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Green human resource management for urban sustainability: Transforming work culture towards smart green cities

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Abstract

This study aims to develop a strategic model of green human resource management (GHRM) to support the realization of smart green cities by fostering a green work culture and promoting environmentally friendly sustainable practices. Using a quantitative approach, data were collected through questionnaires from 400 respondents in four major Indonesian cities: Makassar, South Tangerang, Bandung, and Denpasar. Structural equation modeling (SEM) was used to analyze the relationship between GHRM, work culture, environmental quality, and smart green city development. The research results show that GHRM plays a role in shaping an environmentally oriented work culture and improving environmental quality. These two factors have proven to be the main pathway connecting GHRM policies to the realization of smart green cities. These findings confirm that the success of a smart green city is determined not only by GHRM policies, but also by concrete actions and cross-sector collaboration between organizations, government, and the community.

Introduction

Environmental problems are getting more dangerous every day, with degradation so fast. One of the causes is the reduction of natural resources and human negligence intervention, such as deforestation and disproportionate use of fuel, which results in carbon emissions (Van et al., 2021; Zhang et al., 2022). This impact causes extreme weather changes and extraordinary pollution, so it is necessary to reduce the use of carbon emissions. Moreover, based on IQAir data, Indonesia is ranked 9th (ninth) in the world as a country with a high level of pollution. Therefore, the important role of awareness of human behavior by implementing environmentally friendly human resource management is very important (Hidayat et al., 2023).

Green human resource management (GHRM) aims to reduce the negative impacts of human behavior on the environment (Nisar et al., 2021). Meanwhile, the concept of smart cities is increasingly popular as a solution to urban problems, including environmental problems such as pollution (Su et al., 2023). Smart cities are a concept that utilizes human resources, infrastructure, and social capital, as well as modern telecommunications, to achieve sustainable economic development and a high quality of life. Therefore, the application of GHRM practices in the context of smart cities can be a promising approach to creating sustainable and livable cities. The combination of GHRM practices and smart city implementation can lead to the creation of smart cities that are environmentally friendly, socially responsible, and economically sustainable (Awwad et al., 2022; Agarwal et al., 2022). Challenges in developing smart cities include pollution and traffic congestion (Singh et al., 2023). The application of technology and innovation, as well as community behavior, can help overcome these challenges. Therefore, current organizational behavior needs to

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be integrated to implement greening in operations to create green and environmentally friendly cities (Zhang et al., 2024).

GHRM practices include green recruitment, selection, performance management, and training, which develop green capabilities through HR activities (Muisyo et al., 2022). To implement GHRM in smart city development, organizations can incorporate green practices into HR activities to support sustainable development and environmental protection. For example, agencies/companies can use GHRM practices to encourage green behavior from employers/employees and increase productivity (Muisyo & Qin, 2021; Shahzad et al., 2023).

Previous research has shown that the implementation of GHRM can help organizations better achieve sustainability goals, including pollution reduction and resource efficiency (Paillé et al., 2020). In addition, other research states that the impact of environmentally friendly human resource management practices creates a work culture for better environmental effectiveness without pollution (Khan & Liu, 2022). The development of environmentally friendly future cities by paying attention to quality of life and minimizing air pollution is certainly influenced by human lifestyle/behavior patterns (Bibri, 2020). Specifically, previous research has not revealed the relationship between GHRM and smart green cities, so this study uses the concept of this practice to encourage human behavior in maintaining environmental quality to create a green city. Based on the information above, this study will certainly be a guide for policy makers in creating smart green cities and comfortable work environments based on the implementation of environmentally friendly human resource management practices. Therefore, the purpose of the study is to analyze how the implementation of green human resource management can minimize environmental pollution, namely air pollution, thereby creating a smart and environmentally friendly green city. Of course, this application contributes to adapting new work behaviors in modern society to think about sustainable natural resources for the future.

Literature Review and Hypotheses Development

Stakeholder theory focuses on an organization's morality and values(Yoon & Chung, 2018). These values are the application of human behavior, so GHRM is the organized and planned integration of human resource activities carried out with the organization's environmental priorities (Jose, 2011). Individual behavior, competence, and knowledge of the importance of greening are crucial to environmental success (Subramanian et al., 2016).

