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GREEN ORGANIZATIONAL CULTURE, GREEN WORK ENGAGEMENT, AND GREEN HUMAN RESOURCES MANAGEMENT AS THE ANTICEDENTS OF EMPLOYEE GREEN BEHAVIOR IN INDONESIA'S STATE-OWNED CONSTRUCTION INDUSTRY

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Abstract

This research aim is to analyze the importance of promoting environmentally friendly behavior (Employee Green Behavior) in the state-owned construction service industry. The study aims to examine the influence of Green Organizational Culture (GOC), Green Work Engagement (GWE) and Green Human Resource Management (GHRM) as the antecedent of EGB. The research methodology employs a quantitative approach through surveys conducted with employees of construction service companies under state-owned enterprises (BUMN). The sampling technique used in this study is simple random sampling, involving a total of 386 permanent employees from construction companies. The analysis method utilized in this research is Structural Equation Modeling (SEM) based on Partial Least Squares (PLS), using the SmartPLS 3.0 analysis tool. The results indicate that GHRM, GOC, and GWE directly influence EGB. These findings reinforce the AMO and NAM theories. This research contributes theoretically to the literature on sustainable human resource management and provides practical benefits for companies sustainable strategies.

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INTRODUCTION

Indonesia aims to decrease carbon emissions by 29% or 41% by 2030 as part of the Paris Agreement (Bisnis, 2022), aligning with the adoption of Environmental, Social, and Governance (ESG) practices across the energy, construction, and financial sectors. In 2023, 88% of companies reported implementing ESG practices (PwC, 2023). In 2022, greenhouse gas emissions were recorded at 79.2 tons of CO2e per billion rupiah (BPS, 2024), with the construction sector accounting for 24.6% of carbon emissions in 2023 (Kompas, 2023). Data from state-owned construction firms in 2023 indicate that electricity consumption per employee per year was 4.55 MWh for PT Pembangunan Perumahan, 1.32 MWh for PT Wijaya Karya, and 1.41 MWh for PT Waskita Karya (Kementerian ESDM, 2024). Additionally, domestic waste generated per employee per year was 261.5 kg for PT Pembangunan Perumahan and 871 kg for PT Wijaya Karya, compared to the national average of 248 kg (LCDI, 2024). Furthermore, carbon emissions from business travel by airplane for PT Wijaya Karya amounted to 124,120 kg CO2eq. This situation underscores the necessity for strategies aimed at mitigating environmental impacts and emphasizes the need for further research on green employee behavior within state-owned construction sectors.

Employee Green Behavior (EGB) refers to environmentally conscious practices within the workplace, including waste reduction, energy efficiency, and involvement in sustainability initiatives (Ogiemwonyi et al., 2023; Reza & Khan, 2022). In the construction industry, EGB is essential for meeting sustainability objectives. Reza & Khan (2020) recommend that

organizations establish environmental initiatives through green targets, employee training, and motivation to adopt eco-friendly behaviors, a concept known as Green Human Resource Management (GHRM) (Rachmat & Pendrian, 2024). GHRM fosters EGB by means of training, incentives, and performance assessments (Luu, 2020; Unsworth et al., 2021; Tang et al., 2018; Saptaria, 2023). Studies (Rachmat & Pendrian, 2024; Ogiemwonyi et al., 2023; Raza & Khan, 2022; Sabokro et al., 2021) demonstrate that effective GHRM enhances EGB; however, Kim et al. (2019) and Fawehinmi et al. (2020a, 2020b) identified inconsistent relationships, especially when GHRM is not effectively implemented into the Environmental Management System.

Green Human Resource Management (GHRM) acts as a cornerstone for policies that promote sustainability, emphasizing the development of eco-friendly systems (Susanto, 2023). It is vital for achieving corporate sustainability objectives by motivating employees to engage in environmentally responsible behaviors (Jamal et al., 2021). Furthermore, It also impacts Green Work Engagement (GWE), which pertains to active participation in environmentally sustainable work practices (Gomes et al., 2023; Susanto, 2023; Aboramadan, 2022; Gill et al., 2023). Employees exhibiting high levels of GWE are generally more proactive in conserving energy and reducing waste (Hani & Praningrum, 2023). GWE plays a crucial role in ensuring that GHRM policies are effectively implemented into tangible actions that enhance EGB within the workplace (Karatepe et al., 2022; Hani & Praningrum, 2023).

