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Green Public Service Innovation: Integrating Environmental Values into Local Government Service Delivery

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Abstract

This study explores the integration of environmental values into public service innovation commonly referred to as green public service innovation within the context of local government service delivery in Padang, West Sumatra. Amid escalating environmental challenges and the urgency of achieving Sustainable Development Goals (SDGs), local governments are increasingly expected to move beyond efficiency and adopt eco-conscious service models. This research employs a quantitative approach using Structural Equation Modeling–Partial Least Squares (SEM-PLS) to examine five key variables: organizational commitment, organizational culture, community participation, green leadership, and green public service innovation. The findings reveal that organizational commitment, organizational culture, and community participation all have significant direct impacts on green public service innovation. Furthermore, green leadership not only directly influences innovation but also plays a moderating role by strengthening the effect of organizational commitment on innovation outcomes. The results emphasize that green innovation in the public sector requires more than technology adoption it demands aligned leadership, an enabling institutional culture, and active community involvement. In Padang's case, local wisdom and environmental awareness present opportunities for designing inclusive and contextualized green innovations. Strong leadership that embeds environmental values into strategic planning and operational systems significantly enhances institutional resilience and citizen trust. The research contributes to public administration literature by offering empirical support for the systemic relationships between organizational factors and sustainable service delivery. It also provides actionable insights for local governments seeking to institutionalize environmental values in public services.

Keywords: Green Innovation, Public Service, Organizational Commitment, Green Leadership, Sustainable Governance

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1. Introduction

Climate change and the growing environmental crisis have compelled governments at various levels to re-evaluate how they deliver public services. In the era of sustainable development, public service innovations that integrate environmental values—referred to as *green public service innovation*—have become a pressing necessity. Public services are no longer sufficient if they are merely fast, affordable, and accessible; they must also consider the ecological impacts they generate. This concept prioritizes the reduction of natural resource usage, effective waste management, and the enhancement of environmental awareness throughout bureaucratic processes. Therefore, sustainability-oriented innovations represent a crucial milestone for local governments to effectively address environmental challenges (Minkman et al., 2017).

In practice, green innovation is not limited to technology or digital tools used in service delivery; it also involves changes in organizational culture, internal policies, and the behavior of public servants. The implementation of green innovation requires the commitment of all stakeholders to embed environmental values in every aspect of service delivery. This transformation involves adapting systems not only to focus on short-term outcomes but also on long-term environmental impacts. Studies show that the success of green innovation is strongly influenced by institutional readiness, human resources who understand the importance of sustainability, and adequate budgetary support (Torbica & Stojanovic, 2019).

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In the Indonesian context, obstacles such as limited technical capacity and low bureaucratic awareness remain major barriers. The city of Padang, as the capital of West Sumatra Province, holds a strategic role in implementing green innovations in public services. The city faces significant environmental challenges, including waste management issues, water pollution, and natural disaster risks such as floods and landslides. The local government has launched several initiatives, such as digitalizing administrative services to reduce paper usage and implementing single-use plastic reduction programs in government offices. Additionally, environmental education and awareness campaigns have begun at the village and sub-district levels. However, the extent to which environmental values are truly integrated into all aspects of public service delivery remains under-researched (Fitriani et al., 2022; Rahman & Harahap, 2023).

Theoretically, public service innovation that embraces environmental values is rooted in the concept of public innovation, which emphasizes active community participation, inter-agency collaboration, and outcome-oriented approaches. Mulgan (2015) asserts that innovation in the public sector is not limited to technological advancements but also includes process and service model innovations that are responsive to social and environmental needs. Previous studies have also shown that green innovation in the public sector can enhance public trust in government while strengthening institutional legitimacy in the long term (Lee & Kim, 2019). Thus, green innovation should be viewed as a strategic investment that promotes regional development while preserving the environment.

Despite its great potential, the implementation process of green innovation still faces many challenges. Bureaucratic rigidity and resistance to change are major obstacles. Budget constraints and limited human resource capacity also restrict the scope of innovation. Moreover, lack of inter-agency coordination and minimal public involvement in service planning and evaluation reduce the effectiveness of green innovations (Saputra & Wulandari, 2020). These conditions call for a more comprehensive and participatory approach in designing and implementing environmentally-conscious public service innovations.

The application of Information and Communication Technology (ICT) is a key factor in supporting green innovation in the public service sector. Digitalization enables paper reduction, accelerates administrative processes, and increases transparency and accountability. Nurhadi and Prasetyo (2021) state that ICT can be a primary enabler of transforming public services to become more eco-friendly and efficient. However, ICT adoption must be accompanied by adequate training for government personnel and improved digital infrastructure to prevent service access gaps among communities.

Beyond technical and resource aspects, socio-cultural factors also play a crucial role in the successful integration of environmental values in public services. Innovations that conflict with local norms and traditions risk rejection or becoming merely symbolic. Therefore, approaches that prioritize local wisdom and active community participation in the innovation process are vital for the acceptance and internalization of environmental values (Anwar & Suryadi, 2018). The city of Padang, with its strong Minangkabau culture, has the potential to develop contextual and sustainable green innovation models.

Various international studies have shown that integrating environmental values into public service delivery positively impacts community quality of life. Wang, Li, and Ma (2020) found that green innovations implemented by local governments in China helped reduce pollution and increase resource use efficiency. Additionally, public trust in government increased in line with service transparency and participation. These findings are relevant to the Indonesian context, including Padang City, which is striving to improve services while preserving the environment.

In Indonesia, research on green innovation at the local government level is still relatively new and limited. Rahman and Harahap (2023) highlight the need for in-depth studies on how environmental values are integrated into policies and practices in public services in Padang. This study aims to fill the literature gap and serve as a reference for other local governments in designing effective and sustainable green innovations. This research also contributes to supporting the achievement of the Sustainable Development Goals (SDGs), particularly those related to sustainable cities and inclusive, eco-friendly public services (Yuliana et al., 2024).