The relationship between green human resource management and work culture

GHRM has the potential to shape and work culture (Aggarwal & Agarwala, 2023; Gazi et al., 2024; Gao et al., 2025). GHRM is human resource management because it links environmentally friendly principles. When GHRM is internalized in operational processes, sustainability values will be embedded in employee mindsets and behavior, thus forming a work culture that understands the environment.

The work culture built through GHRM not only shapes individual behavior, but also creates collective norms within the organization such as reducing resource waste and prioritizing social responsibility towards the environment (Abbas & Dogan, 2022; Pan et al., 2022). When environmental principles such as minimizing energy, saving water, and managing waste become part of an organization's HR policies, these behaviors are no longer individual but become collective norms. Over the long term, implementing GHRM, which connects values and practices, can build a consistent work culture that supports the creation of an environmentally friendly business ecosystem.
H_1: GHRM has a positive impact on work culture.

The relationship between green human resource management and the environment

GHRM is a management pattern that incorporates environmental principles into management. The main objective of GHRM is to encourage pro-environmental employee behavior, thus directly impacting the improvement of the quality of the natural environment (Surahman & Andriyani, 2024; Muchsinati et al., 2025). The implementation of GHRM is an important strategy for modern

organizations to address the challenges of environmental degradation while improving environmental performance. According to (Bhatti et al., 2022; Adeel et al., 2022), improving environmental performance or preserving nature is not only determined by government policy but also influenced by internal organizational factors, particularly human resource management. GHRM plays a role because it is able to shape employee behavior that understands the natural environment and internalizes the value of environmental sustainability.

The implementation of GHRM in organizations is typically evident in policies, procedures, and work cultures that promote environmental sustainability. Employees are taught behaviors that reduce carbon emissions, minimize resource consumption, and manage waste responsibly. GHRM behaviors emerge because the daily work culture is directed toward adopting environmentally conscious behaviors, such as paperless meetings and the use of refillable water bottles. Furthermore, involving employees in environmental projects, such as tree planting, contributes to sustainability and strengthens the organization's social responsibility. Through GHRM mechanisms, individual behavior can collectively create norms that have a direct impact on improving the condition of the natural environment.

H_2: GHRM has a positive impact on the environment.

Relationship between work culture and the environment

The work culture established within an organization plays a role in shaping behaviors that understand environmental quality. A work culture created by an organization that understands environmental values, cares for the environment, and promotes green innovation can be a driving force for environmentally friendly practices. This is explained (Fok et al., 2023; Sun et al., 2024). A work culture within an organization that links attention to environmental issues will impact the preservation of the natural environment. Work culture can shape behaviors and policies that can support the preservation of the natural environment. When a work culture prioritizes environmental principles, every individual within the organization tends to internalize environmentally friendly behaviors, such as managing waste responsibly, conserving energy, and using resources efficiently. Scientifically, it can be assumed that the better the work culture within an organization, the greater its contribution to improving environmental quality. In line with research Khan and Terason (2022), a work culture in an organization that supports the environment is able to create integrated green innovations as a strategy for preserving the natural environment.

H_3: Work culture has a positive impact on the environment.

Environmental relations in smart green cities

Good environmental conditions can create a smart green city (Bashirpour et al., 2023; Wang, 2023). A healthy environment with good air quality, maintained natural resources, and a stable ecosystem are the capital of the quality of life of people in a smart green city. Conversely, environmental degradation such as air pollution, water pollution, and reduced green space can hinder the implementation of the smart green city concept because it reduces the carrying capacity of the ecosystem and increases the burden of mitigation costs (Nikki & Kim, 2021). Theoretically, the smart city development model can place environmental quality as one of the main pillars of realizing economic and social conditions (Addas, 2023). The success of a smart green city is highly dependent on environmental conditions, because all smart concepts starting from green transportation, green management, to good waste management are essential for realizing environmental maintenance, good environmental quality strengthens the effectiveness of smart city policies in reducing carbon footprints and increasing resource efficiency.

H_4: The environment has a positive impact on smart green city.

