisms involving sustainability-focused human resource management practices. In this context, *Green Human Resource Management* plays a key role in connecting responsible innovation with sustainable organizational outcomes in Indonesian public-sector organizations.

Discussion

The findings indicate that organizational sustainability in Indonesian public-sector institutions is strengthened not by isolated managerial initiatives but by the interaction between Responsible Innovation Practices (RIP) and Green Human Resource Management (GHRM). The empirical evidence suggests that responsible innovation establishes the strategic orientation through which sustainability objectives are incorporated into organizational governance. In contrast, GHRM translates these strategic commitments into everyday managerial practices that shape employees' behaviors and organizational routines. Rather than functioning as separate organizational capabilities, the two constructs operate complementarily, enabling sustainability principles to be embedded more consistently throughout the organization. This integrated relationship implies that long-term sustainability is more likely to emerge when innovation is accompanied by human resource systems that reinforce environmental responsibility, organizational learning, and continuous institutional adaptation (Awwad Al-Shammari et al., 2022; Liu et al., 2023; Lubberink et al., 2017).

The significant effect of Responsible Innovation Practices on Organizational Sustainability further suggests that responsible innovation should be viewed as a governance capability that extends beyond the traditional objective of improving organizational performance through innovation alone. Public organizations that anticipate the broader implications of innovation, actively involve relevant stakeholders, critically evaluate the societal consequences of organizational decisions, and remain responsive to emerging sustainability challenges appear to be better equipped to maintain institutional legitimacy while addressing increasingly complex environmental and social demands. These findings are closely aligned with Responsible Innovation Theory, which conceptualizes anticipation, inclusion, reflexivity, and responsiveness as the fundamental dimensions through which innovation contributes to sustainable development (Stilgoe et al., 2013). The present results also reinforce previous empirical evidence indicating that responsible innovation strengthens organizational resilience by embedding ethical reflection and stakeholder-oriented decision-making into routine governance processes, thereby supporting the development of more adaptive and sustainable public institutions (Braun & Starkbaum, 2023; Lukkien et al., 2024).

From the standpoint of Stakeholder Theory, the present findings provide additional evidence that organizational sustainability in the public sector is fundamentally shaped by an institution's ability to accommodate the diverse expectations of its stakeholders rather than by pursuing operational efficiency alone (Nonet et al., 2022; Valentinov, 2023). Public organizations operate within a governance environment characterized by high levels of accountability, where policy decisions are expected to generate environmental, social, and institutional benefits simultaneously. In this context, Responsible Innovation Practices help innovation processes remain aligned with broader public interests by integrating stakeholder perspectives into organizational decision-making. Innovation therefore assumes a broader institutional function, serving not only

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as a mechanism for improving administrative performance but also as an instrument for generating sustainable public value while reinforcing governance legitimacy.

The Indonesian public sector offers an important institutional setting for understanding these relationships. Although bureaucratic reform has accelerated digital transformation, encouraged administrative innovation, and promoted performance-based governance, the implementation of sustainability principles remains uneven across public institutions. In many organizations, sustainability initiatives remain isolated programs or regulatory obligations rather than becoming integral to organizational culture and managerial practice. Variations in leadership commitment, institutional capacity, and interdepartmental coordination may further constrain the continuity of sustainability-oriented initiatives. The present findings suggest that these challenges cannot be addressed through responsible innovation alone. Instead, innovation effectiveness depends on organizational mechanisms that embed sustainability values into routine administrative processes. In this regard, Green Human Resource Management emerges as a critical institutional capability that bridges strategic sustainability commitments with their practical implementation, thereby supporting more consistent and enduring organizational transformation.

The significant contribution of Green Human Resource Management to Organizational Sustainability further emphasizes that sustainability-oriented human resource practices should be regarded as strategic organizational capabilities rather than merely administrative functions. This interpretation aligns with the Ability-Motivation-Opportunity (AMO) framework, which proposes that employees are more likely to demonstrate pro-environmental behavior when organizations simultaneously strengthen competencies, provide appropriate motivational incentives, and create meaningful opportunities for participation (Bos-Nehles et al., 2023). Consistent with earlier empirical evidence, practices such as green recruitment, environmental training, sustainability-based performance evaluation, and active employee involvement contribute to an organizational culture that supports environmental responsibility and long-term sustainability (Fang et al., 2022; Liu et al., 2023; Papademetriou et al., 2025). Extending previous studies, the current findings demonstrate that these relationships remain robust within Indonesian public-sector organizations, indicating that sustainability-oriented human resource management represents an important institutional resource for strengthening governance quality in developing-country contexts.