Companies must prioritize altering employee behavior to promote environmental friendliness through recruitment, training, and incentives (Roscoe et al., 2019), A robust Green Organizational Culture (GOC) significantly impacts Employee Green Behavior (EGB) (Yesiltas et al., 2022; Mirahsani et al., 2024; Abbas & Dogan, 2022). This study will concentrate on employees within the state-owned construction sector, which accounted for 24.6% of carbon emissions in Indonesia in 2023. The importance of this sector in national strategic development makes the construction industry particularly relevant for further investigation, as current sustainability reports do not adequately capture the implementation of ESG practices in the workplace. A bibliographic analysis of 147 articles from the Scopus database on related topics was performed to ensure the originality of this research. The analysis revealed that there has been limited exploration of sustainability concepts within the human resource management domain, especially concerning employee green behavior.

Furthermore, the novelty of this research also lies in its focus on a research object that has not been explored in previous studies. This research will be conducted in the construction industry in Indonesia, whereas prior studies have primarily focused on the hospitality and manufacturing industries. Additionally, the use of Green Work Engagement (GWE), Green Organizational Culture (GOC) and Green Human Resource Management (GHRM) as the anticedent from Employee Green Behavior (EGB) is another innovation in this study, as it has not been previously addressed in prior research. The uniqueness of this study also lies in the collective use of the NAM (Norm Activation Model) and AMO (Ability, Motivation, and Opportunity) theories as analytical tools to understand the phenomena discussed in this research. Therefore, it is expected that this study will provide valuable insights and benefits for companies operating in the construction sector in Indonesia.

Ability Motivation Opportunity Theory

The AMO (Ability, Motivation, Opportunity) theory, proposed by Ölander & Thøgersen (1995), elucidates that employees' perceptions of an organization's environmental stance are influenced by GHRM policies, including environmental awareness, training, performance assessments, and rewards (Fawehinmi et al., 2023). Nevertheless, employees maintain a sense of responsibility toward the environment through their awareness, ability, motivation, and participation in sustainability initiatives (Fawehinmi et al., 2023). According to the AMO theory, employee behavior aligns with organizational objectives when they possess sufficient ability, motivation, and opportunity, which can be improved through human resource management practices (Jackson et al., 2014). Eden (1993) further noted that an individual's self-efficacy in demonstrating eco-friendly behavior and their awareness of the adverse environmental effects significantly enhance their motivation to engage in pro-environmental activities. Therefore, the AMO Theory emphasizes how employee behavior can be aligned with organizational goals, particularly in promoting environmentally friendly practices within the workplace.

Norm Activation Model Theory

The Norm Activation Model (NAM), developed by Schwartz (1977) from an altruistic behavior perspective, is utilized to examine individuals' pro-environmental actions (Cordano et al., 2011; Onwezen et al., 2013). Environmentally friendly behavior is largely motivated by pro-social aspirations, which are selfless actions rooted in environmental awareness and a sense of responsibility (Han,

2014). NAM forecasts behavior based on three essential components: awareness of consequences, attribution of responsibility, and personal norms (Schwartz, 1977). Awareness of consequences pertains to an individual's comprehension of the negative effects associated with environmentally harmful behavior (De Groot & Steg, 2009). Attribution of responsibility signifies the individual's duty to act in a pro-social manner, while personal norms reflect a moral obligation to either engage in or abstain from certain actions (Schwartz & Howard, 1981, p. 191). Within organizations, this awareness is fostered through green HRM, which highlights sustainability policies and boosts environmental consciousness. This study employs NAM as the overarching theory to explore how individual awareness, attribution of responsibility, and personal norms influence altruistic behavior, including environmentally friendly actions.

Hypotheses Development

Green Human Resource Management on Employee Green Behavior.

Employee Green Behavior (EGB) can be nurtured through Green Human Resource Management (GHRM), which encourages employees to act responsibly in protecting the environment (Hameed et al., 2020; Gilal et al., 2019). GHRM increases employees' environmental awareness and actions, while supporting sustainability initiatives through their active engagement (Hameed et al., 2020). GHRM includes the development of environmental initiatives, setting green targets, educating new employees on green policies, encouraging green behavior, and providing regular feedback (Aboramadan & Karatepe, 2021). The integration of green policies in HRM encourages employees to demonstrate competencies aligned with sustainability, while rewards for environmental performance enhance their motivation to contribute to environmentally friendly activities (Zhao et al., 2021). Previous studies have shown a positive relationship between GHRM and green behavior (Chandra & Pendrian, 2024; Ogiemwonyia et al., 2023; Raza & Khan, 2022; Sabokro et al., 2021). In line with the NAM theory, employees' attribution of responsibility for sustainability is shaped by company policies, leading us to propose the following hypothesis:
H_1: Green Human Resource Management (GHRM) has a significant positive effect on Employee Green Behavior (EGB)

