HUIT Journal of Science ***26*** *(3E) (2026) 1665-1677*

DOI: https://doi.org/10.62985/j.huit_ojs.vol26.no3E.580

THE ROLE OF GREEN KNOWLEDGE MANAGEMENT IN DRIVING GREEN INNOVATION AND SUSTAINABLE PERFORMANCE: EVIDENCE FROM LEAD-ACID BATTERY MANUFACTURERS IN SOUTHEAST VIETNAM

Nguyen Phan Hoai Lam[1,*], Nguyen Nguyen Phong[2]

[1]*Sebang Battery Vina Co., Ltd*

[2]*Ho Chi Minh City Open University*

*Email: *hoailam1402@gmail.com*

Received: 10 April 2026; Revised: 10 May 2026; Accepted: 14 May 2026

ABSTRACT

This study investigates the role of Green Knowledge Management (GKM) in enhancing sustainable performance through the mediating effect of green innovation in lead-acid battery manufacturers in Southeast Vietnam. The research addresses a gap in understanding how knowledge-driven practices influence environmental and organizational sustainability in emerging market settings. A quantitative research design was employed, drawing on 162 valid responses from lead-acid battery manufacturers in the Southeast of Vietnam. Structural Equation Modeling (SEM) was applied to test the relationships between GKM, green innovation, and sustainable performance. The findings indicate that GKM significantly contributes to green innovation and sustainable performance. Knowledge acquisition, sharing, and application were found to be instrumental in fostering eco-innovative practices. Moreover, green innovation partially mediates the relationship between GKM and firm performance, validating the proposed conceptual framework. The study provides managerial guidance for manufacturers seeking to enhance competitiveness through sustainability. Investments in knowledge infrastructure, employee training, and knowledge-sharing platforms are essential for promoting green strategies such as reducing toxic waste and recycling used batteries. This study is among the first to empirically examine the impact of GKM on green innovation and sustainable performance in the context of the Southeast of Vietnam manufacturing. It integrates concepts from knowledge management and sustainability literature, offering a holistic view of how intangible capabilities drive environmental and organizational outcomes.

Keywords: Lead-acid battery manufacturing, green organizational practices, emerging manufacturing markets, environmental performance, knowledge-based sustainability.

1. INTRODUCTION

In recent years, the imperative for sustainable manufacturing has intensified, particularly in industries with significant environmental footprints such as lead-acid battery production. Green innovation, encompassing environmentally friendly processes, products, and business models, has emerged as a principal strategy to achieve both ecological preservation and long-term corporate resilience. Yet, such innovation thrives only when built upon robust internal systems capable of capturing, sharing, and applying critical organizational knowledge collectively known as knowledge management (KM).

The urgency of integrating sustainability into manufacturing strategies has escalated in the post-pandemic era, necessitating a transition toward circular economy practices and ambidextrous approaches that balance the exploration and exploitation of green knowledge [1], [2]. KM has long been recognized as a catalyst for innovation, enabling organizations to transform tacit and explicit knowledge into actionable business value [3], [4]. Recent studies of manufacturing SMEs in Southeast Asia have demonstrated that KM practices positively affect green innovation and sustainable performance [5], [6]. However, the research gap remains evident: while existing literature highlights KM's importance, there is a lack of empirical evidence exploring the specific mediation mechanisms of Green Innovation (GI) through which aggregated green knowledge management (GKM) capabilities influence sustainability. Furthermore, prior studies have predominantly focused on general manufacturing sectors, overlooking the unique dynamics and institutional pressures of context-specific, high-risk industries like lead-acid battery manufacturing in emerging economies. To fill this gap, this study situates itself at the intersection of GKM, GI, and sustainable performance (SP). It aims to clarify what prior studies have overlooked by testing how aggregated GKM functions as a strategic capability and exploring the causal chain (GKM → GI → SP) in a highly regulated context.