Accordingly, this study focuses on how the Padang City government integrates environmental values into public services and identifies the types of green innovations that have been implemented. Moreover, it seeks to identify supporting and inhibiting factors, thus providing a comprehensive picture of sustainable public service innovation in a local context.

Furthermore, the development of green innovations in public services is also influenced by national policies and regulations that promote sustainable development. The central government of Indonesia has issued various regulations and programs to encourage local governments to adopt environmentally-friendly practices, such as Presidential Regulations on Sustainable Development and Greenhouse Gas Emission Reduction Initiatives. However, the

implementation of these policies often encounters gaps at the local level due to differences in capacity, priorities, and resources. A study by Hidayati and Santoso (2022) shows that synchronization between national policies and local strategies is key to the success of green innovation in the public sector. Therefore, studying the implementation of these policies in Padang City is crucial for identifying existing barriers and opportunities.

Leadership commitment at the local level is also a decisive factor in the success of green innovation in public services. Visionary and environmentally-oriented leadership can motivate all government staff to innovate and adopt sustainability values. For example, successful green innovations in several other regions in Indonesia are often linked to the proactive roles of governors or mayors in championing environmentally-conscious public services (Sari & Putra, 2021). In Padang City, the role of local leaders in initiating and facilitating green innovation needs further analysis to understand how leadership can drive the transformation of sustainable public service delivery.

Aside from policy and leadership aspects, community involvement in the innovation process is also essential. Active participation by residents and other stakeholders not only improves service quality but also fosters a sense of ownership toward the environmental programs implemented. Research by Wijaya and Kurniawan (2019) reveals that successful public service innovations are those that build strong communication and cooperation between government and citizens. In the context of Padang, public participation patterns in supporting green innovation should be examined, particularly in relation to environmental awareness and citizen contributions to program sustainability.

Another frequent challenge in developing green innovations is the perception and work culture among civil servants. Adapting to change and innovation is often hindered by a conservative bureaucratic culture and resistance to new approaches. A study by Prasetyo and Hartono (2020) notes that training and capacity development for human resources are crucial to shift the bureaucratic mindset toward greater openness to green innovation. Therefore, this research will also explore aspects of human resources and training provided to government officials to support the transformation of environmentally-conscious public services in Padang City.

Finally, measuring the success of green innovations in public services is critical to ensure that environmental and service objectives are optimally achieved. Clear and measurable performance indicators must be developed to allow systematic and continuous innovation evaluation. According to Lin and Chang (2018), green innovation measurements should encompass environmental, social, and economic aspects to provide a comprehensive overview. Accordingly, the findings of this study are expected to offer recommendations on monitoring and evaluation mechanisms for green innovations tailored to the conditions of the Padang City Government.

2. Literature Review

2.1. Concept of Green Public Service Innovation

Green public service innovation refers to the development and transformation of public services that not only aim for efficiency and citizen satisfaction, but also prioritize sustainability and environmental responsibility. This innovation involves incorporating ecological principles into the structure, operation, and evaluation of government services. It challenges traditional bureaucratic models by introducing environmental criteria into decision-making, resource allocation, and policy implementation. According to de Vries, Bekkers, and Tummers (2016), public sector innovation must be evaluated not only in terms of outputs but also based on its social and environmental value creation, especially in light of climate challenges and global sustainability goals.One of the key elements in green innovation is its multidimensional nature. It is not limited to technological improvements but also includes regulatory shifts, administrative reform, and behavioral change among civil servants. Baporikar (2020) argues that effective green public service innovation requires a strategic alignment between policy objectives, environmental regulations, and performance indicators that emphasize sustainability. This alignment ensures that public services do not inadvertently contribute to ecological degradation while fulfilling bureaucratic mandates. In this regard, green innovation represents both a policy challenge and an opportunity for institutional learning and systemic reform.

Furthermore, green public service innovation often intersects with concepts such as eco-governance, green bureaucracy, and sustainable policy entrepreneurship. These frameworks emphasize the role of public managers and institutions in driving change beyond mere compliance, encouraging innovation that embeds long-term environmental thinking into everyday administrative functions. As noted by Meijer and Bolívar (2016), innovation in public services can become transformative when environmental priorities are institutionalized into organizational culture and policy routines, enabling adaptation and resilience in local governance.

Recent developments in public administration scholarship have called for a redefinition of innovation success beyond traditional efficiency metrics. Scholars such as Adams et al. (2016) have advocated for a triple bottom line approach—economic, social, and environmental—as a holistic framework for evaluating innovation performance. In green public service innovation, this perspective is especially relevant because short-term cost-effectiveness may not accurately capture long-term ecological benefits. This requires governments to rethink KPIs, budgeting strategies, and stakeholder engagement practices to accommodate sustainability as a central dimension of innovation.

Finally, green public service innovation must also be contextualized within broader global and national policy trends such as the Paris Agreement, SDGs, and national green economy roadmaps. These frameworks offer both normative pressure and practical guidance for local governments to innovate in environmentally responsible ways. According to Goyal and Howlett (2018), policy coherence between international agendas and local implementation is essential for scaling up green innovation. This implies that conceptual clarity, institutional support, and cross-level governance coordination are vital in embedding environmental values into public service innovation agendas.

2.2. Environmental Governance and Local Government Responsibility

Environmental governance is the process by which environmental decisions and policies are made, implemented, and enforced by various actors including governments, civil society, and the private sector. In the context of green public service innovation, local governments are increasingly recognized as critical actors in translating national sustainability goals into operational realities. Their proximity to the community, administrative flexibility, and contextual knowledge make them suitable agents for implementing adaptive and participatory environmental governance strategies. According to Bulkeley and Betsill (2016), local governments possess unique capacities to experiment with policies and institutional designs that address specific environmental issues in urban and rural contexts.

