(Online) ISSN 2712-0554
Original Research

Heritage and Sustainable Development
Vol. 8, No. 2, 2026, pp.507-518
https://doi.org/10.37868/hsd.v8i2.1803

Environmental knowledge and green behavior: The role of employee well-being in the mining industry

Seno Aji[1*], Marlon Ivanhoe Aipassa[2,3*], Ndan Imang[2,4], Jawatir Pardosi[2,5], Harihanto[2,6], Henny Pagoray[2,7], Yohanes Budi Sulistioadi[2,3], Rochadi Kristiningrum[3*], Wulan Iyhig Ratna Sari[8], Martha Ekawati Siahaya[9]

[1] Doctoral Student in Environmental Science, Universitas Mulawarman, Samarinda, East Kalimantan Province, Indonesia
[2] Graduate Program Master of Environmental Science, Universitas Mulawarman, Samarinda, East Kalimantan Province, Indonesia
[3] Faculty of Forestry and Tropical Environment, Universitas Mulawarman, Samarinda, East Kalimantan Province, Indonesia
[4] Faculty of Agriculture, Universitas Mulawarman, Samarinda, East Kalimantan Province, Indonesia
[5] Faculty of Teacher Training and Education, Universitas Mulawarman, Samarinda, East Kalimantan Province, Indonesia
[6] Faculty of Social and Political Sciences, Universitas Mulawarman, Samarinda, East Kalimantan Province, Indonesia
[7] Faculty of Fisheries and Marine Sciences, Universitas Mulawarman, Samarinda, East Kalimantan Province, Indonesia
[8] Accounting Department, Universitas Mulawarman, Samarinda, East Kalimantan Province, Indonesia
[9] Environmental Pollution Control Engineering Technology, Samarinda State Agricultural Polytechnic, Samarinda, East Kalimantan Province, Indonesia

*Corresponding author E-mail: marlon.ivanhoe@gmail.com and rkristiningrum@fahutan.unmul.ac.id

Received Dec. 11, 2025
Revised Sep. 19, 2026
Accepted Oct. 1, 2026
Online Nov. 27, 2026

Abstract

The mining industry faces increasing pressure to balance operational efficiency with social and environmental responsibility. This study examines the relationships between corporate social environmental responsibility (CSER), environmental knowledge (EK), and environmental awareness (EA) with green behavior (GB) and employee well-being (WB). The research was conducted at PT Kaltim Prima Coal (PT KPC), involving 136 employees from the External Affairs & Sustainable Development and Health, Safety, and Environment (HSE) divisions using a census-based survey approach. Data were analyzed using partial least squares structural equation modeling (PLS-SEM). The results indicate that environmental knowledge significantly enhances both green behavior and employee well-being, while green behavior exerts a strong positive effect on well-being. Furthermore, employee well-being mediates the relationship between environmental knowledge and green behavior. In contrast, CSER and environmental awareness do not have significant effects on green behavior or well-being. These findings highlight the importance of knowledge-based interventions over externally oriented CSER initiatives in shaping internal behavioral outcomes. Therefore, mining companies should prioritize employee-focused environmental education and strengthen internal sustainability strategies.

© The Author 2026.
Published by ARDA.

Keywords: Environmental knowledge, Green behavior, Employee well-being, Corporate social environmental responsibility, Mining industry

1. Introduction

Environmental sustainability is currently considered a pressing global concern as climate change, ecological degradation, and pollution continue to intensify. Climate change, environmental degradation,

This work is licensed under a Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0/) that allows others to share and adapt the material for any purpose (even commercially), in any medium with an acknowledgement of the work's authorship and initial publication in this journal.

pollution, and declining quality of life are consequences of uncontrolled development and industrialization [1]. In the modern business context, corporate actors are evaluated through financial performance as well as by environmental and social contributions. This shift has facilitated the integration of corporate social responsibility (CSR) and the environmental extension, namely corporate social environmental responsibility (CSER), into strategic management in high-impact sectors such as mining. The shift occurs because companies are urged to contribute to the global solution by integrating CSR practices into business strategy [2]. Corporate sustainable practices have also been linked to institutional factors and the achievement of Sustainable Development Goals (SDGs) in emerging markets [3], and CSR disclosure is increasingly recognized as a key driver of environmental performance and corporate profitability [4].

The mining industry in Indonesia is a key driver of economic development, yet it remains one of the leading causes of environmental degradation [5]. PT Kaltim Prima Coal (PT KPC), a subsidiary of PT Bumi Resources Tbk, operates a large open-pit coal mine covering approximately 90,938 hectares in the Sangatta and Bengalon areas of East Kalimantan Province. As one of the world's largest coal producers with substantial environmental and social footprints, PT KPC has become an important case for studying CSER implementation in the mining sector. Growing government regulations and increasing public scrutiny have prompted mining companies such as PT KPC to adopt CSER initiatives, improve environmental stewardship, and build organizational cultures that genuinely value sustainability.

However, the company was selected for this study not only because of its prominence but also because of researchers' institutional access facilitated by the Provincial Government of East Kalimantan, which granted ethical clearance through Governor's Decree Number 100.3.3.1/K.260/2025. Empirical examinations of CSER interactions with employee-level psychological and behavioral outcomes remain limited, particularly in the Indonesian mining context [6].

