

Analyzing the Effect of Green HRM on Employee Performance: The Mediating Role of Artificial Intelligence

*Effect Green HRM
on Employee
Performance*

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Submitted:

JUNE 2025

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Accepted:

SEPTEMBER 2025

ABSTRACT

In the era of globalization and increasing environmental awareness, organizations are required to not only pursue productivity and profits but also ensure operational sustainability through Green Human Resource Management (GHRM) strategies. This study aims to evaluate the influence of green abilities and green motivation components on employee performance and examine the mediating role of Artificial Intelligence (AI) in strengthening this relationship. A survey was conducted on 175 Civil Servants (Pegawai Negeri Sipil/PNS) in West Sumatra, and quantitative approach was used, and a survey was conducted on 175 Civil Servants (Pegawai Negeri Sipil/PNS) in West Sumatra. The data were analyzed using Structural Equation Modeling with the Partial Least Squares (PLS) method. The results show that green abilities significantly influence AI utilization and employee performance, while green motivation directly improves performance but has no effect on AI utilization. The role of AI is also proven to be positive, having a direct impact on performance and serving as a mediator between green abilities and employee outcomes. Conversely, AI does not mediate the relationship between green motivation and performance in a statistically significant manner. These findings emphasize the importance of building environmental competencies through green training and integrating AI-based solutions to support sustainable performance in the public sector.

Keywords: *Artificial Intelligence, Civil Servants, Employee Performance, Green Human Resource Management.*

ABSTRAK

Di era globalisasi dan meningkatnya kesadaran lingkungan, organisasi dituntut tidak hanya mengejar produktivitas dan keuntungan, tetapi juga memastikan keberlanjutan operasional melalui strategi Manajemen Sumber Daya Manusia Hijau (GHRM). Studi ini bertujuan untuk mengevaluasi pengaruh komponen kemampuan ramah lingkungan dan motivasi ramah lingkungan terhadap kinerja karyawan dan mengkaji peran mediasi Kecerdasan Buatan (AI) dalam memperkuat hubungan ini. Dengan pendekatan kuantitatif, survei dilakukan terhadap 175 Pegawai Negeri Sipil (PNS) di Sumatera Barat, dan data dianalisis menggunakan Structural Equation Modeling dengan metode Partial Least Squares (PLS). Hasil penelitian menunjukkan bahwa kemampuan ramah lingkungan secara signifikan memengaruhi pemanfaatan AI dan kinerja karyawan, sementara motivasi ramah lingkungan secara langsung meningkatkan kinerja tetapi tidak berpengaruh pada pemanfaatan AI. Peran AI juga terbukti positif, berdampak langsung

JIMKES

Jurnal Ilmiah Manajemen
Kesatuan
Vol. 13 No. 5, 2025
pp. 3837-3842
IBI Kesatuan
ISSN 2337 – 7860
E-ISSN 2721 – 169X
DOI: 10.37641/jimkes.v13i5.3693

pada kinerja dan berfungsi sebagai mediator antara kemampuan ramah lingkungan dan hasil kerja karyawan. Sebaliknya, AI tidak memediasi hubungan antara motivasi ramah lingkungan dan kinerja secara signifikan secara statistik. Temuan ini menekankan pentingnya membangun kompetensi lingkungan melalui pelatihan ramah lingkungan dan mengintegrasikan solusi berbasis AI untuk mendukung kinerja berkelanjutan di sektor publik.

Kata kunci: Kecerdasan Buatan, Kinerja Karyawan, Manajemen Sumber Daya Manusia Hijau.

INTRODUCTION

In the era of globalization, organizations must now prioritize environmental sustainability in addition to productivity and profitability. Therefore, Human Resource Management (HRM), which manages the primary asset, namely the workforce (Amjad et al., 2021), must implement Green Human Resource Management (GHRM). GHRM implements HRM policies that support sustainable resource utilization and prioritize environmental aspects, which increases employee motivation and satisfaction. One important component is a green performance measurement and assessment method Malik et al. (2021), which reflects sustainable behavior and results achieved each period (Ardiza et al., 2021; Mansoor et al., 2021). GHRM implementation has been shown to improve employee performance, align the company's environmental and economic goals, and promote sustainable development (Zhu et al., 2021). Empirical studies also show that GHRM increases employee engagement, satisfaction, and productivity. Several academics emphasize the importance of proper GHRM practices to improve employee performance (Ardiza et al., 2021; Zahrani, 2024; Faeni, 2024).