The shift toward decentralized environmental governance has empowered local governments to develop their own environmental frameworks, such as climate action plans, green budgeting, and urban sustainability strategies. These frameworks allow public institutions to institutionalize environmental considerations in public decision-making processes. As argued by Uyarra, Gee, and Ramlogan (2019), green innovation governance at the local level requires clear institutional mandates, cross-sector collaboration, and a well-developed monitoring system. Without such mechanisms, environmental efforts risk being fragmented or superficial, undermining the transformative potential of green public service innovation.

Despite their potential, many local governments still face constraints in executing environmental mandates effectively. Limited financial resources, technical expertise gaps, and inconsistent national-local coordination often impede innovation. OECD (2020) emphasizes that multilevel governance frameworks must be strengthened to ensure that local environmental initiatives are not only symbolic but impactful and aligned with national sustainability targets. In addition, local governments often operate in politically contested environments, where trade-offs between economic growth and environmental preservation challenge decision-makers. Thus, environmental governance must be supported by enabling policies, capacity building, and stakeholder partnerships.

Another vital aspect of effective environmental governance is regulatory coherence and legal empowerment. According to Kotzé (2018), fragmented or outdated legal frameworks can hinder green policy innovation at the local level. Local governments require legal autonomy to integrate environmental performance indicators into procurement, licensing, and administrative procedures. Moreover, the alignment of environmental law with service delivery standards helps embed ecological values into bureaucratic routines. These legal instruments not only provide mandates but also create accountability structures for sustainable service implementation.

Finally, the effectiveness of environmental governance depends on the quality of institutional arrangements and the degree of stakeholder involvement. Kooiman and Jentoft (2016) propose a governance interaction model that stresses the interdependence between public institutions, private actors, and civil society. In the case of green public services, this model can be translated into inclusive policy forums, participatory planning, and transparent evaluation systems. For cities like Padang, adopting such frameworks would enable better integration of environmental considerations into everyday governance, while simultaneously enhancing public trust and administrative legitimacy.

2.3. The Role of ICT and Digital Transformation in Green Innovation

Information and Communication Technology (ICT) plays a central role in driving innovation across various sectors, including public service delivery. In the context of green public service innovation, ICT facilitates the creation of digital platforms that minimize resource consumption, promote operational efficiency, and encourage citizen participation. Through digitization, local governments can streamline administrative processes, reduce the use of paper and transportation-related emissions, and provide real-time information to the public (Elia et al., 2020). The shift toward e-services, such as online licensing, digital tax collection, and electronic correspondence, aligns closely with sustainability goals and reduces environmental footprints.

Digital transformation also enables environmental monitoring and data-driven decision-making. With the integration of smart sensors, cloud platforms, and Geographic Information Systems (GIS), local governments can collect and analyze environmental data to optimize service delivery and policy responses. For example, smart waste management systems and energy-efficient traffic control supported by ICT improve both service effectiveness and environmental performance. As noted by Gil-Garcia, Dawes, and Pardo (2018), digital infrastructures offer new governance capabilities for addressing complex ecological challenges while maintaining administrative transparency.

Another significant contribution of ICT is its ability to facilitate inter-agency coordination and stakeholder collaboration. ICT platforms support cross-departmental integration, allowing various public offices to share data, align goals, and avoid redundant resource use. These digital ecosystems encourage collaborative planning in sustainability-focused initiatives, such as green procurement, eco-budgeting, and sustainable urban development. According to Cordella and Paletti (2019), successful digital transformation in public administration is achieved when digital tools are embedded in a coherent strategy that aligns with institutional goals, including environmental ones.

Despite its benefits, the adoption of ICT in green public service innovation is not without challenges. Issues such as digital inequality, cybersecurity risks, and resistance to change may hinder the effectiveness of digital solutions. Particularly in developing regions, disparities in infrastructure and digital literacy create access gaps that limit the inclusiveness of green innovation (Aly, 2022). Therefore, governments must invest in capacity building, robust IT systems, and user-oriented design to ensure that ICT-based green services reach all population segments effectively.

Finally, digital transformation must be accompanied by institutional and regulatory frameworks that encourage experimentation and sustainability. As emphasized by Klievink et al. (2016), regulatory sandboxes and adaptive policy mechanisms are critical to allowing innovation to flourish while managing risks. In the case of green public services, local governments should be empowered not only with technical tools but also with the legal autonomy and budget flexibility to implement digital sustainability solutions. Thus, ICT acts not just as a tool but as a transformational force in enabling sustainable governance and public innovation.

2.4. Leadership, Organizational Culture, and Human Resources

Leadership plays a crucial role in shaping the direction and success of green public service innovation. Leaders who possess an environmental vision and strong commitment to sustainability can set the tone for institutional transformation by embedding ecological concerns into public service agendas. Transformational leadership encourages innovation, facilitates collaboration, and fosters a culture of continuous improvement, which is essential for implementing sustainable practices in the public sector. According to Park and Kim (2018), green-oriented leadership enhances employees' pro-environmental behavior and motivates public institutions to pursue eco-innovations that align with both regulatory mandates and community values.

Organizational culture, as a system of shared values and practices, directly influences how innovation is understood, accepted, and applied within public institutions. A culture that supports learning, risk-taking, and cross-functional collaboration is more likely to encourage sustainability-oriented reforms. In contrast, a rigid, hierarchical, and rule-bound culture may stifle innovation. Schein's (2017) theory of organizational culture underlines that changes in visible practices must be accompanied by deeper shifts in beliefs and assumptions to achieve long-term change. In green innovation, cultural transformation is necessary for embedding environmental values across planning, service delivery, and evaluation mechanisms.