Green Work Engagement on Employee Green Behavior

The concept of engagement reflects the mental, emotional, and physical commitment of employees to their work. Green Work Engagement (GWE) refers to employees' drive in environmentally friendly work, including greater effort and high involvement (Aboramadan et al., 2020). Shuck et al. (2014) state that employees with environmentally friendly characteristics in industries that demand high mental and physical participation will have a strong emotional attachment to their work. Engaged employees tend to be goal-oriented, energetic, and enthusiastic in completing their tasks (De Souza Meira & Hancer, 2021; Orlowski et al., 2021). This suggests that engagement in environmentally friendly work improves environmentally friendly work outcomes, including pro-environmental behavior. However, empirical research on the impact of GWE on green work outcomes is still limited. Studies by Aboramadan (2022) and Ababneh (2021) show that GWE promotes environmentally friendly behavior both within and outside of employees' roles. As engagement in environmentally friendly work increases, employees' pro-environmental behavior also rises. Based on this explanation, the following hypothesis is proposed:
H_2: Green Work Engagement (GWE) has a significant positive effect on Employee Green Behavior (EGB).

Green Organizational Culture on Employee Green Behavior

To implement successful environmental management, sustainability values must be instilled in every employee. One way to achieve this is by building an environmentally oriented organizational culture (Green Organizational Culture, GOC) (Yeşiltaş et al., 2022). Motivation for sustainability can be influenced by organizational culture (Govindarajulu & Daily, 2004), which shapes individual behavior. In companies that implement GOC, employees are more likely to exhibit environmentally friendly behavior (Employee Green Behavior, EGB), which supports sustainability goals in the workplace (Ones & Dilchert, 2012). Employees' attitudes and behaviors are influenced by the culture, structure, and identity of the organization (Lasrado & Zakaria, 2020). Therefore, developing GOC can encourage EGB in the work environment (Pham et al., 2018). Based on this theoretical foundation, the following hypothesis is proposed:

H_3: Green Organizational Culture (GOC) has a significant positive effect on Employee Green Behavior (EGB).

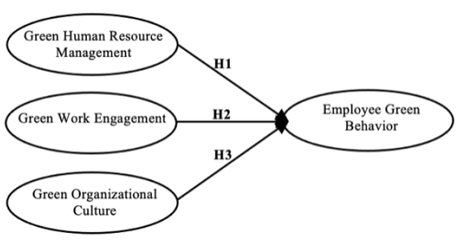

Figure 1. Research Model

METHOD

This explanatory study uses a quantitative approach. A survey method is employed with a questionnaire distributed online via Google Forms. The population of this study consists of all permanent employees in state-owned construction service companies, totaling 10,794 employees (Sekaran & Bougie, 2016). The sample is selected using a probabilistic sampling technique with simple random sampling, where each element in the population has an equal chance to be selected (Sekaran & Bougie, 2017). According to the 2023 sustainability report, the number of permanent employees in the companies being studied is as follows: PT Brantas Abipraya (642), PT PTPP (1,780), PT Nindya Karya (392), PT Adhi Karya (2,595), PT Hutama Karya (2,075), PT Wijaya Karya (1,793), and PT Waskita Karya (1,517). With a margin of error of 5% and using the Slovin formula, the minimum sample size required is 386 respondents.

Data is gathered using a questionnaire with a 5-point Likert scale to measure respondents' attitudes and perceptions toward social phenomena (Hair et al., 2019; Sekaran & Bougie, 2017). The data analysis in this study uses Smart PLS 3 with Structural Equation Modeling (SEM) based on variance or Partial Least Squares (PLS).

To measure the Employee Green Behavior (EGB) variable, this study adopts the instrument from Sabokro et al. (2021), which consists of 5 indicators and 5 dimensions they are Working Sustainability, Avoiding Harm, Conserving, Influencing Others, and Taking Initiatives. To measure the Green Human Resource Management (GHRM) variable, this study adopts the instrument from Roscoe et al. (2018), which consists of 15 indicators and 6 dimensions: Job Description, Recruitment, Selection, Training, Performance Assessment, and Reward. The Green Work Engagement (GWE) variable is measured using the instrument from Aboramadan (2020), which consists of 6 indicators and 3 dimensions: Dedication, Absorption, and Vigor. Finally, to measure the Green Organizational Culture (GOC) variable, this study adopts the instrument from Roscoe et al. (2018), which consists of 20 indicators and 4 dimensions: Leadership Emphasis, Message Credibility, Peer Involvement, and Employee Empowerment.