Green Human Resource Management (GHRM) is influenced by several factors, one of which is green abilities, namely the ability of employees to implement environmentally responsible behaviors and practices (Alshammari & Alshammari, 2023). This ability not only demonstrates an individual's commitment to sustainability but also positively impacts employee performance, as evidenced by research showing that increased knowledge and skills regarding environmental issues can improve work performance (Faeni, 2024; Hung et al., 2025). Developing these green abilities also requires environmental training, energy efficiency education, and waste management. A second dimension supporting GHRM is Green Motivation, namely internal employee motivation guided by a personal commitment to sustainability, such as respect for nature and awareness of resource conservation (Firmansa & Wiyadi, 2023; Ilmi & Juliana, 2023; Meng et al., 2024). This motivation encourages pro-environmental actions that stem from life values, not just company policies (Wei et al., 2024). Previous studies confirmed the influence of green motivation on employee performance (Charli et al., 2020; Carli & Sopali, 2023).

GHRM research is often comprehensive, without highlighting the specific role of dimensions such as green abilities and Green motivation, and with minimal discussion of technological factors such as AI as moderators (Gomes et al., 2023; Ramachandaran et al., 2024; Weber & Kassab, 2024). Green abilities refer to an individual's ability to adopt environmentally friendly behaviors (Alshammari & Alshammari, 2023). Research shows that increasing this knowledge and these skills, including environmental training, energy efficiency, and waste management, can improve employee performance (Faeni, 2024; Hung et al., 2025). Meanwhile, Green Motivation, an internal motivation driven by a personal commitment to sustainability (Charli et al., 2020; Carli and Sopali, 2023), encourages pro-environmental actions stemming from life values (Meng et al., 2024; Wei et al., 2024). Furthermore, the use of AI, defined as technology that makes machines think and function more intelligently, has been shown to have a significant positive impact on employee performance (Tong et al., 2021; Priyanka, 2024; Mahzum & Charli, 2025).

Performance Management is a strategy used to encourage employee professional development to achieve company goals (Faeni, 2024). Farida et al. (2024) and Panjaitan et al. (2025) state that employee performance is the result of the quantity and quality of

work performed according to the task. Purnandika and Fazri (2023) argue that performance reflects work results that meet standards within a certain time. In the context of environmental sustainability, performance includes environmental protection activities that are part of formal job responsibilities (Ones & Dilchert, 2012; Hung et al., 2025).

This study aims to investigate the impact of green competency and green motivation on employee performance and how Artificial Intelligence (AI) moderates this relationship. The main focus of the study is to provide an empirical understanding of the integration of principles and technology in HRM to promote sustainable performance. GHRM emphasizes the development of green competency and internal motivation, while AI plays a role as a strengthening factor in the relationship between the two and employee performance. Various studies have shown a positive relationship between GHRM and performance, but they are still limited in highlighting the specific role of green competency and green motivation, as well as the use of AI as a moderating variable, especially in the context of Indonesian organizations. This study empirically examines the influence of these two dimensions and the role of AI in strengthening the impact on employee performance. The results are expected to provide theoretical and practical contributions in the development of greener and technology-based HRM practices in the Industry 4.0 era.

LITERATURE REVIEW & HYPOTHESES DEVELOPMENT

Green Abilities, Green Motivation, and Artificial Intelligence Adoption

Green Human Resource Management (GHRM) integrates environmentally friendly practices into organizational processes such as recruitment, training, and performance management to foster sustainable employee behavior (Bidin, 2021; Ogbeibu et al., 2024). Green Abilities refer to employees' skills and knowledge in implementing eco-friendly practices, such as resource efficiency and waste management, which enhance organizational sustainability (Alshammari & Alshammari, 2023). These abilities are critical as they enable employees to align their tasks with environmental goals, improving operational efficiency and commitment to green initiatives (Siddhartha, 2022). Studies show that employees with strong green abilities demonstrate higher engagement in sustainable practices, which can spur the adoption of advanced technologies like Artificial Intelligence (AI) (Faeni, 2024). AI, defined as technology enabling intelligent machine functions, supports green practices through data analysis, real-time monitoring, and adaptive training (Tong et al., 2021). For instance, AI-driven tools can optimize resource use, reducing waste and enhancing sustainability efforts (Roy et al., 2013). Green Motivation, an intrinsic drive rooted in personal environmental ethics, encourages employees to adopt sustainable behaviors beyond organizational mandates (Purba et al., 2024). This motivation, grounded in self-determination theory, fosters proactive engagement in green practices (Anshima et al., 2025). However, its influence on AI adoption may vary, as motivation alone may not suffice without technical proficiency (Susanto & Nopiyanti, 2020; Russell, 2024; Budiherwanto, 2025). Organizations leveraging green abilities and motivation can enhance AI adoption, aligning employee efforts with technological advancements for sustainability.