Relationship between work culture in smart green city

Organizational work culture is a system of values, norms, and practices that can shape behavior in carrying out activities (Judijanto et al., 2025). When work culture is linked to environmental values, human resources within the organization will be more proactive in supporting the smart green city

concept. An adaptive work culture makes it easier for organizations to respond to urban environmental challenges, while consistent sustainability values ensure the ongoing implementation of environmentally friendly programs.

A smart green city is a city development concept that integrates environmentally friendly technologies to improve the quality of life for the community. The creation of a smart green city relies not only on technological and infrastructure innovation but is also heavily influenced by the organizational work culture within the city (Mutambik et al., 2023). This is in line with research Guenduez et al. (2024) explains that the success of a smart green city is highly dependent on human resources working in an organizational work culture environment that supports green understanding.
H_5: Work culture has a positive impact on smart green city.

The relationship of green human resources management to smart green cities

Green human resources refer to individuals who possess high competence, awareness, and commitment to the principles of environmental understanding in carrying out their duties and responsibilities (Fawehinmi et al., 2020). Green human resources have a role as agents of change who are able to integrate environmentally friendly principles to realize green cities (Puppim de Oliveira et al., 2013; Aboramadan & Karatepe, 2021). Private and public sector organizations can recruit, train, and develop human resources through the implementation of GHRM as a driver of green concept programs.

Demonstrated that the presence of green-oriented human resources increases the effectiveness of environmental policy implementation, including emission reduction, energy efficiency, and smart waste management. Similarly, Shahzad et al. (2023) found that GHRM directly contributes to achieving smart and sustainable city goals through increased green innovation, adoption of environmentally friendly technologies, and community participation in maintaining environmental quality. Therefore, the higher the quality and quantity of green human resources in an urban ecosystem, the greater the opportunity for realizing a smart green city that is environmentally friendly, energy efficient, and livable.
H_6: GHRM has a positive impact on smart green cities.

Research Methods

This research is an exploratory study that expects a relationship and impact between GHRM variables, the environment, work culture and smart green cities. So, the research approach used is a quantitative approach that aims to test the hypothesis, because quantitative is more suitable for testing theories, knowing the relationship between variables and can produce broad generalizations and can be applied to a larger population while qualitative focuses more on in-depth understanding and description which is rich but cannot be generalized widely. This approach is used to see the relationship and how much impact GHRM practices as an exogenous variable have on the smart green city variable as an endogenous variable which is of course mediated by work culture and environmental variables.

Based on data from the National Development Planning Agency of the Republic of Indonesia through the movement towards 1000 smart cities, currently there are 25 districts/cities in Indonesia that are pioneers of smart cities in Indonesia, but this study only focuses on 4 (four) cities, namely Makassar, Tangerang Selatan and Bandung in this study because these cities have high levels of air pollution (Rachmawati & Rohmah, 2025) while Denpasar was chosen even though in terms of air pollution, it is not always included in the national list, but also because of its strategic position as a representative urban city of Eastern Indonesia. As a research location so that it will be in line with the environmental variables in this study. The sampling technique was determined and in accordance with the basic characteristics, namely that the city's residents had worked in companies or government agencies, this was to see the process of implementing policies related to GHRM practices.

The data for this study were collected through a questionnaire distributed using Google Forms. Data collection began with a discussion meeting with the city government, specifically the

Regional Development Planning Agency (BAPEDA). Based on the sample size, a questionnaire containing statements regarding the variables of GHRM, environment, work culture, and smart green cities was submitted. The research object locations were taken from four cities, and the 400 samples were distributed directly by the researchers to the communities in those cities according to predetermined criteria.

The number of respondents per city was calculated using the proportional allocation method, using 2022/2023 population data from the Central Statistics Agency. From a total sample size of 400 respondents (calculated using the Slovin formula with a 5% margin of error), the respondent allocation is shown in the table.