This study offers three main contributions: (1) it bridges a literature gap by empirically validating KM's role in promoting green innovation and sustainable performance in a Southeast Asian manufacturing context; (2) it enriches the theoretical dialogue on sustainability by integrating findings with recent empirical studies; and (3) it provides actionable managerial insights for firms seeking to align KM strategies with environmental objectives.

Thus, understanding the KM–green innovation–performance linkage is essential for firms aiming to navigate environmental challenges and harness knowledge-driven capabilities for enduring competitive advantage.

2. THEORETICAL BACKGROUND

2.1. Theoretical background

This study is grounded in an integrated theoretical perspective combining the resource-based view (RBV) [7], the knowledge-based view (KBV) [8], and the dynamic capabilities view (DCV) [9]. While there is conceptual overlap among these theories in explaining knowledge as a strategic asset, this study delineates their distinct explanatory values to avoid theoretical redundancy. The RBV establishes the foundational premise that valuable, intangible resources such as organizational knowledge are critical for achieving a sustainable competitive advantage [10]. The KBV extends this by specifically emphasizing that *environmental knowledge* is the most strategically significant resource for eco-innovation and sustainability [11]. Finally, the DCV provides the operational mechanism, explaining how firms dynamically reconfigure and transform this foundational knowledge to adapt to environmental changes and realize tangible innovations [12].

Furthermore, Institutional Theory is employed not as a direct analytical mechanism (e.g., a moderating variable), but rather as a *background contextual lens* [13]. It elucidates how external institutional pressures such as stringent environmental regulations, ISO 14001 compliance, and stakeholder expectations in an emerging market like Vietnam shape the boundaries and urgency within which high-risk manufacturers deploy their knowledge capabilities.

2.2. Hypothesis development

2.2.1. Green knowledge management (GKM) and green innovation (GI)

Rooted in the broader knowledge management literature, GKM encompasses the systematic acquisition, sharing, and application of environmental knowledge to support sustainability-oriented initiatives [14]. In highly regulated sectors such as lead-acid battery manufacturing, GKM enables firms to integrate environmental considerations into strategic decision-making.

In this study, GKM is deliberately treated and tested as an aggregated, higher-order construct rather than being disaggregated into sub-hypotheses. The theoretical justification for this approach is that the strategic value of knowledge management lies in the synergistic interplay of its dimensions; isolated activities (e.g., acquiring knowledge without applying it) fail to capture the holistic capability required to drive structural innovation. Grounded in the KBV, firms possessing this aggregated GKM capability are better equipped to identify eco-innovation opportunities, optimize resource efficiency, and adapt to evolving regulatory requirements [15]. Consequently, a comprehensive knowledge base provides the necessary intellectual foundation to stimulate green creativity and eco-friendly product development. Thus, the following hypothesis is proposed:

H1: Green knowledge management (as an aggregated, higher-order construct) positively influences green innovation.

2.2.2. Green innovation (GI) and sustainable performance (SP)

Green innovation (GI) involves the application of environmentally friendly processes, products, and practices aimed at reducing ecological harm while creating corporate value [16]. Contemporary literature widely acknowledges that GI allows firms to enhance environmental performance through pollution reduction and resource efficiency, while simultaneously improving economic competitiveness and social legitimacy [17]. Specifically, in emerging markets navigating global supply chains, green innovation is an essential capability to meet international standards and respond to institutional sustainability pressures. Therefore,

H2: Green innovation positively influences sustainable performance.

2.2.3. Green knowledge management (GKM) and sustainable performance (SP)

GKM reflects a firm's systemic ability to utilize environmental knowledge to proactively manage ecological impacts and anticipate stakeholder expectations. Drawing on the RBV, GKM acts as a pivotal intangible asset that enhances a firm's internal capacity to address sustainability challenges [11]. Especially in emerging economies characterized by developing institutional frameworks, robust GKM empowers firms to self-regulate, achieve operational excellence, and minimize inefficiencies [18]. This holistic knowledge mechanism translates directly into improved economic, environmental, and social outcomes. Therefore:

H3: Green knowledge management (as an aggregated, higher-order construct) positively influences sustainable performance.