H1: Green abilities have a positive effect on employee use of AI.

H2: Green motivation has a positive effect on employee use of AI.

Green Abilities, Green Motivation, Use of AI, and Employee Performance

Green Abilities significantly contribute to employee performance by equipping individuals with the knowledge to implement sustainable practices effectively (Alshammari & Alshammari, 2023). Research indicates that employees trained in environmental competencies, such as energy efficiency and waste reduction, exhibit improved task efficiency and organizational commitment (Hung et al., 2025). This aligns with the resource-based view, where unique competencies enhance performance outcomes (Chen et al., 2025). Green motivation, driven by personal values like

environmental ethics, also directly boosts performance by fostering dedication to sustainable tasks (Charli et al., 2020; Carli & Sopali, 2023). Employees with high green motivation often exceed job requirements, positively influencing team dynamics and productivity (Chowdhury et al., 2025). Artificial Intelligence further enhances performance by streamlining processes, providing real-time analytics, and automating routine tasks, which allows employees to focus on high-value activities (Mahzum & Charli, 2025). AI's role in performance management includes personalized feedback and adaptive training, which amplify the impact of green competencies (Malik et al., 2022). Studies show that AI-driven systems improve efficiency by up to 30% in large-scale operations, supporting sustainable performance (Priyanka, 2024). Both green abilities and motivation, when supported by AI, align individual efforts with organizational sustainability goals, enhancing overall performance in the workplace.

H3: Green abilities have a positive effect on employee performance.

H4: Green motivation has a positive effect on employee performance.

H5: AI use has a positive effect on employee performance.

Use of AI as a Mediator

The integration of Artificial Intelligence (AI) in Green Human Resource Management (GHRM) serves as a critical mediator, enhancing the relationship between green competencies and employee performance (Tong et al., 2021). Green abilities, encompassing skills in sustainable practices, benefit from AI's capabilities in data analytics and real-time feedback, which optimize resource use and improve task efficiency (Faeni, 2024). AI acts as a bridge, translating green skills into measurable performance outcomes by enabling precise monitoring and adaptive training systems (Roy et al., 2013). For instance, AI-driven tools can track environmental metrics, ensuring employees' green efforts align with organizational goals (Malik et al., 2022). Green motivation, while a strong driver of pro-environmental behavior, may not directly translate to performance through AI without sufficient technical integration (Purba et al., 2024). Studies suggest that AI's mediation is more effective for green abilities due to their technical nature, whereas motivation relies more on intrinsic values (Chowdhury et al., 2025). The mediation effect of AI is evident in its ability to amplify green competencies, making them more impactful through automation and personalized development plans (Priyanka, 2024). However, the digital divide, including limited AI literacy, may hinder its mediating role for motivation-driven behaviors (Mahzum & Charli, 2025). Thus, AI's integration in GHRM is pivotal for maximizing the impact of green abilities and, to a lesser extent, green motivation on sustainable employee performance.

H6: AI use mediates the effect of green abilities on employee performance.

H7: AI use mediates the effect of green motivation on employee performance.

Figure 1 presents a conceptual framework explaining how green abilities and green motivation influence employee performance, with Artificial Intelligence (AI) as an intervening and moderating variable. Green abilities encompass knowledge and skills in implementing environmentally friendly work practices, directly tested to improve performance through resource efficiency, waste reduction, and sustainable policies (H1); while simultaneously encouraging the adoption of AI technology. Meanwhile, green motivation, as an intrinsic drive to support sustainability, motivates employees to achieve productive and environmentally oriented performance (H4) and encourages the use of AI (H2). AI here takes the form of systems that support workers with fast and accurate decision-making, adaptive training, and real-time performance monitoring. AI acts as a bridge between green abilities/motivation and performance (H5, H6), and strengthens the effects of both on performance (H7). Employee performance itself is measured by effectiveness and efficiency in completing tasks, including contributions to the organization's sustainability goals.