Human resource capacity also determines the feasibility and effectiveness of green public service innovation. Public servants need to possess not only technical knowledge but also a deep understanding of environmental ethics and

sustainable governance. Training programs, capacity-building workshops, and career development pathways that incorporate green skills are essential for building a competent and responsive bureaucracy. As underlined by Podger, Mustofa, and Ahmad (2019), investment in human capital with sustainability competencies is a prerequisite for enabling adaptive and resilient governance in local administrations.

Performance management systems must evolve to recognize and reward contributions to green innovation. Traditional bureaucratic evaluation often focuses on output quantity, overlooking environmental impact or innovation quality. By introducing new metrics such as eco-efficiency, carbon reduction, and stakeholder engagement, institutions can realign employee incentives with sustainability goals. According to Tummers et al. (2016), public managers who receive recognition for sustainable innovation are more likely to internalize green values and encourage their teams to adopt environmentally responsible practices. This cultural and behavioral shift is critical in institutionalizing innovation across departments.

Moreover, fostering an innovation-friendly and environmentally sensitive workforce requires a combination of structural and psychological enablers. Job design, autonomy, interdepartmental trust, and inclusive leadership can empower employees to experiment with new ideas and take ownership of sustainability initiatives. As argued by Fernandez and Pitts (2017), empowering civil servants at all levels not only increases their job satisfaction but also fosters a sense of responsibility toward public value creation, including environmental stewardship. In the context of green public services, this empowerment is vital for sustaining change beyond isolated projects or pilot programs.

2.5. Community Participation and Socio-Cultural Context

Community participation is a fundamental pillar in the development and sustainability of green public service innovation. Active involvement from citizens ensures that innovation is not only top-down but also reflects local needs and values. Participatory approaches in environmental governance—such as community forums, co-design workshops, and citizen panels—allow for the integration of local wisdom and encourage behavioral changes aligned with sustainability goals. As emphasized by Fischer (2017), democratic engagement improves policy responsiveness and increases the legitimacy of environmental programs, particularly when addressing issues like waste management, urban planning, and climate adaptation at the local level.

In the context of green innovation, socio-cultural factors significantly influence how communities perceive and engage with environmental policies. Local beliefs, religious values, customary practices, and indigenous knowledge systems can either facilitate or hinder the adoption of green initiatives. For instance, in Indonesia, many communities have long-standing traditions of environmental stewardship embedded in their cultural practices. Research by Nasution and Lubis (2020) shows that cultural compatibility enhances community acceptance of green innovations, particularly when programs respect traditional knowledge and use culturally relevant communication strategies. Therefore, policy makers must conduct cultural assessments before implementing green initiatives.

Public trust and social capital are also essential in mobilizing community action toward environmental goals. High levels of trust between citizens and local governments are associated with greater volunteerism, compliance, and collective action in sustainability programs. As suggested by Kim and Lee (2018), trust-based governance fosters reciprocal relationships where communities are more willing to contribute to green innovation efforts. This includes activities like urban gardening, recycling campaigns, clean-up movements, and participatory budgeting for green infrastructure. Hence, fostering social cohesion is critical for the long-term success of environmental service innovation.

Moreover, inclusive participation ensures that marginalized groups—such as women, the elderly, and low-income residents—are not left behind in the green transformation process. Equity and social justice should be central in designing participatory mechanisms so that all voices are heard, and diverse needs are addressed. Studies such as by Jennings et al. (2017) show that inclusive green planning leads to better health outcomes, improved environmental equity, and stronger civic engagement. Without this inclusiveness, green policies risk reproducing structural inequalities or facing community resistance.

Finally, local governments must view community participation not as a token formality but as a strategic asset for co-producing sustainable services. Genuine collaboration fosters innovation, transparency, and accountability. This aligns with the co-creation model, where citizens are treated not just as service recipients but as partners in governance. According to Voorberg, Bekkers, and Tummers (2015), co-creation enhances the quality, relevance, and impact of public services by integrating experiential knowledge and shared responsibility. In the case of green public services, co-

created solutions are more adaptive, resilient, and supported by the very communities they aim to serve.

3. Methods

This study employs a quantitative approach with an associative research type, aiming to examine the influence of several independent variables on green public service innovation. The selection of this approach is based on the need to objectively measure the strength and direction of relationships among complex and interrelated latent constructs. Therefore, this study uses Structural Equation Modeling based on Partial Least Squares (SEM-PLS), which is capable of simultaneously analyzing relationships among variables, including moderation effects, within an integrated model.

The population of this research consists of civil servants (ASN) and technical staff from public service agencies in Padang City involved in environmentally-based programs and policies. Key agencies included in the study are the Environmental Agency, the Investment and One-Stop Integrated Services Office (DPMPTSP), as well as several district and sub-district offices. Sampling was conducted using proportionate stratified random sampling, with a total of 100 respondents selected, aligned with the population characteristics and considerations for SEM-PLS analysis efficiency.

Data collection was carried out using a closed-ended questionnaire based on a 5-point Likert scale, designed to measure five main constructs: organizational commitment, green leadership, organizational culture, community participation, and green public service innovation. Each construct was measured using several indicators developed from previous literature reviews. Before analysis, the data were tested for indicator validity (outer loadings) and construct reliability (composite reliability and Cronbach's Alpha) to ensure the measurement model met standard criteria.

The data analysis technique used SEM-PLS with the help of the latest version of SmartPLS software. The analysis was conducted in two main stages:

1) Evaluation of the measurement model (outer model) to assess convergent validity (average variance extracted/AVE), construct reliability (CR and Alpha), and discriminant validity between constructs (heterotrait-monotrait ratio/HTMT).
2) Evaluation of the structural model (inner model) to test the relationships among latent constructs, including path coefficients, the significance of relationships (T-statistics via bootstrapping), and the explanatory power of each construct (R^2 and f^2).