CSR and green behavior (GB) have been widely investigated in various sectors from an academic perspective. However, assessment explicitly focused on the integrated relationships among CSER, environmental knowledge (EK), environmental awareness (EA), GB, and employee well-being (WB) in the Indonesian mining context remains limited. Existing research has shown associations between CSR, EA, ecological knowledge, pro-environmental behavior, and WB across various industries. There is still a lack of integrative models assessing how organizational-level CSER, in combination with individual-level EK and EA, shapes both GB and WB in mining companies.

Few investigations explore psychological mediation, such as the role of WB in translating knowledge into behavior. This creates a clear research gap necessitating an integrative, employee-centered model that examines how a company's CSER programs interact with knowledge and awareness to produce GB and affect WB in mining workplaces. The empirical testing of a comprehensive PLS-SEM model at PT KPC is conducted to address this gap, providing both theoretical contributions (an integrated model and mediation analysis) and practical recommendations for designing CSER interventions targeting internal employees and improving both environmental sustainability outcomes and employee welfare.

In theoretical discussions, increasing attention has been directed toward green behavior (GB) and employee well-Being (WB). GB denotes individual behaviors intended to mitigate environmental damage within both household and organizational contexts [7]. WB encompasses material aspects as well as job satisfaction, mental health, and a sense of meaning derived from contributing to the company and society [2]. The main factors believed to influence these two outcomes include CSER, EK, and EA.

Previous research showed a positive connection between CSR, EK, EA, GB, and WB, finding that positive perceptions of CSR improved employees' pro-environmental behavior through environmental awareness and commitment [2]. Research at PT Petrokimia Gresik showed that CSR, EK, and WB

significantly influenced GB [6]. Green HRM practices and a sustainability-focused workplace culture reinforced the connection between CSR and employee GB [7]. Similar observations were reported in the mining sector, where green training and green work culture have been proven to improve employees' environmental performance [8].

This research advances existing literature in three important ways. First, it tests a comprehensive PLS-SEM model connecting CSER, EK, EA, GB, and WB, thereby offering a systematic view of behavioral and psychological dynamics in a mining workforce. Second, it incorporates mediation analysis to identify WB as an internal psychological mechanism that partially explains how EK promotes GB. Third, it employs a census sampling strategy in two sustainability-related divisions at PT KPC, generating reliable, population-level insights from a high-impact mining context. The results contribute theoretically by refining cross-level reasoning in CSER research and practically by guiding mining companies to reorient CSER programs toward employees rather than solely external communities.

2. Research method

2.1. Research design

This research was carried out within a quantitative framework using a structured online questionnaire designed to capture employee perceptions across all variables of interest. Data were collected between July 2024 and July 2025, covering the entire target population in the two sustainability-related divisions. The questionnaire instrument was built upon previously validated scales [9][10] and refined with expert guidance to enhance content validity. Responses were screened for consistency and completeness before analysis. The hypothesized interconnections among constructs were evaluated using PLS-SEM, which is considered effective for prediction and causal framework analysis. This analytical approach allows simultaneous assessment of measurement reliability and structural relationships, offering a holistic view of the dynamics among CSER, EK, EA, GB, and WB.

2.2. Research population and sample

The population consisted of all 136 employees in the External Affairs & Sustainable Development Division and the Health, Safety, and Environment (HSE) Division at PT KPC. Both divisions were selected because they are directly responsible for sustainability-related functions: the External Affairs & Sustainable Development Division manages stakeholder engagement and CSR programs, while the HSE Division oversees environmental compliance and employee safety. These two divisions represent the primary organizational units most closely aligned with the study's focus on CSER, green behavior, and employee well-being [6][7].

A census sampling strategy was selected because the population was small, well-defined, and fully accessible, allowing this research to maximize coverage and minimize sampling errors. The use of a census increases statistical power for model estimation in PLS-SEM by including the entire target population rather than a subset. This method had limitations: restricted generalizability beyond the two studied divisions or PT KPC as a single company.

Additionally, the sample was not a probabilistic sample of all mining employees in Indonesia, and caution is required when extrapolating results to other contexts. Potential non-response bias and the cross-sectional nature of the survey constrain causal inference. Future research should consider multi-site or multi-company sampling to enhance external validity. The questionnaire instrument summary is presented in Table 1.

Table 1. Questionnaire instrument summary

Variable	Key Indicators	Scale	Items	Reference
CSER	Environmental protection, employee welfare, legal compliance, volunteer encouragement	5-point Likert	4	[7]

Variable	Key Indicators	Scale	Items	Reference
EK	Waste separation, recycling, environmental impact awareness, community participation	5-point Likert	6	[8]
EA	Low-impact products, energy saving, alternative energy, environmental activities	5-point Likert	4	[9]
WB	Emotional, psychological, and social well-being	5-point Likert	3	[10]
GB	Environmentally friendly task completion, initiative, proactive environmental protection	5-point Likert	6	[11]

Source: Primary data (2025)

All indicators were sourced from established literature [9][11][10][12][13] and refined to suit the mining sector context. To ensure instrument validity and linguistic-cultural equivalence, a multi-step validation procedure was applied: (1) translation and back-translation between original English items and Bahasa Indonesia; (2) expert judgment review by three subject-matter experts (an environmental management researcher, a PT KPC HSE manager, and an organizational behavior academic) to assess content relevance and face validity; and (3) a pilot test conducted prior to the main survey to assess item clarity, comprehension, and completion time (respondents in the pilot were excluded from the final sample). Preliminary analyses confirmed reliability through Cronbach's alpha above 0.70 and factor loadings exceeding 0.60 for all items before full deployment.