Table 1. Number of Respondents per City

No	City	Population 2022/2023	Percentage of Total (%)	Number of Respondents (n)
1	Makassar	1,432,189	23.74	95
2	Tangerang Selatan	1,378,466	22.86	91
3	Bandung	2,469,589	40.96	164
4	Denpasar	748,400	12.42	50
	Total	6,028,644	100	400

Source: Data processing, 2025

This study, several key variables related to green city development were measured using a carefully designed questionnaire. Green human resources (Ari et al., 2020) is measured using eight items. Examples include, "*Providing adequate training to promote environmental stewardship as a core value*" and "*The importance of environmentally friendly concepts for career development*". Work culture (Komar, 2021) is assessed using ten items, with examples such as, "*Prioritizing public service interests over personal/group interests during activities*". Environmental conditions (Henri & Journeault, 2008; Farouk et al., 2024) measured with six question items, such as, "*Current environmental conditions are deteriorating*" and "*Government regulations support environmentally friendly programs*". Smart Green city by Hara et al. (2016) is measured with seven question items, including "*Effective and environmentally friendly utilization of energy resources*" and "*Need for green open spaces (RTH) in urban areas*". This measurement tool is designed to comprehensively assess the relationship between GHRM, work culture, environmental conditions, and green city development.

These indicators will be processed using structural equation modeling (SEM) to analyze the research data with the help of the AMOS application analysis tool. SEM is used because the results are considered more accurate (Newsom, 2023). The researcher believes that this study not only looks at the relationship between variables but also the magnitude of the components forming those variables. This research is causal or explanatory in nature, so SEM is a data analysis method that can measure complex relationships between latent variables simultaneously. The concept of this research model is formed based on the literature review and the hypothesis above. This research model will be analyzed as follows.

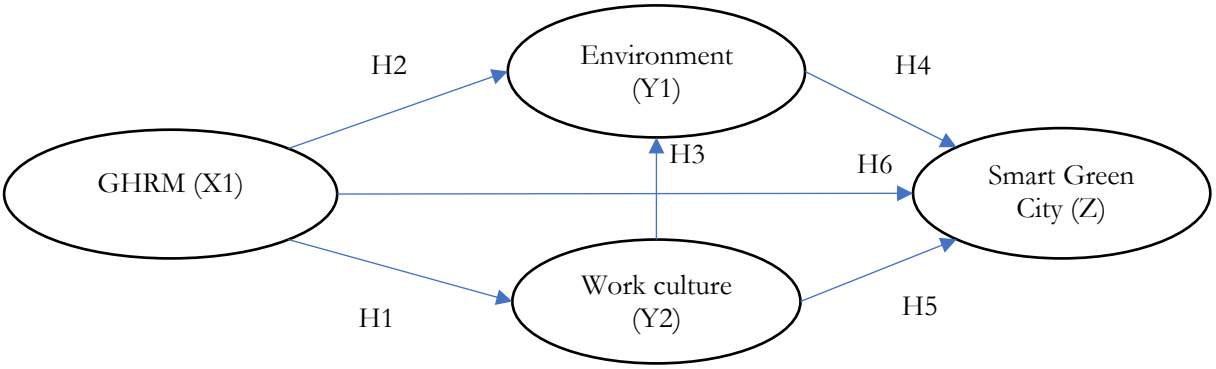

Figure 1. Research Framework Model

Results and Discussion

Table 2 presents a description of only 336 respondents from the 400 target samples, meaning that only around 84% were achieved due to the researcher's limited time and regional access, based on the characteristics of the four large cities used as research locations.

Table 2. Respondent Characteristics

Characteristics	Categories	Number (n)	Percentage (%)
Gender	Male	134	39.9
	Female	202	60.1
Age (years old)	< 30	183	54.5
	30 – 39	66	19.6
	40 – 49	58	17.3
	> 50	29	8.6
Education background	High school/vocational high school/equivalent	103	30.7
	Bachelor's degree (S1)	171	50.9
	Master's degree (S2)	51	15.2
	Doctorate (S3)	11	3.3