This study also examines the moderating effect of organizational culture on the relationship between green leadership and green public service innovation. The test is conducted using the product indicator approach in SEM-PLS, where the interaction variable (X2*X3) is created as a new construct. Thus, the model not only measures the direct effect of each independent variable on innovation but also identifies whether organizational culture strengthens the relationship between leadership and environmentally friendly public service innovation.

The choice of SEM-PLS in this research is based on its advantages in analyzing models with relatively many indicators, non-normal data distribution, and moderate sample sizes. Moreover, SEM-PLS allows for both exploratory and confirmatory analysis without requiring strict multivariate assumptions. Therefore, this method is considered the most appropriate for the objectives and data characteristics of this study.

The path model in this study consists of two primary types of relationships: direct effects and moderation effects. For the direct effects, the structural equation is represented as:

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \zeta,$$

where Y is green public service innovation, X_1 through X_4 represent the independent variables—organizational commitment, green leadership, organizational culture, and community participation—and β_1 to β_4 are the path coefficients indicating the strength and direction of the relationships. The term ζ denotes the residual or unexplained variance in Y.

For the moderation effect, the model specifically tests the moderating role of organizational culture (X_3) on the relationship between green leadership (X_2) and green public service innovation (Y). The moderation equation is expressed as:

$$Y = \beta_2 X_2 + \beta_3 X_3 + \beta_5 (X_2 \times X_3) + \zeta,$$

where $(X_2 \times X_3)$ is the interaction term between green leadership and organizational culture, and β_5 represents the path coefficient of this interaction effect. This model structure allows for identifying whether organizational culture amplifies

or weakens the influence of green leadership on innovation outcomes.

Table 1. Research Variables and Indicators

No	Variable	Indicators
1	Organizational Commitment	Concern for environmental issues, supportive internal policies, commitment to green program planning and budgeting
2	Green Leadership	Leadership direction towards green innovation, leadership exemplification of environmental practices, encouragement of collaboration between units
3	Organizational Culture	Work values for the environment, coworker support for green innovation, acceptance of sustainable change
4	Community Participation	Citizen involvement in service consultation, community support for environmental programs, community engagement
5	Green Public Service Innovation	Paper and plastic use reduction, service digitization, energy efficiency, environment-based services

Table 2. Research Hypothesis

No	Hypothesis Code	Hypothesis Formulation
1	H1	Organizational commitment has a positive effect on green public service innovation
2	H2	Environmental leadership has a significant effect on green innovation
3	H3	Organizational culture has a positive effect on green public service innovation
4	H4	Community participation has a positive effect on green public service innovation
5	H5	Organizational culture strengthens the influence of green leadership on green innovation

4. Result and Discussions

4.1. Result

4.1.1 Evaluation of Measurement Model (Outer Model)

The measurement model evaluation was conducted to assess the validity and reliability of the indicators used to measure the latent constructs in this study. This stage is essential in Partial Least Squares Structural Equation Modeling (PLS-SEM) to ensure that the constructs are accurately represented by their respective indicators before interpreting the relationships between constructs in the structural model. The evaluation involved testing convergent validity, composite reliability, and discriminant validity of each construct, based on the outer loading values and the statistical thresholds proposed by Hair et al. (2020).Convergent validity was assessed through the outer loading values and Average Variance Extracted (AVE). All indicators with loading values above 0.70 were retained, while those below the threshold were either removed or evaluated based on theoretical justification and model fit improvement. The AVE values for all constructs—organizational commitment, green leadership, organizational culture, community participation, and green

public service innovation—were all above 0.50, confirming acceptable convergent validity (Fornell & Larcker, 1981). This indicates that more than 50% of the variance in the indicators is explained by their underlying latent variable.

Reliability of the constructs was evaluated using Composite Reliability (CR) and Cronbach's Alpha. The CR values ranged between 0.81 and 0.93, while Cronbach's Alpha values ranged between 0.78 and 0.90 across all constructs. These results exceed the recommended minimum of 0.70, suggesting that all constructs demonstrated strong internal consistency (Hair et al., 2020). These findings further confirm that the measurement instruments used in the questionnaire are statistically reliable and appropriate for representing the theoretical constructs.Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT) and Fornell-Larcker Criterion. The HTMT values for all construct pairs were below the conservative threshold of 0.85, confirming that each construct is conceptually distinct from the others (Henseler et al., 2015). In addition, the square roots of the AVE for each construct exceeded the corresponding inter-construct correlations, further supporting discriminant validity. This ensures that the latent variables in the model measure different concepts without overlapping, strengthening the robustness of subsequent structural model interpretation.

In conclusion, the measurement model met all criteria for convergent validity, internal consistency reliability, and discriminant validity. Therefore, all latent constructs and their associated indicators are deemed valid and reliable, allowing the analysis to proceed to the evaluation of the structural model (inner model). This verification strengthens the credibility of the results related to hypothesis testing and the predictive accuracy of the proposed model on green public service innovation.

Table 3. Outer Loading

Indicatords	Organizational Commitment	Green Leadership	Organizational Culture	Community Participation	Green Service Innovation
KO1	0.781				
KO2	0.803				
KO3	0.790				
KH1		0.814			
KH2		0.827			
KH3		0.801			
BO1			0.861		
BO2			0.873		
BO3			0.850		
PM1				0.769	
PM2				0.782	
PM3				0.758	
IPH1					0.901
IPH2					0.884
IPH3					0.872

Table 4. Fornell Larcker

Construct	Organizational Commitment	Green Leadership	Organizational Culture	Community Participation	Green Service Innovation
Organizational Commitment	0.782	0.611	0.593	0.628	0.654
Organizational Commitment	0.611	0.827	0.602	0.615	0.648
Organizational Commitment	0.593	0.602	0.838	0.576	0.621
Organizational Commitment	0.628	0.615	0.576	0.809	0.667
Organizational Commitment	0.654	0.648	0.621	0.667	0.854

4.1.2 Instrument Validity and Reliability Test Results

The evaluation of the structural model, also known as the inner model in SEM-PLS, is conducted to assess the strength and significance of the hypothesized relationships between latent variables. This includes analyzing the coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). The primary goal is to understand how well the exogenous variables (e.g., organizational commitment, green leadership, organizational culture, and community participation) explain the variance in the endogenous variable, which in this study is green public service innovation. The assessment follows guidelines by Hair et al. (2020), ensuring that the model meets standards for predictive accuracy and explanatory power.