The mediation analysis provides a deeper understanding of the organizational process through which Responsible Innovation Practices contribute to Organizational Sustainability. Beyond exerting a direct influence, responsible innovation also strengthens sustainability outcomes indirectly by fostering the implementation of Green Human Resource Management. This pattern indicates that strategic commitments to responsible innovation are unlikely to achieve their full organizational impact unless institutionalized through human resource practices that shape employees' attitudes, competencies, and daily work routines. Green Human Resource Management therefore represents the organizational mechanism through which sustainability principles are translated from strategic intent into operational practice. This interpretation aligns with the Natural Resource-Based View (NRBV), which argues that environmental capabilities embedded in organizational processes constitute valuable strategic resources that support long-term competitive advantage and sustainable organizational performance (Li et al., 2024; Zihan & Makhbul, 2024a). In the context of public organizations, these

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findings suggest that sustainable governance is strengthened when innovation strategies are reinforced by internal management systems that institutionalize environmental responsibility across the organization.

The practical implications of these findings extend beyond encouraging innovation as an isolated organizational objective. Instead, sustainability should be integrated into the broader architecture of public-sector management through organizational policies that consistently reinforce environmentally responsible behavior. Human resource systems represent a particularly important entry point for this transformation. Public organizations should therefore incorporate sustainability considerations into recruitment processes, competency development, performance evaluation, leadership development, and employee recognition systems. At the same time, stronger coordination across organizational units is required to ensure that sustainability initiatives are implemented as interconnected organizational practices rather than fragmented administrative programs. Such institutional integration is expected to strengthen the long-term effectiveness of bureaucratic reform while enhancing public organizations' capacity to respond to increasingly complex environmental and societal challenges.

Overall, the findings contribute to the growing sustainability literature by showing that Responsible Innovation Practices and Green Human Resource Management should be interpreted as mutually reinforcing organizational capabilities rather than independent managerial interventions. Responsible innovation establishes the strategic direction that aligns organizational decision-making with sustainability objectives. In contrast, Green Human Resource Management provides the institutional infrastructure through which these strategic aspirations are embedded in everyday organizational practices. By integrating Responsible Innovation Theory, Stakeholder Theory, the Ability-Motivation-Opportunity framework, and the Natural Resource-Based View into a single explanatory model, this study offers a more comprehensive understanding of how public-sector organizations can develop sustainability-oriented governance. The proposed framework also extends existing empirical evidence by showing that the relationship between responsible innovation and organizational sustainability strengthens when supported by organizational capabilities that promote environmental responsibility, employee engagement, and continuous institutional learning.

CONCLUSION AND RECOMMENDATIONS

Responsible Innovation Practices (RIP) and Green Human Resource Management (GHRM) jointly strengthen Organizational Sustainability in Indonesian public-sector organizations. The findings suggest that responsible innovation provides the strategic foundation for sustainability, whereas GHRM translates these commitments into everyday organizational practices through sustainability-oriented human resource management. This study also supports Responsible Innovation Theory while extending Stakeholder Theory, the Ability–Motivation–Opportunity (AMO) framework, and the Natural Resource-Based View (NRBV), indicating that sustainable organizational transformation relies on integrating governance and organizational capabilities rather than innovation alone.

These findings should be interpreted in light of several limitations. The cross-sectional design does not capture organizational change over time, and the focus on Indonesian public-sector organizations may limit the findings' transferability. Moreover, the proposed model did not include factors such as leadership capability, organizational

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culture, digital governance, and institutional capacity, which deserve further investigation.

The study highlights the need for public organizations to integrate sustainability into recruitment, training, performance appraisal, career development, and employee recognition to strengthen sustainability-oriented practices. Policymakers should also incorporate sustainability competencies into civil servant development and public governance frameworks to institutionalize responsible innovation. Future research could adopt longitudinal or comparative designs and examine additional organizational capabilities, including green leadership, organizational learning, and institutional resilience, to deepen understanding of sustainability transformation across different contexts.

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