Source: Data processed, 2025

Table 3. Results of Construct Reliability Test

Variables	Indicators	Loading factor	AVE	CR	Cronbach's alpha
Green human resource management	X1.1	0.707	0.59	0.97	0.919
	X1.2	0.708			
	X1.3	0.817			
	X1.4	0.767			
	X1.5	0.845			
	X1.6	0.870			
	X1.7	0.685			
	X1.8	0.726			
Work culture	Y2.1	0.725	0.73	0.99	0.964
	Y2.2	0.856			
	Y2.3	0.870			
	Y2.4	0.894			
	Y2.5	0.875			
	Y2.6	0.826			
	Y2.7	0.878			
	Y2.8	0.847			
	Y2.9	0.872			
	Y2.10	0.903			
Environment	Y1.1	0.630	0.56	0.95	0.884
	Y1.2	0.876			
	Y1.3	0.676			
	Y1.4	0.726			
	Y1.5	0.713			
	Y1.6	0.856			
Smart green city	Z1.1	0.805	0.68	0.98	0.944
	Z1.2	0.861			
	Z1.3	0.875			
	Z1.4	0.786			
	Z1.5	0.827			
	Z1.6	0.853			
	Z1.7	0.848			
	Z1.8	0.750			

Source: Data processed, 2025

This research was analyzed using SEM, with one of the stages being model testing to assess the validity and reliability of indicators for each variable construct. Construct validity was evaluated by examining the loading factors and was considered valid if the loading factor value was greater than 0.5. Meanwhile, reliability was tested by calculating the construct's AVE (average value) and CR (reliability value) for each construct. A construct was declared reliable if the AVE value was greater than 0.5 and the CR value was greater than 0.7. The results of the overall measurement model test analyzed using SEM can be seen in Table 3.

All indicators have a loading factor (λ) value above 0.60; thus, they are declared valid. The AVE value for each construct is above 0.50 (0.56–0.73), indicating that convergent validity is met. Meanwhile, the composite reliability (CR) and Cronbach's alpha (α) values are all greater than 0.70 (CR = 0.95–0.99; α = 0.94–0.98). Furthermore, based on these results, normality and outlier tests, as well as multicollinearity tests, were conducted, which resulted in normality tests indicating that the research data does not meet the assumption of a normal distribution. This is evident from the multivariate value of 80.285, which is outside the interval $-2.58 < z < 2.58$ as the normality criterion. Furthermore, the results of the outlier test calculated using the CHINV (0.001; 32) formula yielded a value of 62.487. Several observations had values that exceeded this limit, so it can be concluded that there are still indications of outliers in the data. However, the characteristics of the data that are not normal and the presence of outliers do not automatically negate the feasibility of the analysis. This is in line with the explanation in Hair et al. (2014) that structural equation modeling (SEM) based on observational data from questionnaires does not provide room for researchers to intervene with respondents' answers.

However, the multicollinearity test obtained shows that the independent and mediating variables have a tolerance value of > 0.10 and a VIF value of < 10. As the results prove, the green human resource management variable has a tolerance of 0.266 with a VIF of 3.760. For the work culture variable, the tolerance value is 0.242 with a VIF of 4.130, and then the environment has a tolerance value of 0.248 with a VIF of 4.033.

Thus, the non-normal data and the presence of outliers are empirical consequences of the field data, but not methodological weaknesses that should hinder further analysis, especially since the other test results are free of multicollinearity symptoms. Furthermore, the research instrument has been proven valid and reliable, thus ensuring its measurement quality. Therefore, this study proceeds to the hypothesis testing stage through full-model SEM estimation. The complete model can be seen below:

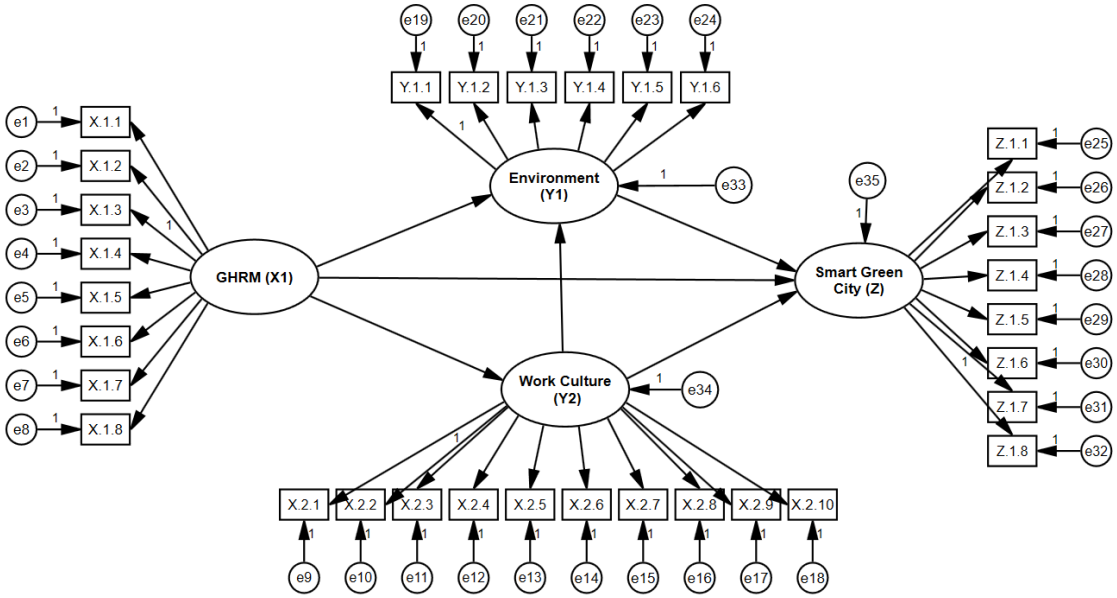

Figure 2. Structural Model Estimation Results

The results of structural model testing using SEM are evaluated based on several goodness-of-fit criteria, namely probability, RMR, NFI, CFI, TLI, IFI, RFI, and RMSEA. These

indices measure how well a statistical model fits the observed data. The standard criteria that must be met for a model to be considered fit are as follows (Hair et al., 2014).

Table 4. Evaluation of the Overall Model Criteria Suitability Index

Good Match	Limit Value	Computational Results	Information
Possibility	≥0.05	0.000	Marginal Fit
RMR	≤0.05	0.025	Fit
NFI	≥0.90	0.905	Fit
CFI	≥0.90	0.945	Fit
TLI	≥0.90	0.940	Fit
IFI	≥0.90	0.945	Fit
RFI	≥0.90	0.897	Marginal Fit
RMSEA	≤0.08	0.060	Fit

Source: Data processed, 2025

Based on Table 4, the probability and chi-square values approach a good level of fit. This indicates that the data in the model has a covariance matrix that matches the population covariance matrix. Therefore, this model is considered suitable for use in testing research hypotheses. Significance testing is carried out at the 0.05 level. If the P value <0.05 and cr >1.96, then H0 is rejected, and Ha is accepted. Conversely, if the P value >0.05 and cr <1.96, then H0 is accepted, and Ha is rejected. The results of the significance testing in this study are as follows.

Table 5. Hypothesis Testing

Path	Hypothesis Statement	Estimate	SE	CR	P Value
H1	GHRM → work culture	0.894	0.054	16.638	0.001
H2	GHRM → environment	0.319	0.053	5.988	0.001
H3	Work culture → environment	0.387	0.053	7.348	0.001
H4	Environment → smart green city	0.478	0.125	3.822	0.001
H5	Work culture →smart green city	0.283	0.064	4.426	0.001
H6	GHRM → smart green city	0.219	0.063	3.490	0.001

Source: Data processed, 2025

Based on Table 5, the research results refer to the first hypothesis, indicating that the influence of green human resource management on work culture is very strong and positive. The implementation of GHRM policies can almost immediately change organizational behavior patterns and work values. Theoretically, this confirms the concept that GHRM is not merely an HR administration strategy, but an instrument for organizational culture transformation. This is in line with research by Maheshwari et al. 2024 and Al-Swidi et al. 2021, which states that green human resources are a strategic capability capable of transforming work culture within an organization. These results are consistent with research by Goel et al. (2022) which found that integrating GHRM into organizational policies can create work norms that are inherent in employees at all levels, resulting in systemic cultural change.