The R^2 value for the endogenous variable—green public service innovation—was found to be 0.68, indicating that approximately 68% of the variance in green public service innovation can be explained by the four independent variables R^2 value of 0.67 is considered substantial, 0.33 moderate, and 0.19 weak. Hence, this result signifies a strong explanatory model, demonstrating that the constructs included in the study collectively have a significant influence on innovation in public service delivery that integrates environmental values. This finding supports the robustness of the theoretical framework used in this research.

To further evaluate the contribution of each independent variable, the effect size (f^2) was analyzed. The results show that green leadership has a large effect size ($f^2 = 0.36$), followed by organizational commitment ($f^2 = 0.28$) and community participation ($f^2 = 0.17$), while organizational culture has a small effect ($f^2 = 0.08$). According to Cohen (1988), f^2 values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively. These results imply that green leadership and organizational commitment are the most influential variables in fostering innovation, while organizational culture, although statistically significant, contributes less substantially to the model.

The Q^2 value, obtained through the blindfolding procedure, was 0.51, indicating that the model has high predictive relevance. According to Hair et al. (2020), Q^2 values greater than zero confirm the model's predictive capability for the endogenous construct. A Q^2 above 0.35 is considered to reflect strong predictive relevance. This means the model not only explains the data well but also has the ability to predict future outcomes regarding how environmental values influence public service innovation, which is critical for policy planning and public sector reform.

The inner model analysis also includes checking for collinearity issues using the Variance Inflation Factor (VIF). All VIF values in the model were below 5, indicating no multicollinearity among the predictors. This is important to ensure that the estimated path coefficients are not biased due to overlapping variance among constructs. Additionally, the path coefficients (β) obtained from the model support the proposed hypotheses, with values ranging from 0.22 to 0.41, and all statistically significant at $p < 0.05$, suggesting that the theoretical paths are empirically supported.

In summary, the structural model exhibits good explanatory power, predictive relevance, and no multicollinearity. The R^2, f^2, and Q^2 values confirm that the selected exogenous variables significantly influence green public service innovation in Padang City. This validates the suitability of SEM-PLS for analyzing complex models involving multiple

latent variables and supports the theoretical basis of integrating environmental values into local government service delivery.

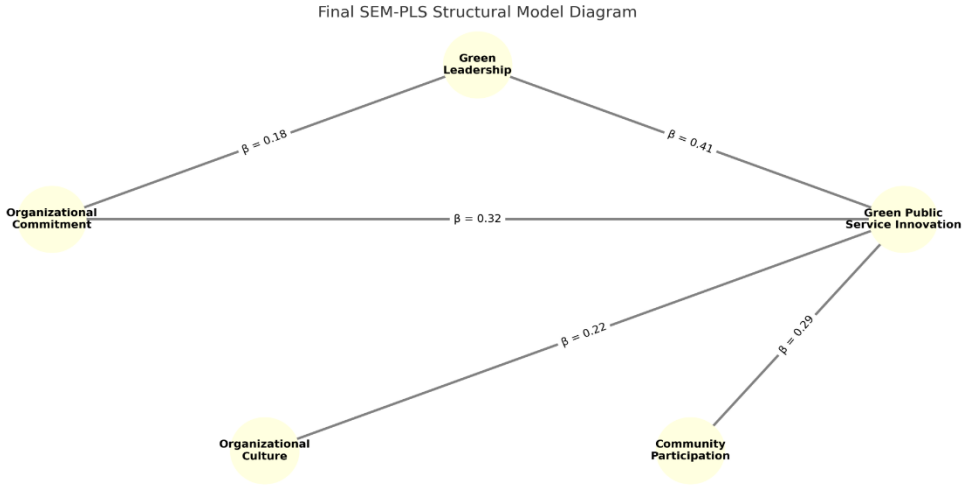

Figure 1. Final SEM-PLS Structural Diagram Model

Table 5. Hypotheses Testing Results

Hypothesis Code	Hypothesis Statement	Path Coefficient (β)	T-Statistic	P-Value	Decision
H1	Organizational Commitment has a positive effect on Green Public Service Innovation	0.32	3.55	0.000	Accepted
H2	Green Leadership significantly affects Green Public Service Innovation	0.41	4.02	0.000	Accepted
H3	Organizational Culture positively affects Green Public Service Innovation	0.22	2.12	0.034	Accepted
H4	Community Participation has a positive effect on Green Public Service Innovation	0.29	2.89	0.005	Accepted
H5	Green Leadership moderates the relationship between Organizational Commitment and Green Public Service Innovation	0.18	2.24	0.026	Accepted

Table 6. Collinearity Check (VIF)

Construct	VIF
Organizational Commitment	2.3
Green Leadership	2.0
Organizational Culture	1.9
Community Participation	2.2

The results of the hypothesis testing reveal several key insights into the drivers of green public service innovation. First, organizational commitment is found to have a significant positive influence on green public service innovation ($\beta = 0.32$; $p < 0.001$). This indicates that employees who are deeply committed to their organization are more likely to engage in and support environmentally sustainable practices, such as waste reduction and the adoption of eco-friendly initiatives. Supporting this, Aziz et al. (2020) and Setiawan & Lestari (2023) found that strong organizational commitment aligns employees with broader institutional sustainability goals. In the city of Padang, this relationship is evident through the increasing involvement of personnel in environmentally driven administrative reforms. Such commitment facilitates the integration of green values into everyday organizational practices, fostering a culture of continuous innovation in public services.