2.3. Data examination

The PLS-SEM analysis was performed using SmartPLS 4.0 with the following specifications: 5,000 bootstrap samples, bias-corrected bootstrapping, two-tailed testing at $\alpha = 0.05$, a maximum of 300 iterations, and a convergence criterion of 1×10^{-7}. The overall model fit was assessed using SRMR (= 0.100), which exceeds the traditional 0.08 threshold for covariance-based SEM but remains acceptable within the PLS-SEM framework, which prioritizes predictive validity over global fit [14][15]. The specifications also follow [16].

The analysis proceeded in two stages. Stage 1 evaluated the outer model for measurement validity and reliability, including convergent validity (AVE > 0.5, factor loadings > 0.6), discriminant validity (cross-loadings and Fornell–Larcker criterion), and composite reliability (> 0.7) [17]. Indicator reliability and validity assessment also followed [18]. Stage 2 focused on the inner model by examining path coefficients, R-squared (R^2) values, and p-values via bootstrapped confidence intervals. Mediation effects were assessed using the specific indirect effect method. To mitigate common method bias, procedural remedies including anonymity, item randomization, and proximal separation were applied. Harman's single-factor test confirmed that no single factor explained more than 50% of the variance, and all full collinearity VIF values were <3.3, indicating no severe bias.

2.4. Conceptual framework

The proposed research model is illustrated in Figure 1. CSER, EK, and EA are positioned as the primary antecedents influencing employees' GB. CSER reflects the company's commitment to social and environmental responsibility, which may shape employees' behavioral expectations. At the individual level, EK provides cognitive tools to understand environmental consequences, while EA captures emotional sensitivity and ecological concern. These three factors are hypothesized to work jointly in motivating employees to engage in environmentally responsible behavior. GB then acts as the central pathway through which both organizational-level and individual-level factors translate into WB. This framework reflects the idea that well-being is

strengthened not only by workplace conditions or personal traits but also by employees' sense of purpose and fulfillment when engaging in environmentally responsible behavior.

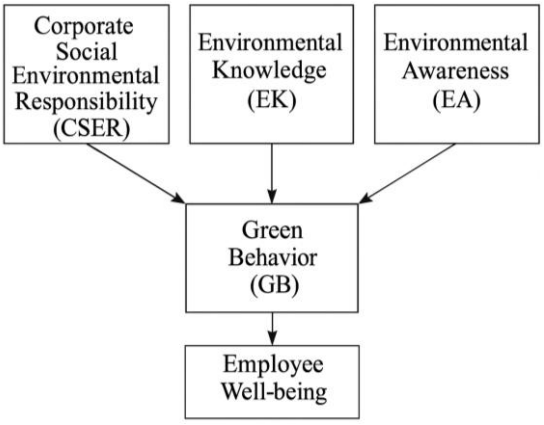


Figure 1. Conceptual framework

3. Results and discussion

3.1. Results

3.1.1. General overview of the survey participants

Age, tenure, education, and gender were not included as control variables in the SEM because training on social responsibility, EA, EK, and GB forms essential foundations for all employee levels in mining companies. New employees tend to display high EA owing to the influence of formal education and contemporary social media emphasis on environmental issues, making them comparable to more experienced colleagues. Moreover, environmentally friendly behavior is an explicit performance indicator within both targeted divisions, leading to routine practice across all employees. Table 2 presents the demographic characteristics of survey participants.

Table 2. Overview of survey participants

Characteristics	Category	Frequency	Percentage
Gender	Men	109	80.1%
	Women	27	19.9%
Age	< 20 years	0	0%
	> 20 to 40 years	44	32.4%
	> 40 to 60 years	92	67.6%
Education	Senior High School	16	11.8%
	Associate degree	8	5.9%
	Undergraduate degree	76	55.9%
	Graduate degrees	34	25.0%
	Doctorate	2	1.5%
Length of Employment	< 1 year	1	0.7%
	> 1 until 5 years	12	8.8%
	> 5 until 10 years	7	5.1%
	>10 until 20 years	81	59.6%
	> 20 years	35	25.7%

Source: Primary data (2025)

3.1.2. Outer model evaluation

Results from the measurement model assessment demonstrated a robust model with strong reliability and validity. Internal consistency was satisfactory, with composite reliability and Cronbach's alpha exceeding the recommended thresholds of 0.84 and 0.75, respectively. Convergent validity was confirmed as all average variance extracted (AVE) values exceeded 0.53. Discriminant validity was established using the Fornell–Larcker criterion and cross-loading analysis, which demonstrated that each construct shared greater variance with its own indicators than with other constructs. The overall model fit was acceptable, evidenced by an SRMR value of 0.100.

3.1.3. Inner model evaluation and hypothesis testing

R^2 for WB was 0.443, indicating that CSER, EK, and EA collectively explained 44.3% of the variance in WB. The R^2 for GB was 0.708, implying that 70.8% of the variance in GB was explained by CSER, EK, EA, and WB. Hypothesis testing results are presented in Table 3 (direct effects), Table 4 (mediation), and Table 5 (effect sizes).