RESULT AND DISCUSSION

Out of 389 respondents, 386 met the established criteria. The demographic profile shows that the majority of respondents are aged 31-35 years (29.4%) and 26-30 years (25.5%), reflecting the dominance of the Millennial generation with high awareness of environmental issues. The respondents are predominantly male (94.3%), with a small percentage being female. The majority of respondents hold a Bachelor's degree (79.9%), followed by a Master's degree (18%). The distribution of respondents is evenly spread across state-owned construction service companies, with 23.9% from PT Brantas Abipraya, 18.3% from PT Nindya Karya, 14.9% from PT Waskita Karya, 13.4% from PT Hutama Karya, 12.6% from PT Adhi Karya, 11.3% from PT Pembangunan Perumahan, and the remaining respondents from PT Wijaya Karya. Most respondents have over 5 years of work experience (35.7%), and 30.8% have 3-4 years of experience. The majority of positions held are staff (60.4%), followed by managers (26%) and executives (13.3%).

Indicator & Consistency Reliability

The consistency of indicator measurement is evaluated using the squared standardized outer loading, with a minimum value of ≥0.708, indicating that more than 50% of the variance of the indicator is explained by the related latent variable (Hair et al., 2022). Five indicators—GOC16, GOC17, GOC18, GOC19, GOC20—were found to be unreliable due to their loading values being below 0.708. In more detail, Table 1 shows the outer loading and internal consistency reliability that meet the standards.

Table 1. Indicator & Consistency Reliability

Var.	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability	
				Rho_a	Rho_c
EGB	EGB1	0.812	0.841	0.842	0.887
	EGB2	0.791			
	EGB3	0.773			
	EGB4	0.803			
	EGB5	0.727			
GHRM	GHRM1	0.893	0.982	0.983	0.983
	GHRM2	0.906			
	GHRM3	0.892			
	GHRM4	0.910			
	GHRM5	0.899			
	GHRM6	0.912			

Var.	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability	
				Rho_a	Rho_c
	GHRM7	0.732			
	GHRM8	0.900			
	GHRM9	0.909			
	GHRM10	0.900			
	GHRM11	0.913			
	GHRM12	0.900			
	GHRM13	0.916			
	GHRM14	0.897			
	GHRM15	0.905			
GOC	GOC1	0.870	0.981	0.987	0.989
	GOC2	0.920			
	GOC3	0.855			
	GOC4	0.938			
	GOC5	0.876			
	GOC6	0.940			
	GOC7	0.785			
	GOC8	0.838			
	GOC9	0.935			
	GOC10	0.839			
	GOC11	0.940			
	GOC12	0.853			
	GOC13	0.944			
	GOC14	0.889			
	GOC15	0.924			
GWE	GWE1	0.746	0.888	0.890	0.915
	GWE2	0.835			
	GWE3	0.713			
	GWE4	0.824			
	GWE5	0.842			
	GWE6	0.844			

Table 1 shows that all indicators meet the minimum reliability standards, evaluated using three metrics: Cronbach's Alpha (CA), Rho_a, and Rho_c, all of which exceed the threshold [≥0.7]. The hierarchical pattern of CA ≤ Rho_a ≤ Rho_c (Hair et al., 2022) is also satisfied, reinforcing the validity of the analysis. The GHRM variable dominates with the highest scores, while EGB recorded the lowest values (CA: 0.841; Rho_a: 0.842; Rho_c: 0.887), but still falls within the very good category. These findings affirm adequate measurement precision, which is crucial for ensuring the credibility of the research findings and reducing the risk of measurement errors in structural and predictive analysis.

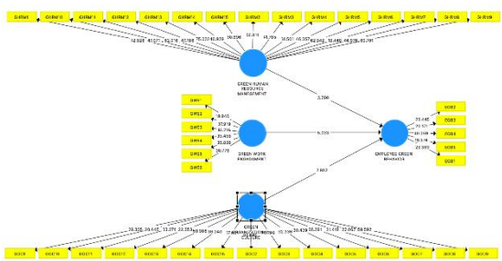

Figure 2. The First Result of Loading Factors

Convergent & Discriminant Validity Test

To ensure the validity of the measurement model, this study uses two approaches: convergent validity, which refers to the AVE value, and discriminant validity, which refers to the HTMT value. The details of these evaluations can be seen in Table 2 and 3 below.