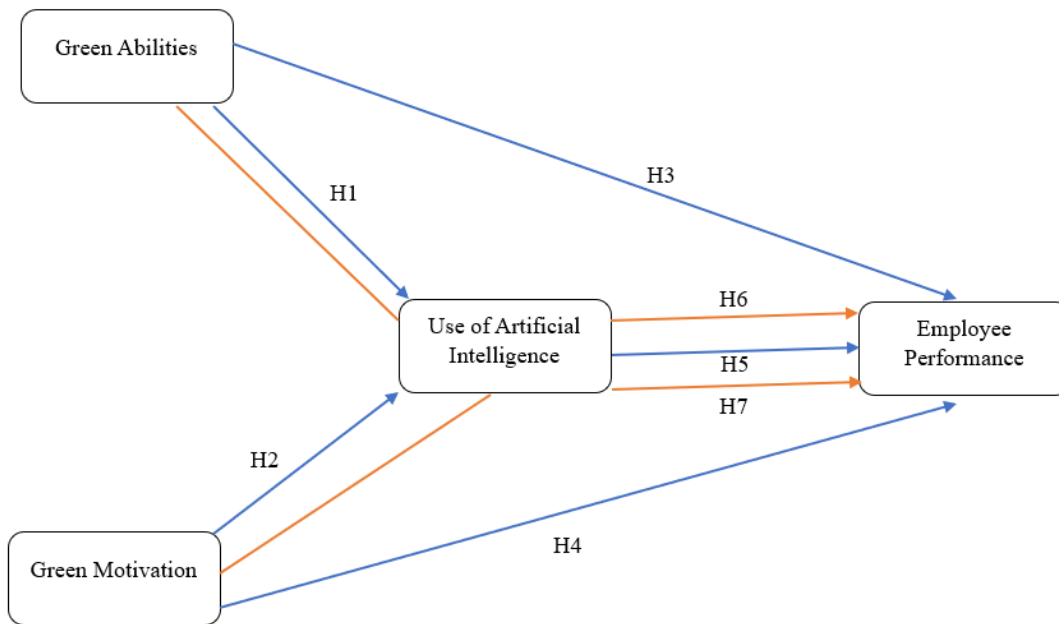


Figure 1. Research Framework

RESEARCH METHOD

This study employed a quantitative research approach, utilizing a closed-ended questionnaire based on a 1–5 Likert scale to collect objective and measurable numerical data. The focus of the study was on civil servants in the public sector of West Sumatra, who were selected due to their strategic role in implementing technology, particularly Artificial Intelligence (AI), to enhance performance. A total of 175 respondents were chosen through simple random sampling, a widely recognized method in quantitative survey design. This approach ensures that every individual has an equal opportunity to be selected, thereby producing a representative sample that reflects the broader population.

The research instrument was meticulously developed based on previously tested indicators, which ensured both construct validity and measurement sensitivity. This careful design is crucial in quantitative research, as it enhances the reliability of the findings and allows for meaningful interpretations of the data collected.

Data analysis was conducted using Structural Equation Modeling (SEM) with the Partial Least Squares (PLS) method. This analytical technique is particularly well-suited for testing complex theoretical models that involve a large number of significant indicators. The evaluation of the model was carried out in two distinct stages: first, the measurement model assessment, which focused on validity and reliability; and second, the structural model assessment, which involved hypothesis testing. The analysis was performed using SmartPLS version 4.1, the latest software that offers advanced features such as graphical analysis of variance, moderation, mediation, and confirmatory tetrad analysis.

The PLS–SEM algorithm in SmartPLS executes iterative regressions to derive latent variable scores and path coefficients within the model (Hair et al., 2023). This iterative process enhances the robustness of the analysis, allowing for a more nuanced understanding of the relationships among the variables studied. The comprehensive design of this research, from the quantitative methodology and representative sampling to the use of valid instruments and SEM–PLS analysis, provides a solid empirical foundation for examining the influences of green ability, green productivity, and AI on employee performance.

The strength of this research method lies in its capacity to test not only direct relationships but also the mediating or moderating influences within the research framework. Employing this rigorous approach, the study aims to contribute valuable insights into how technological advancements, particularly AI, can be leveraged to improve performance in the public sector, thereby enhancing overall efficiency and effectiveness in service delivery. This research is expected to inform policymakers and organizational leaders about the critical role of technology in fostering a productive work environment.