Table 3. Direct effect hypothesis tests; Source: Primary data (2025)

Hypothesis	Relationship	Path Coefficient	T-Statistic	P-Value	Result
H1	CSER → GB	-0.113	0.333	0.739	Not confirmed
H2	EK → GB	0.313	3.996	0.000	Confirmed
H3	EA → GB	0.379	1.199	0.231	Not confirmed
H4	CSER → WB	0.409	1.000	0.318	Not confirmed
H5	EK → WB	0.331	3.545	0.000	Confirmed
H6	EA →WB	-0.023	0.056	0.955	Not confirmed
H7	GB → WB	0.382	5.057	0.000	Confirmed

Table 4. Bootstrapped indirect effects (mediation results); Source: Primary data (2025)

Hypothesis	Relationship	Specific Indirect effect	T-Statistic	P-Value	Result
H8	CSER → WB→GB	0.156	0.366	0.366	Not confirmed
H9	EK → WB→ GB	0.126	2.886	0.004	Confirmed
H10	EA → WB→ GB	-0,009	0.053	0.957	Not confirmed

Table 5. Effect size test results; Source: Primary data (2025)

Instrument	CSER	EA	EK	WB	GB	Note
CSER				0.011	0.002	small effect
EA					0.019	small effect
EK				0.093	0.145	medium effect
WB					0.278	big effect

Note: CSER = Corporate social and environmental responsibility; EK = Environmental knowledge; EA = Environmental awareness; GB = Green behavior and WB = well being

SRMR = 0.100 exceeds the traditional 0.08 threshold for covariance-based SEM but remains acceptable within PLS-SEM, which prioritizes predictive validity over global fit. Effect sizes (f^2) range from small to large (CSER→WB: $f^2 = 0.011$; EK→GB: $f^2 = 0.145$; WB→GB: $f^2 = 0.278$). Bootstrapped 95% confidence intervals confirmed the significance of the EK→GB, EK→WB, and GB→WB paths, as none of these CIs included zero.

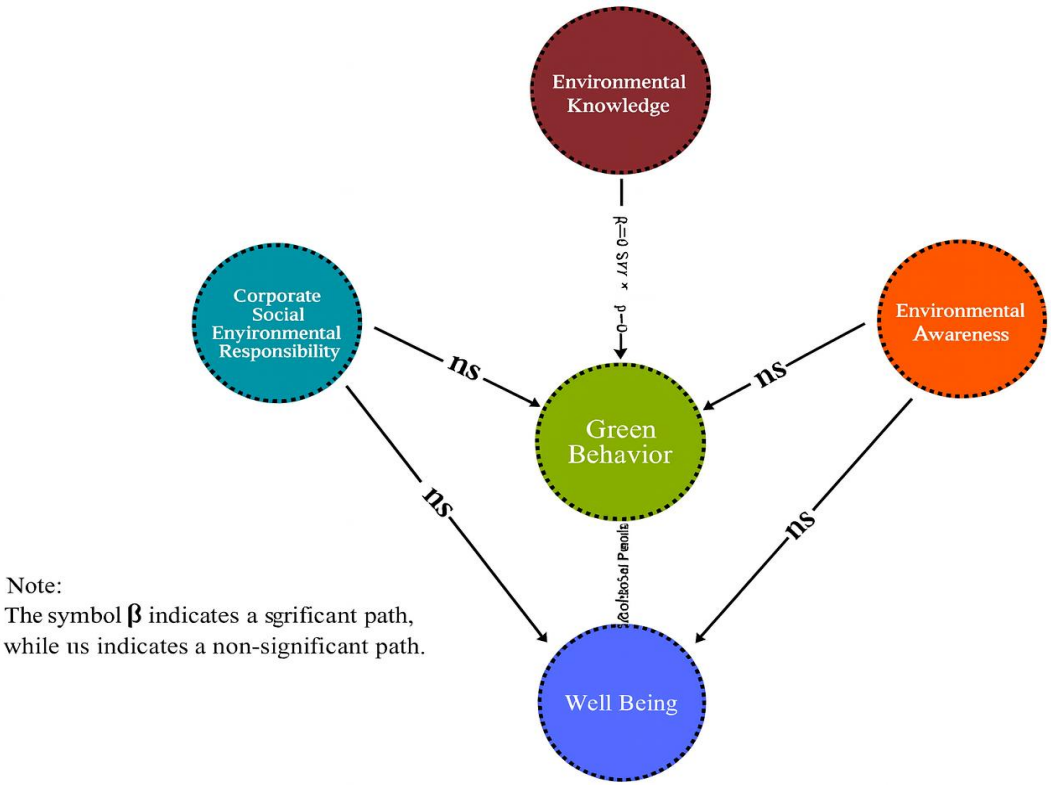


Figure 2. Path diagram model indirect effects

3.2. Discussion

3.2.1. General overview of respondents

As shown in Table 2, 80.1% of respondents were male, reflecting the typically male-dominated nature of the mining industry and signaling the need for gender inclusivity strategies [19][20]. Regarding age, 67.6% of respondents were between 41 and 60 years old, and 85.3% had worked for more than 10 years (59.6% for 11–20 years; 25.7% for over 20 years), reflecting high human resource stability and employee loyalty. This experienced cohort brings strategic and organizational perspectives that are valuable for understanding long-term sustainability culture [21]. With respect to education, 83.4% held higher education qualifications (Bachelor's: 55.9%, Master's: 25.0%, Doctorate: 1.5%), indicating that the workforce is academically well-equipped to engage with complex sustainability concepts [22]. The high tenure observed suggests that respondents possessed deep familiarity with organizational culture and operations, which likely enhanced the validity of their self-reported perceptions of CSER, EK, EA, GB, and WB [23].