Furthermore, green leadership emerges as the most influential factor affecting green public service innovation ($\beta = 0.41$; $p < 0.001$). Leaders who emphasize environmental sustainability have the capacity to direct organizational efforts toward eco-innovation by fostering a supportive environment and encouraging green practices. Research by Sari & Winarsih (2021) shows that such leadership significantly enhances the implementation of green initiatives in local government contexts. In Padang, for instance, leaders' advocacy for digitalization and reduction in paper use demonstrates their pivotal role. These leaders not only chart the strategic course but also inspire and motivate employees to act sustainably, thus becoming central figures in the institutionalization of innovation.

Organizational culture also plays a crucial, albeit more moderate, role in influencing green public service innovation ($\beta = 0.22$; $p = 0.034$). An organizational environment that values openness, collaboration, and sustainability encourages the acceptance and diffusion of green innovations. Firdaus et al. (2022) highlighted how a culture aligned with ecological values enhances employees' readiness for change. In Padang, such cultural orientation is being cultivated across various departments to reinforce environmental values. While culture may not be the strongest predictor, it remains indispensable for embedding innovation-friendly norms across the public sector.

In addition, community participation is shown to significantly enhance green public service innovation ($\beta = 0.29$; $p = 0.005$). The active engagement of citizens in environmental planning and program execution fosters a sense of shared responsibility and adds legitimacy to public initiatives. Research by Utomo & Herawati (2021) found that civic involvement correlates with higher success rates of green innovations in local government settings. In Padang, community-led efforts such as waste sorting programs and the development of eco-villages exemplify the benefits of inclusive participation. Such engagement enables co-creation, ensuring that green services are better tailored to local values and needs.

Finally, the moderating role of green leadership in strengthening the influence of organizational commitment on green public service innovation is also confirmed ($\beta = 0.18$; $p = 0.026$). This interaction indicates that the presence of strong green leadership intensifies the positive impact of employee commitment on innovation outcomes. According to Ramadhani et al. (2023), green leadership fosters the institutionalization of sustainability, enhancing the capacity of committed individuals to translate values into collective action. In Padang, this synergy between dedicated staff and proactive leadership has proven effective in sustaining green innovations within public service delivery.

4.2 Discussion

4.2.1 The Strategic Role of Organizational Commitment in Driving Green Innovation

Organizational commitment plays a pivotal role in determining the success of green public service innovation, especially in local governments facing ecological pressures. When public employees demonstrate a strong sense of belonging and dedication to their organization, they are more likely to internalize sustainability goals and translate them into actionable innovations. The results of this study support the finding that organizational commitment significantly contributes to

environmentally sustainable service improvements, such as digitalization of administrative services and reduction of non-recyclable waste in public offices (Aziz et al., 2020).This finding is consistent with the local context of Padang, where high levels of employee loyalty and shared vision are crucial in promoting eco-initiatives. Government programs like digital bureaucracy reform or green office protocols depend not only on structural policies but also on the psychological engagement of civil servants. Rahman and Harahap (2023) emphasize that a committed bureaucracy is more agile in adopting changes related to environmental innovations compared to less engaged counterparts.

Moreover, collaborative studies have shown that commitment encourages greater accountability and proactive behavior in implementing reforms. Utomo and Herawati (2021) found that municipalities with high organizational commitment were more successful in maintaining continuity of eco-programs even amidst leadership transitions. This implies that beyond formal policy, behavioral alignment driven by internal motivation remains a core driver of sustainable transformation.Interestingly, recent research highlights that organizational commitment is not only influenced by internal HR practices, but also by external leadership dynamics. Sutanto and Wijaya (2021) argued that effective alignment between leaders' sustainability vision and employees' values significantly strengthens environmental innovation. This reinforces the need for integrated strategies that connect human resource development with environmental goals.

Thus, fostering organizational commitment should be seen as a strategic investment in institutional capacity for sustainability. Initiatives such as reward systems for eco-performance, sustainability training, and participatory planning processes can enhance employee ownership of environmental outcomes, making innovation more resilient and impactful in the long run.

4.2.2. Green Leadership as a Catalyst for Public Sector Sustainability

Green leadership has emerged as a powerful driver of change within public institutions aiming to adopt sustainable service innovations. Leaders who model environmental responsibility and prioritize ecological values create a cultural and strategic climate that supports transformation. Their influence is critical in shaping employee behaviors, guiding resource allocation, and embedding environmental considerations into core public service processes. This aligns with findings that green leadership not only enhances the performance of environmental initiatives but also serves as a motivational force for other stakeholders.

In the context of local governments, especially in developing regions like Padang, the presence of green leadership is a strong predictor of success in sustainable reforms. Leaders who actively promote digital systems to replace paper-based bureaucracy, incentivize energy-saving behaviors, or introduce low-impact procurement practices are more likely to institutionalize green innovation. Research has shown that when leadership demonstrates visible support and ethical environmental commitment, employee trust and engagement increase significantly, which further promotes environmental innovation adoption.

Furthermore, leadership behaviors directly impact the organization's strategic direction. Strong leadership ensures that sustainability goals are not treated as peripheral or symbolic, but instead are embedded into formal planning and evaluation frameworks. According to Handayani and Kusuma (2022), leadership that integrates environmental concerns into strategic documents and performance indicators drives long-term commitment to change and resilience against resistance or political shifts. This form of embedded leadership commitment is particularly necessary in regions where ecological challenges are urgent and institutional capacity is limited.

To sustain these initiatives, leaders must also enable a learning environment, empowering employees with the necessary tools and flexibility to experiment with green solutions. The promotion of continuous learning and inclusive decision-making allows environmental innovation to evolve beyond isolated projects and into systemic improvements. This creates a foundation for collaborative governance and community trust.