RESULTS

In this study, data analysis encompasses both the evaluation of the measurement model (external model) and the structural model (internal model). The measurement model assessment aims to confirm that the indicators used are valid and reliable in representing the intended constructs. Meanwhile, the structural model analysis is conducted to assess the magnitude and direction of the relationships among the key variables in the research framework, namely green capability, green motivation, the use of artificial intelligence, and employee performance. This dual testing ensures that the proposed model can accurately and consistently explain the underlying causal relationships.

Figure 2 illustrates the results of the measurement model analysis, showing the factor loadings for each indicator related to green capability, green motivation, AI utilization, and employee performance. All indicators demonstrate strong factor loadings above the threshold of 0.70, confirming that each item significantly contributes to its respective latent construct.

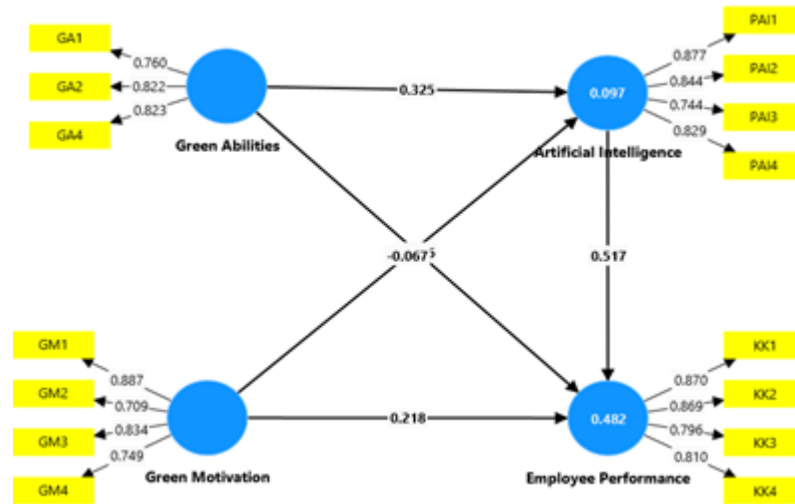


Figure 2. Outer Loading

Table 1. Reliability Test

Variable	Cronbach's Alpha	Composite Reliability
Green Abilities	0.725	0.736
Green Motivation	0.820	0.881
Artificial Intelligence	0.846	0.872
Employee Performance	0.857	0.860

Reliability test is conducted to measure the internal consistency of the indicators in each construct. The two measures used in this test are Cronbach's Alpha and Composite Reliability. Based on Table 1, all variables in the research model show Cronbach's Alpha and Composite Reliability values above the minimum threshold value of 0.7, which indicates that these constructs have good reliability

In detail, the Green Abilities variable has a Cronbach's Alpha value of 0.725 and a Composite Reliability of 0.736, which means it is reliable even though it is at the lower

limit. The Green Motivation variable shows a Cronbach's Alpha value of 0.820 and a Composite Reliability of 0.881, which indicates excellent reliability. Artificial Intelligence and Employee Performance have Cronbach's Alpha values of 0.846 and 0.857, respectively, and Composite Reliability values of 0.872 and 0.860. These results indicate that all variables have a sufficient level of internal consistency to be used in further structural model analysis.

Table 2. Validity Test

Variable	Average Variance Extracted (AVE)
Artificial Intelligence	0.681
Employee Performance	0.700
Green Abilities	0.644
Green Motivation	0.636

The construct validity in this study was tested using the Average Variance Extracted (AVE) value as an indicator of convergent validity. The AVE value shows how much the proportion of variance from the indicator can be explained by the latent construct concerned. AVE value must exceed the 0.50 threshold, which indicates that the construct has been able to capture more than half of the variance of the indicators that measure it.

Table 2 shows all variables' AVE values that exceed 0.50, which means that the four constructs have met the criteria for convergent validity. This indicates that the indicators used in each construct have been able to represent the construct accurately and consistently. Thus, the constructs in this study are declared valid and suitable for use in further structural analysis stages using Partial Least Squares Structural Equation Modeling (PLS-SEM).