Changes in work behavior and culture in an organization are not solely due to external factors, such as government regulations, market demands, and consumer demands, but can also originate from internal factors within the organization through policies designed by the organization itself. The concept of inside-out transformation refers to a process of change that begins within the organization, starting with the formation of values, norms, and work behaviors that align with the principles of sustainability. Transformational change factors within the organization are strengthened through the implementation of strategies and policies, such as GHRM, which are then implemented consistently across all levels of the organization. Changes in work behavior that are rooted in a vision, mission, and values firmly held become the foundation for employees to be proactive in responding to external pressures. This belief-oriented and commitment-oriented approach creates more lasting change because it is embedded in the work

culture and employee behavior, rather than simply following rules that can change at any time. The results of the implementation of GHRM bring internalized changes in daily work practices, influence the behavior of all members of the organization, and ultimately produce a positive impact that is more widespread in the external environment, including communities and even urban areas.

The results of the study examined the second hypothesis that GHRM has a positive effect on the environment (Estimate = 0.319; $p < 0.01$). This positive relationship clarifies that the implementation of GHRM policies by organizations can contribute to improving the condition of the natural environment, both by reducing the negative impacts of company operations and through environmentally friendly innovations carried out by employees.

Although the impact is moderate, this finding is scientifically significant because it demonstrates that a green HR management strategy can produce measurable environmental impacts. GHRM influences the condition of the natural environment through a series of regulations such as the implementation of energy efficiency policies, carbon emission reduction, optimization of natural resource use, and responsible waste management. Implementing green HR policies can change internal employee behavior and also provide direct benefits to the ecosystem and the quality of the physical environment outside the organization. This finding is consistent with research Tanveer et al. (2024); Faeni et al. (2025); Shahbaz and Malik (2025) showed that organizations that consistently implement GHRM are able to reduce their environmental footprint. This is supported by studies Afum et al. (2021); Zaidi et al. (2025). Liu et al. (2025) who found that employee involvement in environmental programs through GHRM policies contributed to improving air quality, resource conservation, and reducing environmental pollution in the area around the company.

The third hypothesis test shows that a work culture with environmental principles has a positive effect on the environment with a coefficient estimate of 0.387 ($p < 0.01$). This significant influence indicates that the values, norms, and work practices implemented by the organization can have a significant impact on improving environmental quality. This finding reinforces the notion that work culture and environmental performance are formed through the internalization of shared norms and values within the organization (Qasim et al., 2024; Augustine, 2025). A green work culture directs organizational members to voluntarily adopt environmentally friendly behavior, such as energy and water conservation, proper waste management, the use of sustainable materials, and involvement in environmental restoration programs. These behaviors, when implemented consistently by all members of the organization, contribute directly to reducing the environmental footprint and improving the quality of the surrounding ecosystem.

These results are in line with the statement that an environmentally based work culture creates a commitment in employees to engage in environmental initiatives, even outside of formal work hours and scope (Usman et al., 2023; Noor et al., 2024). This suggests that the power of culture lies in its ability to transform behavior into part of employees' professional identities, so that environmentally friendly actions are no longer merely an obligation but become a habit and a source of pride. Therefore, the research results for the third hypothesis confirm that an organization's work culture toward a green orientation is an effective strategy for improving the quality of the natural environment while simultaneously fostering environmentally conscious behavior, both individually and collectively.

The results of the fourth hypothesis test indicate that a well-maintained natural environment has a positive influence on the realization of a smart green city, with an estimate value of 0.478 ($p < 0.01$). This coefficient indicates that ecosystem quality consisting of clean air, well-managed water, and low levels of pollution are several important factors for the success of a city towards a green and smart development model. This finding emphasizes that well-maintained natural environmental conditions in an area have a broader positive effect on the quality of life, public health, and the efficiency of city infrastructure (Liu et al., 2021; Puchkov & Maltseva, 2025; Chen & Chan, 2023).