Table 2. Convergent Validity – AVE

Variablel	Average Variance Extracted (AVE)
EGB	0.611
GHRM	0.798
GOC	0.794
GWE	0.644

Table 3. Discriminant Validity – HTMT

	EGB	GHRM	GOC	GWE
EGB				
GHRM	0.437			
GOC	0.212	0.130		
GWE	0.541	0.523	0.140	

Convergent validity is measured using the Average Variance Extracted (AVE), with a minimum threshold of ≥0.5 (Hair et al., 2022). Based on Table 2, all constructs recorded AVE scores above the minimum criteria, indicating significant relationships between indicators that reflect the theoretical constructs. The GHRM variable has the highest AVE (0.798), followed by GOC (0.794), GWE (0.644), and EGB (0.611). These results indicate high measurement stability and precision, providing a foundation for the validity of statistical inferences in subsequent structural analysis.

Furthermore, Table 3 also shows that all HTMT values between constructs are below the critical threshold of <0.85, meeting the criteria for discriminant validity. This proves that the constructs in this study's model are measured as independent entities. The HTMT evaluation was chosen based on scientific evidence highlighting its superiority in detecting construct non-independence compared to the Fornell-Larcker method (Hair et al., 2022). Hair et al. (2022) critique the limitations of Fornell-Larcker in detecting cross-loadings, while Hair et al. (2023) recommend HTMT as a more precise alternative, in line with the advancements in PLS-SEM

Explanatory Power & Effect Size

To assess the structural model, this research utilizes the value of f-square and r-square which can be seen in a detail om Tabel 5 and 6.

Tabel 5. F-Square

	EGB
EGB	
GHRM	0.449
GOC	0.520
GWE	0.627

Tabel 6. R-Square

	R Square	R Square Adjusted
EGB	0.775	0.769

Table 5 shows the disparity in the strength of the relationships between GHRM → EGB, GOC → EGB, and GWE → EGB show Strong effects (F-Square > 0.35) according to Cohen (1988). Furthermore, GWE become the strongest determinant to influence EGB followed by GOC and GHRM. Furthermore, based on Table 6, the adjusted R-Square value for EGB is 0.769 (Strong effect), indicating that 76.9% of the EGB variable is explained by GOC, GWE, and GHRM, while 23.1% is influenced by others.

Hypothesis Testing

Tabel 7. The Result of Hypothesis Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Result
H_1: GHRM → EGB	0.216	0.211	0.066	3.290	0.001	Accepted
H_2: GOC → EGB	0.123	0.126	0.044	2.802	0.005	Accepted
H_3: GWE → EGB	0.348	0.352	0.069	5.033	0.000	Accepted

The results of hypothesis testing show that all tested hypotheses are accepted, with significant p-values (≤0.05). Hypothesis 1 (H1) tests the effect of GHRM on EGB, with a coefficient of 0.216 and a T-statistic of 3.290, indicating a significant positive effect (p = 0.001). Futhermore, Hypothesis 2 (H2), testing the effect of GOC on EGB, is also accepted with a coefficient of 0.123 and a T-statistic of 2.802 (p = 0.005). Hypothesis 3 (H3), which tests the effect of GWE on EGB, has a coefficient of 0.348 and a T-statistic of 5.033 (p = 0.000), indicating a significant positive effect.

Green Human Resource Management on Employee Green Behavior

The analysis results indicate that GHRM has a significant effect on EGB (H1), meaning that sustainability policies in the construction industry, particularly in state-owned enterprises (BUMN), can shape employees' environmentally friendly behavior. The stronger the sustainability policy, the higher the level of employees' environmentally friendly behavior. This finding supports the research of Sabokro et al. (2021), which states that GHRM plays a crucial role in enhancing environmental awareness and behavior. Sustainability policies that need to be implemented include rigorous assessments of employees' sustainability activities, as reflected in the GHRM indicator 13: "I am recorded based on individual performance assessments related to environmental tasks." This documentation and evaluation of environmental performance can encourage employees to improve their environmentally friendly behavior, in line with the findings of Reza et al. (2022) regarding the impact of GHRM in providing rewards that strengthen EGB. Structured documentation also creates a positive impact among employees, motivating each other to engage in environmentally friendly behavior. This is

reflected in the EGB4 indicator: "I strive to inspire others to minimize their environmental footprint," which shows that individuals are not only responsible for their own actions but also encourage others to do the same. A systematic evaluation creates a work environment that fosters positive behavioral changes collectively.