3.2.2. The impact of CSER, EK, and EA on GB

The analysis found that EK was the sole significant direct predictor of GB (H2: $\beta = 0.313$, $p < 0.001$). This result aligns with cognitive-behavioral theory, which posits knowledge as a proximal antecedent to action [24][25]. Employees who understand environmental principles tend to apply them in daily work activities. This suggests that PT KPC's ecological training programs, including green office, HSE, and energy efficiency training, have been effective in building knowledge that translates into tangible pro-environmental behavior.

The non-significant direct effects of CSER (H1: $\beta = -0.113$, $p = 0.739$) and EA (H3: $\beta = 0.379$, $p = 0.231$) on GB can be explained by several contextual mechanisms. First, PT KPC's CSER programs are largely externally oriented, prioritizing community development, regulatory compliance, and reputation management for external stakeholders rather than shaping internal employee behavior. Symbolically targeted or externally focused CSR/CSER programs may not be perceived by employees as relevant incentives for changing daily work practices [26][27].

Second, a communication and visibility gap may exist, where employees are unaware of program details, lack clarity about how CSER affects their tasks, or perceive CSER as corporate public relations rather than substantive organizational change. Third, strong operational and safety constraints in mining environments strict safety protocols, heavy machinery, and production priorities may limit the feasibility of certain green behaviors even when awareness and organizational initiatives are present. Fourth, measurement and level-of-analysis issues are relevant: CSER is often measured as an organizational-level construct, while GB and EA are individual-level measures. Without multilevel analysis, cross-level dynamics may be obscured. Finally, the results align with the 'value–action gap' framework, in which attitudes or organizational commitments do not automatically produce behavior due to structural, social, or psychological barriers [28][29]. This has also been observed in fisheries sustainability contexts [30].

These mechanisms suggest that to make CSER and EA more effective at promoting GB in mining settings, companies should: (a) integrate CSER with internal HR practices and daily operations (internal CSR); (b) improve internal communication and employee participation in program design; (c) provide practical enabling infrastructure and incentives; and (d) adopt longitudinal and multilevel research designs to capture organizational-to-individual pathways. PT KPC's commitment to internal sustainability, evidenced by its mining safety, environment, and security policy, as well as its human rights and sustainable development policy, provides a strong foundation for such realignment [31].

These findings diverge from prior research reporting positive influences of CSR on GB [32][7]. The non-significant effect of CSER in this study aligns with [33], which reported no significant connection between externally focused CSER and individual employee behavior. The divergence may be attributable to PT KPC's predominantly external CSER orientation, where employees do not perceive a direct link between corporate programs and their own job responsibilities. EA did not directly affect GB, diverging from [34][35], who reported positive correlations. This supports the 'value-action gap' phenomenon [28], where positive environmental attitudes fail to produce matching behavior without adequate organizational infrastructure (e.g., accessible recycling facilities, clear green policies) or strong social norms.

3.2.3. The impact of CSER, EK, and EA on WB

EK significantly improved WB (H5: $\beta = 0.331$, $p < 0.001$), consistent with psychological well-being theory, which identifies environmental mastery and competence as key dimensions of well-being [36] [37]. Employees who felt competent in understanding and addressing environmental issues reported higher self-esteem and a greater sense of purpose at work. This finding supports the view that knowledge empowerment contributes positively to well-being [32][33].

Neither CSER (H4: $\beta = 0.409$, $p = 0.318$) nor EA (H6: $\beta = -0.023$, $p = 0.955$) had a significant direct impact on WB. The absence of a significant CSER effect contradicts studies reporting that CSR enhances WB through social exchange processes [38][39]. This discrepancy may reflect the external focus of PT KPC's CSR programs: for WB to be impacted, employees need to feel they directly benefit from the company's social responsibility efforts. The non-significant result for EA may imply that, without the capacity to make meaningful environmental contributions, high awareness might even generate 'ecological anxiety' rather than improved WB, a nuance that warrants further investigation [36].

3.2.4. The influence of GB on WB

A key finding is the strong positive relationship between employee GB and overall WB (H7: $\beta = 0.382$, $p < 0.001$). This can be explained through self-determination theory [37], which posits that engaging in environmental behavior satisfies three core intrinsic needs: autonomy, relatedness, and competence. This result supports and extends prior research [38][39], which found correlations between workplace behavior and well-being, but rarely specifically tested the GB–WB relationship in the mining sector. The relationship forms a positive feedback loop in which 'doing good' leads to 'feeling good.' PT

KPC's strong safety and sustainability culture, evidenced by its mining safety, environment, and security policy as well as its human rights, sustainable development, and business performance improvement policy, provides an enabling environment for this dynamic, explaining why employees' GB remains high even when CSER's direct influence is limited.

3.2.5. The intermediary effect of WB

WB significantly mediated the impact of EK on GB (H9: Specific Indirect Effect = 0.126, p = 0.004), indicating a sequential process in which EK enhanced WB, which in turn facilitated GB. This provides a more nuanced explanation than the direct associations commonly documented in earlier studies [6], demonstrating the psychological mechanism through which knowledge is converted into sustained action. WB did not mediate the relationship between CSER and GB (H8: p = 0.366), nor between EA and GB (H10: p = 0.957). These non-significant pathways support the argument that CSER and EA exert weaker and less efficient pathways to GB in this context, likely due to the lack of direct individual relevance or insufficient facilitative conditions. Importantly, this selective mediation effect fills a literature gap by signaling that not all antecedents of GB operate through identical psychological mechanisms.