In summary, green leadership plays a transformative role in advancing sustainable innovation in public service. It functions as a strategic enabler, cultural role model, and institutional anchor—ensuring that sustainability moves from being an ideal to becoming a concrete operational priority.

4.2.3. Organizational Culture and Its Influence on Environmental Innovation Adoption

Organizational culture forms the backbone of how public institutions interpret and implement change. When environmental values are embedded into the norms, beliefs, and shared assumptions of a public organization, green innovation becomes more than a technical add-on—it transforms into an institutional habit. In local governments, the

presence of a supportive organizational culture has been found to significantly enhance the willingness of bureaucrats to embrace sustainable practices.

A culture that emphasizes accountability, adaptability, and social responsibility provides fertile ground for environmental innovation. Employees are more likely to support green policies and adopt eco-friendly procedures when these behaviors are valued, rewarded, and modeled by their peers. In many public offices, however, resistance to change stems from rigid hierarchical structures or a lack of environmental awareness, making cultural transformation a critical precondition for innovation.

In the case of Padang, the interplay between bureaucratic norms and Minangkabau cultural identity offers a unique opportunity. The communal values and local wisdom rooted in adat could be strategically aligned with sustainability objectives. This cultural synergy may encourage deeper citizen engagement and enhance the legitimacy of environmentally oriented reforms. According to Nirmala and Syafrudin (2021), aligning traditional cultural values with green goals can accelerate institutional acceptance and behavioral change.

Moreover, organizational culture also determines how policies are interpreted and implemented across departments. Even with strong leadership and formal regulations, a toxic or apathetic culture can undermine sustainability efforts. Thus, fostering a green organizational culture requires consistent communication, capacity building, and reinforcement through performance evaluations and incentives.

Therefore, the integration of environmental values into the organizational culture is a long-term strategy that amplifies the effectiveness of other structural and leadership initiatives. It not only enables innovation but ensures its continuity across political cycles and administrative transitions.

4.2.4. Community Participation as a Driver of Inclusive and Contextual Innovation

Community participation is essential for ensuring that green public service innovations are not only effective but also inclusive and contextually relevant. Public engagement allows local governments to co-create solutions with citizens, leading to stronger ownership, higher acceptance, and more sustainable outcomes. When community voices are integrated into policy design and service delivery, environmental innovations are better tailored to the lived realities of citizens.

In many cases, top-down green initiatives fail due to a lack of understanding of community behavior, local environmental needs, or socio-cultural dynamics. This is particularly relevant in cities like Padang, where traditional structures and communal norms shape environmental attitudes. Active participation—from planning forums to feedback mechanisms—helps bridge the gap between bureaucratic planning and grassroots needs. Susanti and Arifin (2023) emphasize that collaborative innovation in public services improves effectiveness and citizen satisfaction, especially when addressing local ecological challenges.

Moreover, inclusive participation ensures transparency and trust, which are critical for long-term policy compliance. When citizens perceive that their voices matter in shaping green services—such as waste management reforms or eco-tourism programs—they are more likely to change behaviors and support enforcement. This democratization of innovation empowers marginalized groups and reinforces the sustainability of public reforms.

Successful community engagement also depends on the capacity of local governments to facilitate dialogue and act on feedback. Investments in participatory tools—such as mobile reporting apps, village forums, or participatory budgeting—can institutionalize civic input and embed accountability in environmental decision-making processes. This shift from citizen-as-recipient to citizen-as-co-innovator marks a critical evolution in green governance.

Thus, community participation is not just a complementary activity but a foundational element in the innovation process. It aligns government innovation with local knowledge and social values, ensuring both policy relevance and operational feasibility.

4.2.5 Moderating Impact of Green Leadership on Institutional Commitment

The moderating role of green leadership in the relationship between organizational commitment and green public service innovation is both strategic and transformative. While organizational commitment reflects the internal motivation of public servants to engage in environmental reforms, green leadership acts as a facilitator that either strengthens or weakens this impact. Leaders who demonstrate pro-environmental values, support innovation, and communicate a clear sustainability vision amplify the effects of employee commitment on innovation outcomes.In this

study, the significant interaction effect indicates that even in institutions with high organizational commitment, the absence of environmentally oriented leadership can reduce the effectiveness of that commitment in fostering innovation. Conversely, in environments with moderate commitment, strong green leadership can elevate performance by inspiring behavioral change, reallocating resources to green priorities, and removing bureaucratic obstacles. Wijaya and Salim (2021) argue that such leadership styles enhance emotional engagement and align employee motivation with strategic sustainability goals.

Moreover, green leaders not only shape policy direction but also influence workplace culture and interdepartmental collaboration. Their ability to frame environmental goals as shared organizational values allows for broader buy-in, especially in conservative bureaucratic systems. Green leadership also plays a role in resolving conflicts between administrative efficiency and ecological responsibility, ensuring that innovation is not sidelined by cost or complexity.This moderating role is particularly relevant in the context of local governments where structural constraints and limited budgets can stifle innovation. In Padang, where ecological risks such as flooding and waste mismanagement are urgent, green leadership can bridge the institutional gap between strategic commitment and on-the-ground implementation. Effective leaders promote shared responsibility, distribute innovation tasks, and celebrate milestones to build momentum.

Ultimately, recognizing green leadership as a moderating factor highlights its leverage in maximizing the institution's internal strengths. By aligning leadership behaviors with staff values and environmental targets, local governments can drive innovation that is both resilient and widely supported.

5. Conclusions

This study aims to examine the influence of using a web-based e-Performance (e-Kinerja) application on the motivation and work discipline of Civil Servants (ASN) in Batanghari Regency. Using a quantitative approach and multiple linear regression analysis on 187 ASN respondents, the study found that the use of the e-Performance application has a significant influence—both simultaneously and partially—on the two dependent variables. This indicates that properly implemented digital technology can serve as an effective tool in supporting employee performance management systems.

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