Green Work Engagament on Employee Green Behavior

The results of the study also show that GWE has a positive effect on EGB, meaning that employee engagement in environmental activities can encourage environmentally friendly behavior (EGB). The higher the level of GWE, the more likely employees are to change their habits to be more environmentally friendly, in line with the findings of Ozturen et al. (2022). Corporate Social Responsibility (CSR) programs in state-owned construction companies, such as tree planting and waste patrols, provide opportunities for employees to engage in environmental activities with a sense of happiness, as reflected in the GWE5 indicator: "I feel happy when I complete environmental tasks." This supports the adoption of sustainability values in employees' daily lives and enhances EGB. This finding aligns with Ababneh (2021), who stated that employee engagement in environmental issues strengthens their attachment to sustainability values.

Green Organizational Culture on Employee Green Behavior

Furthermore, GOC has a significant effect on EGB (H3), meaning that companies with a strong sustainability culture can shape employees' environmentally friendly behavior. When the sustainability culture is reinforced, employees become more responsive to environmental issues, which is reflected in their behavior in the workplace. These findings align with Abbas & Dogan (2022), who state that employees in companies with a sustainability culture will adopt these norms in their daily lives. To strengthen GOC, companies can facilitate activities such as seminars or focus group discussions, which provide space for employees to share knowledge and experiences related to sustainability. This finding supports Al-Swidi et al. (2021), who assert that institutionalizing environmental issues within the values and norms of the organization can strengthen GOC and influence EGB. This finding supports the NAM theory, which emphasizes the importance of social norms in motivating individuals to act based on values they deem important. In this context, GOC acts as a trigger for pro-environmental norms, encouraging employees to implement environmentally friendly behaviors both at work and in daily life.

CONCLUSION & RECOMMENDATION

This study aims to further explore the influence of Green Work Engagement (GWE), Green Organizational Culture (GOC), and Green Human Resource Management (GHRM) on Employee Green Behavior from the perspectives of the AMO and NAM theories. In an effort to provide a significant contribution to theoretical understanding and the construction industry literature, this research adopts a quantitative approach to test 3 (three) hypotheses that were developed. The results indicate that Green Human Resource Management (GHRM) implemented within the organization has a significant positive impact on employees' environmentally friendly behavior. Moreover, Green Work Engagement (GWE) has a positive impact on employees' environmentally friendly behavior. Employees who are actively engaged in their work related to sustainability are more likely to adopt and implement environmentally friendly actions in their daily lives.

The research results provide several managerial recommendations for state-owned construction companies. First, in the GHRM aspect, companies need to deepen sustainability evaluation by conducting a sustainability assessment of employees every semester. Currently, the measurement indicators are limited to employees' participation in environmental activities without assessing their behavior in the workplace. Therefore, companies need to develop more detailed assessment indicators related to employees' sustainability performance. Additionally, rewards related to environmental performance are currently only given at the company level, not to individuals. Rewards should be given to employees with the best environmental performance, which can be monitored through sustainability reports. Routine activities such as discussions and seminars related to sustainability can strengthen communication among employees and help foster a more deeply internalized sustainability culture. Regarding GWE, state-owned construction companies should involve employees in decision-making related to sustainability programs, rather than relying solely on the CSR department. By involving employees, they will feel more connected and motivated to implement environmental programs, which will ultimately enhance their environmentally friendly behavior.

The results of this study show that the R-Square value for EGB is moderate, meaning that the influence of GHRM, GOC, and GWE on EGB has a moderate strength. Future research is recommended to explore other variables to understand the factors influencing EGB. Therefore, future studies are suggested to examine the variable of employee ambidexterity as a factor that could influence EGB. This study also does not provide a deeper interpretation of each item used to measure the variables, such as the GWE5 item, which discusses employees' sense of happiness when involved in environmental activities. Future research is recommended to use

a mixed-method approach to obtain a more comprehensive understanding, combining statistical analysis and descriptive analysis through Focus Group Discussions (FGD) or interviews. This approach will allow for a richer exploration of employee experiences and perspectives on environmental engagement. Additionally, this study does not distinguish the levels of GWE based on age, educational background, and employee position in the construction industry. Therefore, future research is recommended to use ANOVA testing to explore the role of demographics in the implementation of EGB in more depth. Finally, the limitations of time, cost, and energy led this study to use a cross-sectional design. Given that EGB is a dynamic behavior, future research is recommended to use a longitudinal study design to observe employee behavior more comprehensively over time.

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