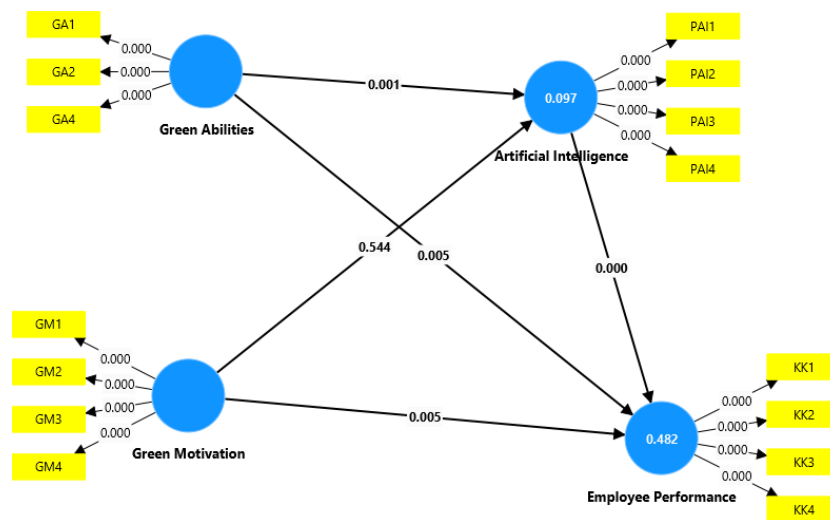


Figure 3. Full Results

Figure 3 depicts a PLS-SEM model with four constructs: Green Abilities, Green Motivation, Artificial Intelligence (AI), and Employee Performance. The R^2 values indicate the explained variability: AI accounts for only 9.7%, while performance accounts for 48.2%. The path coefficients from Green Abilities and Green Motivation to AI are very small ($\beta = 0.001$ and 0.005 , respectively), indicating no significant effect. AI has no significant impact on performance ($\beta = 0.000$), and the direct effect of Green Motivation on performance is also very weak ($\beta = 0.005$). The Green \rightarrow AI \rightarrow Performance mediation path is ineffective due to AI's minimal contribution. Although the model explains almost half of the variance in performance, these data indicate that AI does not play a significant role in the relationship between green abilities or motivation and employee performance, indicating the need for model refinement or the addition of supporting variables.

Table 3. Hypothesis Testing

Hypothesis	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Green Abilities -> Artificial Intelligence	0.098	3.321	0.001
Green Motivation -> Artificial Intelligence	0.110	0.607	0.544
Green Motivation -> Employee Performance	0.077	2.838	0.005
Green Abilities -> Employee Performance	0.084	2.818	0.005
Artificial Intelligence -> Employee Performance	0.089	5.802	0.000
Green Abilities -> Artificial Intelligence -> Employee Performance	0.067	2.496	0.013
Green Motivation -> Artificial Intelligence -> Employee Performance	0.059	0.587	0.558

Table 3 displays the direct and indirect relationships between variables. First, Green Abilities → Artificial Intelligence shows a significant effect with a t-statistic value of 3.321 and $p = 0.001$ ($p < 0.01$), indicating that employee green abilities significantly increase AI adoption. Conversely, the Green Motivation → Artificial Intelligence path is not significant ($t = 0.607$; $p = 0.544$), so green motivation has no impact on AI adoption. Then, both paths Green Motivation → Employee Performance ($t = 2.838$; $p = 0.005$) and Green Abilities → Employee Performance ($t = 2.818$; $p = 0.005$) are both significant ($p < 0.01$), indicating that green abilities and motivation directly improve employee performance. Artificial Intelligence → Employee Performance proved highly significant ($t = 5.802$; $p = 0.000$), indicating that the use of AI directly has a positive impact on performance. For the mediation effect, the Green Abilities → AI → Performance path was significant ($t = 2.496$; $p = 0.013$), meaning AI acts as a mediator between green capabilities and performance. However, the Green Motivation → AI → Performance mediation path was not significant ($t = 0.587$; $p = 0.558$), indicating that AI does not mediate the relationship between green motivation and performance. Based on the statistical criteria ($t \geq 1.96$; $p < 0.05$) commonly used in PLS-SEM, it can be concluded that green capabilities contribute both directly and through AI to performance, while green motivation only contributes directly, without involving AI.

DISCUSSION

The results of the hypothesis testing provide valuable insights into the relationships between Green Abilities, Green Motivation, Artificial Intelligence (AI) adoption, and employee performance among civil servants in West Sumatra. Green Abilities significantly influence AI adoption ($t=3.321$; $p=0.001$) and employee performance ($t=2.818$; $p=0.005$), confirming that environmental competencies, such as knowledge of resource efficiency and waste management, drive both technological integration and performance outcomes. This aligns with Mehrajunnisa et al. (2023), who found that environmental competencies spur AI-driven digital transformation in sustainability-focused organizations. Zhu et al. (2021) noted that employees with green skills enhance operational efficiency, which is further amplified by AI tools like real-time analytics and adaptive training systems. In the public sector context, where bureaucratic constraints often hinder innovation, Green Abilities enable civil servants to implement sustainable practices effectively, such as optimizing energy use in government offices, thereby improving task efficiency and organizational sustainability.