4. Conclusions

This research demonstrated that environmental knowledge (EK) played the most essential role in driving both green behavior (GB) and employee well-being (WB) in the mining industry, confirming that internal capability-building is a central pillar of successful organizational sustainability practices. CSER and environmental awareness (EA) did not have significant direct effects on WB or GB, primarily due to the external orientation of PT KPC's CSER programs and the operational constraints inherent in mining environments. The strong positive relationship between GB and WB implies that engaging in environmentally responsible activities enables employees to experience feelings of competence, meaning, and psychological satisfaction. The partial mediation of WB in the EK GB relationship reveals an important psychological pathway through which knowledge is transformed into sustained pro-environmental action.

Based on these findings, the following specific and actionable recommendations are offered for PT KPC and similar mining companies: (1) Develop and implement internal CSER programs specifically targeting employees in operational divisions, such as environmental literacy workshops, green incentive schemes, and knowledge-sharing platforms, to bridge the gap between organizational-level CSER commitments and individual-level behavior. (2) Integrate environmental knowledge training as a core competency within all employee development programs, rather than treating it as a supplementary HSE activity. (3) Establish a monitoring and feedback system for employee GB and WB, enabling companies to track the effectiveness of sustainability initiatives and identify areas requiring infrastructure improvements (e.g., recycling facilities, energy-saving equipment). (4) Improve internal communication of CSER activities to ensure employees perceive direct personal benefits and understand the link between corporate sustainability programs and their own job roles. (5) Conduct longitudinal and multilevel studies to capture dynamic organizational-to-individual sustainability pathways and to assess whether the effects of CSER and EA on GB evolve over time as internal program alignment improves.

Declaration of competing interests

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

Funding information

Funding for this research was provided by the Provincial Government of East Kalimantan under the 2025 Regional Revenue and Expenditure Budget (APBD) and managed by the Regional Research and Development Agency (BRIDA).

Acknowledgements

The authors are grateful to the Provincial Government of East Kalimantan, referring to the Governor's Decree Number 100.3.3.1/K.260/2025 dated 25 August 2025 concerning the establishment of the implementation team for strategic research on environmental and social management in PT. Kaltim Prima Coal, a coal mining company in East Kalimantan.

Author contribution

The contribution of each author to this manuscript is as follows: Seno Aji, Marlon Ivanhoe Aipassa, Ndan Imang, Jawatir Pardosi, and Rochadi Kristiningrum contributed to the study conception and research conceptualization. Seno Aji was responsible for the research design, manuscript preparation, and critical revision of the manuscript. Seno Aji, Marlon Ivanhoe Aipassa, Ndan Imang, Jawatir Pardosi, Rochadi Kristiningrum, Wulan Iyhig Ratna Sari, and Martha Ekawati Siahaya conducted field observations, surveys, and data collection. Seno Aji, Rochadi Kristingrum, and Wulan Iyhig Ratna Sari contributed to manuscript writing and editing. Marlon Ivanhoe Aipassa, Ndan Imang, Jawatir Pardosi, and Wulan Iyhig Ratna Sari contributed to the methodological design of the study. Marlon Ivanhoe Aipassa, Ndan Imang, Jawatir Pardosi, Harihanto, Henny Pagoray, Yohanes Budi Sulistioadi, Rochadi Kristingrum, Wulan Iyhig Ratna Sari, and Martha Ekawati Siahaya were involved in reviewing and critically evaluating the manuscript. Marlon Ivanhoe Aipassa, Ndan Imang, Jawatir Pardosi, Rochadi Kristingrum, Wulan Iyhig Ratna Sari, and Martha Ekawati Siahaya provided supervision throughout the research process. Wulan Iyhig Ratna Sari was responsible for software-related analysis and support. Marlon Ivanhoe Aipassa and Rochadi Kristingrum served as corresponding authors. All authors have read and approved the final version of the manuscript.

Ethical approval statement

This research was conducted with ethical approval from the Provincial Government of East Kalimantan (Governor's Decree Number 100.3.3.1/K.260/2025). All participants were informed of the purpose of the study, and their voluntary participation was ensured. Data were collected anonymously and used solely for academic research purposes.

Informed consent

All participants provided informed consent prior to participating in this survey. They were informed of the research objectives, their right to withdraw at any time, and the confidentiality of their responses.

References

[1] H. Lee and J. Romero, "IPPC Climate Change 2023 Synthesis report contribution of working groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change," Geneva, Switzerland, 2023. https://doi.org/10.59327/IPCC/AR6-9789291691647.

[2] S. Haider *et al.*, "The impact of perceived CSR on employees ' pro-environmental behaviors : The mediating effects of environmental consciousness and environmental commitment," *Sustainability*, vol. 15, no. 4350, pp. 1–25, 2023, https://doi.org/10.3390/su15054350.

[3] S. G. Maji and A. Haloi, "Corporate sustainable practices, institutional factors, and sustainable development goals: Evidence from Asian Emerging Markets," *Sustain. Dev.*, vol. 33, no. S1, pp. 381–398, Nov. 2025, https://doi.org/10.1002/sd.70006.