From a theoretical perspective, these results reinforce the concept of urban sustainability transition, which explains that a city's success in achieving smart green city status is largely determined by its basic environmental conditions (Javidroozi et al., 2023; Paes et al., 2023). A

healthy natural environment not only provides an ecosystem for clean water supply and air filtration, but also supports the implementation of smart technologies for resource management. Without adequate environmental quality, smart city technology will be difficult to realize. Furthermore, this positive relationship confirms that the success of smart green city development begins not only with infrastructure and technological innovation, but also with well-maintained ecological conditions. For example, low-emission transportation systems are more effectively implemented in cities, sensor-based water management, and green open space programs. Maintaining the condition of the natural environment is not only the result of city policy but also serves as capital for the development of a healthy city in the long term. Improved green environments create the possibility of cities that function efficiently and intelligently to improve the quality of life of their residents.

The results of the fifth hypothesis test show that work culture has a positive effect on the development of smart green cities, with an Eestimate value of 0.283 ($p < 0.01$). This coefficient value is included in the moderate influence category, indicating that although its contribution is not as large as the natural environmental factor (H4), a pro-environmental work culture still has a strengthening role in the development of smart green cities.

A work culture that emphasizes environmental principles, such as energy efficiency, waste reduction, and the use of green technology, shapes environmentally friendly employee behavior. This behavior is not only implemented in the office but also carried over into daily life, thus creating a chain effect (spillover effect) in the city environment. When a green work culture has taken root in an organization, it can become a role model for citizens and other business actors. This encourages the formation of a collective awareness that sustainability is not only a government affair, but a shared responsibility. The more entities that adopt this value, the faster the process of transforming cities into smart green cities. Organizations with a work culture that pays attention to the environment are more likely to actively forge partnerships to implement smart green city projects. For example, participation in urban greening programs, the development of low-emission public transportation, or integrated waste management.

An organization's work culture can shape employee attitudes by Junça Silva and Coelho (2023) and Subramanian and Suresh (2023). However, according to Tam (2025), a pro environmental work culture only acts as a soft driver to influence people's perceptions and attitudes, but does not directly change the physical condition of the city. To produce a real impact of work culture at the urban level, measurable concrete actions are needed. These can take the form of active employee participation in urban greening programs, involvement in environmental projects, adoption of smart technologies that support energy efficiency, waste management, and natural resource conservation. The integration of awareness formed by this work culture is what allows for the creation of direct contributions to the development of a smart green city.

The sixth hypothesis test shows that GHRM has a positive effect on the creation of a smart green city with a coefficient estimate of 0.219 ($p < 0.01$). The implementation of GHRM policies can contribute to the development of smart green cities, but its direct impact is relatively limited. This finding reinforces the understanding that GHRM does not work instantly in influencing the urban scale, but rather requires intermediary mechanisms, especially through the formation of an environmentally oriented work culture and improving the condition of the natural environment around the organization.

GHRM can be seen as strategic to support the realization of smart green city development (Lawelai & Nurmandi, 2024; Doghan, 2024). GHRM serves as an initial trigger for change that internalizes sustainability values within the organization, shapes environmentally friendly employee behavior, and encourages the creation of a green environment. However, its effects on a smart green city will only be optimal when these values are embodied in a consistent work culture. For example, GHRM training and policies that encourage energy efficiency or sustainable waste management will have an impact on reducing emissions and conserving resources; however, these impacts become significant at the city level only when these practices are adopted collectively, involving the community, and synergizing with local government policies.

Conclusion and Implications

Through the implementation of GHRM, organizations are able to establish a consistent green work culture, improve environmental quality, and collectively support the transformation of cities into smart and environmentally friendly cities. The test results show that the influence of GHRM on smart green city is significant, both directly and through the mediation of work culture and environmental quality. This finding will enrich the literature by confirming that the influence of GHRM on smart and green cities occurs through the formation of an environmentally friendly work culture and improved environmental quality, thereby expanding the scope of smart city theory, which has previously emphasized technological and infrastructure aspects. This study provides concrete implementation directions, including reducing paper use with digital systems, energy efficiency in the workplace, responsible waste management, pollution reduction through environmentally friendly transportation, and the habituation of green behavior in daily activities. This study has limitations in terms of the sample, which is not appropriate to the target and the variables used, where the results are not fully representative of diverse industrial and regional conditions. Further research is recommended to test on a broader geographic and sector scale, and include technological factors and government participation as variables that can strengthen the relationship between these variables.

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