In contrast, Green Motivation does not significantly influence AI adoption ($t=0.607$; $p=0.544$), though it directly enhances employee performance ($t=2.838$; $p=0.005$). This suggests that intrinsic motivation rooted in environmental ethics, as described by Purba et al. (2024), encourages sustainable behaviors but lacks the technical alignment needed to drive AI use. Susanto and Nopiyanti (2020) emphasize that environmental motivation requires technological support to maximize impact, which may explain this non-significant relationship. The lack of AI literacy among civil servants or limited access to AI infrastructure in public sector settings could further hinder the translation of Green Motivation into technology adoption. This finding contrasts with Chowdhury et al.

(2025), who reported that green motivation indirectly enhances performance through organizational support, suggesting that external factors like training or infrastructure are critical for technological integration.

AI's direct impact on employee performance is substantial ($t=5.802$; $p=0.000$), highlighting its role in improving efficiency and productivity. Mitchell (2024) underscores AI's ability to streamline processes, such as automating environmental reporting, which reduces low-value tasks and enhances decision-making. The mediation analysis reveals that AI significantly mediates the relationship between Green Abilities and performance ($t=2.496$; $p=0.013$), acting as a catalyst that amplifies the impact of environmental competencies. For instance, AI-driven tools can monitor waste reduction initiatives, providing real-time feedback that strengthens employees' green practices (Malik et al., 2022). However, AI does not mediate the relationship between Green Motivation and performance ($t=0.587$; $p=0.558$), likely due to the intrinsic nature of motivation, which may not directly translate into technology-driven outcomes without technical proficiency (Mahzum & Charli, 2025). This aligns with Amjad et al. (2021), who suggest that technological interventions are more effective when paired with skill-based competencies rather than motivational factors alone.

These findings have significant implications for public sector organizations in Indonesia. To maximize the benefits of Green Abilities, government agencies should invest in targeted training programs that enhance environmental competencies, such as workshops on energy-efficient practices or waste management, integrated with AI tools for real-time monitoring. For example, AI platforms could be used to track carbon emissions in public offices, aligning employee efforts with national sustainability goals. To address the non-significant impact of Green Motivation on AI adoption, organizations should develop hybrid training programs that combine environmental awareness with AI literacy, enabling civil servants to leverage technology effectively. Additionally, policymakers should address infrastructural barriers, such as limited access to AI systems in public institutions, to ensure broader adoption. These strategies can support Indonesia's Sustainable Development Goals by fostering a digitally enabled, environmentally conscious workforce. Future research should explore additional variables, such as organizational culture or technological infrastructure, to further elucidate the dynamics of GHRM and AI in public sector performance.

CONCLUSION

This study establishes that Green Abilities and Green Motivation significantly enhance employee performance among civil servants in West Sumatra, with Green Abilities uniquely driving Artificial Intelligence (AI) adoption to amplify performance outcomes. As one of the first studies in Indonesia to integrate Green Human Resource Management (GHRM) with AI in the public sector, it underscores the pivotal role of environmental competencies in fostering sustainable performance through technology. Green Motivation directly boosts performance, but its lack of influence on AI adoption highlights the need for technical proficiency to bridge intrinsic motivation and technological integration. These findings affirm that combining green competencies with AI-driven tools can transform public sector efficiency, aligning employee efforts with organizational and national sustainability goals.

The practical implications of this study are significant for public sector organizations aiming to achieve sustainable performance. Government agencies should prioritize continuous training in environmental competencies, such as waste management and energy efficiency, while integrating AI tools like real-time analytics to monitor sustainability initiatives. However, limitations include the study's focus on the public sector in West Sumatra, which may limit generalizability to private sectors or other regions, and the relatively small sample size of 175 respondents, which could introduce subjective bias in questionnaire responses. Future research should expand to the private sector and international contexts, incorporate moderating variables like organizational culture or technological infrastructure, conduct longitudinal studies to explore dynamic

relationships, and investigate other intelligent technologies, such as Big Data or Green AI, to further enhance sustainable organizational performance.

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