[4] D. Leniwati, N. F. Handayani, A. P. N. Wicaksono, and E. D. Wahyuni, "Corporate social responsibility disclosure , environmental performance , and corporate profitability : Green innovation as intervening variable," *AFRE Account. Financ. Rev.*, vol. 6, no. 3, pp. 384–393, 2023, https://doi.org/10.26905/afr.v6i3.11362.

[5] Direktorat Statistik Ketahanan Sosial, *Environment Statistics of Indonesia 2023*. Badan Pusat Statistik,

2023.

[6] L. H. Purbawinasta and G. C. Premananto, "Unlocking green initiatives : A comprehensive study on factors influencing employee environmental behavior at PT Petrokimia Gresik," *Welf. J. Ilmu Kesejaht. Sos.*, vol. 12, no. 2, pp. 122–138, 2023, https://doi.org/10.14421/welfare.2023.122-03.

[7] M. A. Aukhoon, J. Iqbal, and Z. A. Parray, "Corporate social responsibility supercharged: greening employee behavior through human resource management practices and green culture," *Evidence-based HRM a Glob. Forum Empir. Scholarsh.*, vol. 12, no. 4, pp. 945–965, Apr. 2024, https://doi.org/10.1108/EBHRM-11-2023-0312.

[8] D. Nusraningrum, A. Rahmawati, W. Wider, L. Jiang, and L. N. Udang, "Enhancing employee performance through motivation : the mediating roles of green work environments and engagement in Jakarta ' s logistics sector," *Front. Sociol.*, vol. 9, no. May, pp. 1–8, 2024, https://doi.org/10.3389/fsoc.2024.1392229.

[9] T. Y. Liang and S. J. Yoon, "The effect of perceived corporate social responsibility (PCSR) on subjective well-being," *Sustainability*, vol. 15, no. 7497, pp. 1–13, 2023, https://doi.org/10.3390/su15097497.

[10] I. C. de S. Paiva, M. I. S. Hernandez, and L. C. Carvalho, "CSR information , environmental awareness and CSR diffusion in SMEs of Angola," *J. Account. Emerg. Econ.*, vol. 2042–1168, pp. 1–24, 2022, doi: https://doi.org/10.1108/JAEE-10-2022-0280.

[11] S. S. Abdul-Nabi, V. Al Karaki, A. Khalil, and T. El Zahran, "Climate change and its environmental and health effects from 2015 to 2022: A scoping review," *Heliyon*, vol. 11, no. 3, p. e42315, 2025, doi: https://doi.org/10.1016/j.heliyon.2025.e42315.

[12] L. W. P. Lezar and F. Van Der Walt, "Cultural intelligence , flourishing , and thriving in the South African Work Context," *SAGE OPEN*, no. September, pp. 1–16, 2023, https://doi.org/10.1177/21582440231187361.

[13] H. Jiang, K. Wang, Z. Lu, Y. Liu, Y. Wang, and G. Li, "Measuring green creativity for employees in green enterprises : Scale development and validation," *Sustainability*, vol. 31, no. 275, pp. 1–16, 2021, https://doi.org/10.3390/su13010275.

[14] G. D. Garson, *Prtial least squares: Regression & structural equation models*. North Carolina State University, 2016.

[15] M. Sarstedt, C. M. Ringle, and J. F. Hair, *Partial least squares structural equation modeling*. Springer Nature Switzerland, 2021. https://doi.org/10.1007/978-3-319-05542-8_15-2.

[16] J. F. Hair, G. T. Hult, C. M. Ringle, M. Sarrstedt, N. P. Danks, and S. Ray, *Partial least squares structural equation modeling (PLS-SEM) Using R*, Classroom. Springer, 2021. https://doi.org/10.1007/978-3-030-80519-7.

[17] S. Haryono, *Metode SEM untuk penelitian manajemen dengan AMOS 22.00, LISREL 8.80 dan Smart PLS 3.0*. Jakarta: Badan Penerbit PT. Intermedia Personalia Utama., 2016.

[18] M. Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, "An Introduction to structural equation modeling," in *a primer on partial least squares structural equation modeling (PLS-SEM)*, India: SAGE Publications, 2022, ch. A Primer o. [Online]. Available: https://www.pls-sem.net/

[19] B. A. Kansake, G. B. Sakyi-Addo, and N. K. Dumakor-Dupey, "Creating a gender-inclusive mining industry: Uncovering the challenges of female mining stakeholders," *Resour. Policy*, vol. 70, p. 101962, 2021, https://doi.org/10.1016/j.resourpol.2020.101962.

[20] S. Bansal, P. Nangia, S. Singh, and D. Cichoń, "Where's our share: Agenda for gender representation in mining industry," *Resour. Policy*, vol. 90, p. 104820, 2024, https://doi.org/10.1016/j.resourpol.2024.104820.

[21] S. Lakeman, "Gender in mining," *Nat. Energy*, vol. 8, no. 3, p. 221, 2023, https://doi.org/10.1038/s41560-023-01239-2.

[22] S. Heimann and K. Johansson, "Gender in industrial mine work and organizations – recommended actions toward gender equality," *Miner. Econ.*, vol. 38, no. 3, pp. 513–526, 2025, https://doi.org/10.1007/s13563-025-00499-6.

[23] K. Nielsen, M. B. Nielsen, C. Ogbonnaya, M. Känsälä, E. Saari, and K. Isaksson, "Workplace resources to

improve both employee well-being and performance : A systematic review and meta-analysis," *Work Stress An Int. J. Work. Heal. Organ.*, vol. 0, no. 0, pp. 1–20, 2017, https://doi.org/10.1080/02678373.2017.1304463.

[24] H. M. Arshad, K. Saleem, S. Shafi, T. Ahmad, and S. Kanwal, "Environmental Awareness , concern , attitude and behavior of university students : a comparison across academic disciplines," *Policy J. Environ. Study*, vol. 30, no. 1, pp. 561–570, 2021, https://doi.org/10.15244/pjoes/122617.

[25] R. C. Tsaur and C. H. Chen, "Sustainable tourism planning for Taiwanese in administrative effects with respect to Chinese Arrivals," *Sustain.*, vol. 10, no. 12, 2018, https://doi.org/10.3390/su10124729.

[26] F. Qonita, M. Moeljadi, and K. Ratnawati, "The influence of corporate social responsibility on firm value through corporate reputation and financial performance," *Int. J. Environ. Sustain. Soc. Sci.*, vol. 3, no. 3, pp. 691–701, 2022, https://doi.org/10.38142/ijesss.v3i3.271.

[27] I. Hadiwibowo and L. Purwanti, "Corporate social responsibility and firm performance : A literature review," *Account. Financ. Stud.*, vol. 4, no. 3, pp. 135–157, 2024, https://doi.org/10.47153/afs43.9702024.

[28] A. Kollmuss and J. Agyeman, "Mind the Gap : why do people act environmentally and what are the barriers to," *Environ. Educ. Res.*, vol. 8, no. 3, pp. 239–260, 2002, https://doi.org/10.1080/1350462022014540.

[29] A. Chapman, S. C. Karmaker, and Y. Shigetomi, "Investigating the impact of working arrangements and lifestyle factor importance on environmental consciousness Investigating the impact of working arrangements and lifestyle factor importance on environmental consciousness," in *Environmental Research Communications*, IOP Publishing, 2023, p. 065010. doi: Environ. Res. Commun. 5 (2023) 065010 https://doi.org/10.1088/2515-7620/acddbd.

[30] S. Mantziaris, I. Tzouramani, A. Liontakis, and A. Sintori, "A comparative sustainability performance assessment of the fishing fleet segments : The case of the Greek fishing sector," *Fish. Res.*, vol. 289, no. September 2024, p. 107484, 2025, https://doi.org/10.1016/j.fishres.2025.107484.

[31] L. M. A. Dujana, T. E. B. Soesilo, and Fatmah, "Relationship between environmental knowledge , Pro-environmental attitude , and pro-environmental behavior of employees (Study at PT X)," *J. Nat. Resour. Environ. Manag.*, vol. 15, no. 2, pp. 227–233, 2025, http://dx.doi.org/10.29244/jpsl.15.2.227.

[32] J. N. Faezah, M. Y. Yusliza, Y. N. Azlina, S. A. Asrul, E. R. Johar, and N. Rosli, "Enhancing pro-environmental behavior through CSR : The dual impact of green organizational identification and environmental knowledge," *Compend. by Pap.*, vol. 41, no. 1b, pp. 16–25, 2025, https://doi.org/10.59953/paperasia.v41i1b.248.

[33] J. Y. B. De Jesus, P. N. B. Merle, E. U. Moñedera, R. A. F. Nicdao, and A. E. E. Junior, "Generation Z ' s purchase intention towards green apparel : The mediating role of apparel sustainability knowledge and green perceived value," *Rev. Integr. Bus. Econ. Res.*, vol. 13, no. 2, pp. 107–122, 2024.

[34] M. Ehrnström and F. Steffen, "The political ontology of corporate social responsibility : obscuring the pluriverse in place," *J. Bus. Ethics*, vol. 185, no. 2, pp. 245–261, 2023, https://doi.org/10.1007/s10551-022-05175-1.

[35] H. Han, J. Yu, H.-C. Kim, and W. Kim, "Impact of social/personal norms and willingness to sacrifice on young vacationers' pro-environmental intentions for waste reduction and recycling," *J. Sustain. Tour.*, vol. 26, no. 12, pp. 2117–2133, Dec. 2018, https://doi.org/10.1080/09669582.2018.1538229.

[36] M. Mansour, "The influences of environmental awareness on green performance," *Glob. J. Environ. Sci. Manag.*, vol. 9, no. 4, pp. 899–914, 2024, https://doi.org/10.22035/gjesm.2023.04.16.

[37] R. M. Ryan and E. L. Deci, "Intrinsic and extrinsic motivations : Classic definitions and new directions," *Contemp. Educ. Psychol.*, vol. 25, pp. 54–67, 2000, https://doi.org/10.1006/ceps.1999.1020.

[38] L. K. Jena and S. Pradhan, "Workplace spirituality and employee commitment: The role of emotional intelligence and organisational citizenship behaviour in Indian organisations," *J. Enterp. Inf. Manag.*, vol. 31, no. 3, pp. 380–404, Apr. 2018, https://doi.org/10.1108/JEIM-10-2017-0144.

[39] N. M. Widhi, M. Ihksan, and E. Wartiningsihi, "The relationship between corporate social responsibility (csr) initiatives and employee engagement in Indonesian Corporations," *J. Bus. Adm. Entrep. Innov.*, vol. 1, no. 2, 2024, https://doi.org/10.32722/baei.v1i02.7329.