2.2.4. The mediating role of Green Innovation

While GKM provides the vital intellectual and intangible foundation (RBV and KBV), it is the effective transformation of this knowledge into actionable practices that ultimately optimizes sustainable performance. Here, the DCV positions green innovation as the vital dynamic capability through which the potential benefits of GKM are realized [19], [20]. Firms that successfully channel their aggregated green knowledge into specific innovative processes such as cleaner production methods or advanced waste management can translate abstract knowledge assets into tangible sustainability metrics. Therefore, this study posits a specific indirect pathway where innovation functions as the crucial bridge.

H4: Green innovation mediates the relationship between green knowledge management and sustainable performance

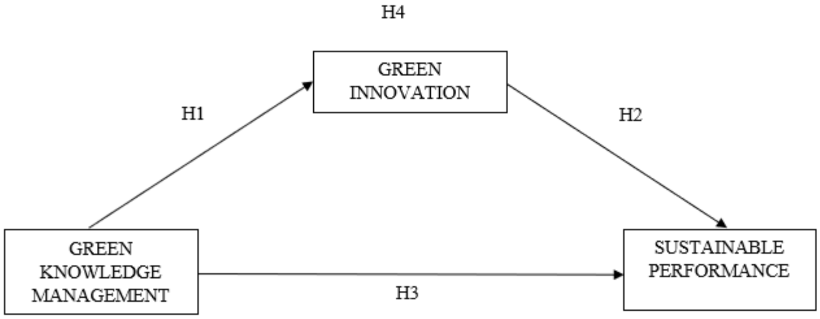

Figure 1. Conceptual Model. (Source: own research by authors)

3. METHODOLOGY

This study adopts a quantitative research design to test the proposed conceptual framework linking Green Knowledge Management (GKM), Green Innovation (GI), and Sustainable Performance (SP) in the lead-acid battery manufacturing sector.

3.1. Justification of research design and method choice

Structural Equation Modelling using the Partial Least Squares approach (PLS-SEM) was specifically selected over Covariance-Based SEM (CB-SEM) for several theoretical and methodological reasons. Unlike CB-SEM, which is primarily suited for theory confirmation and requires strict multivariate normal data distributions, PLS-SEM is highly robust for prediction-oriented research and exploratory frameworks [21]. More importantly, PLS-SEM is methodologically superior for analysing complex conceptual models that incorporate formatively or reflectively aggregated higher-order constructs. Since this study operationalizes GKM as an aggregated, second-order construct encompassing multiple dimensions, PLS-SEM provides the optimal algorithmic approach to estimate these complex relationships without model identification issues.

3.2. Sampling strategy and representativeness

The target population comprises managers and technical experts from lead-acid battery manufacturing companies in Southeast Vietnam. To ensure data quality and relevance, a purposive sampling technique was employed. The selection criteria required respondents to be directly involved in environmental management, production operations, or R&D departments. The survey was conducted across 10 major manufacturers in the region. To ensure adequate organizational representation, an average of 17 to 18 questionnaires were distributed per firm, resulting in a total of 175 distributed surveys.

After careful screening for missing data and unengaged responses, 162 valid questionnaires were retained, yielding an effective response rate of 92.57%. To address potential non-response bias, a wave analysis was conducted comparing the demographic characteristics and core construct scores of early respondents with those of late respondents. The independent samples t-test revealed no significant statistical differences between the two groups, confirming that non-response bias is not a concern and the sample is highly representative of the target population.

3.3. Measurement scale adaptation and pilot study

All measurement scales were adapted from established literature. To ensure contextual suitability for Vietnam's manufacturing environment, a rigorous translation and back-translation procedure was applied. Originally, the questionnaire contained 35 items: GKM was measured using 15 items across its three dimensions (Knowledge Acquisition, Knowledge Sharing, Knowledge Application) adapted from [14]; GI was assessed using 5 items adapted from [22]; and SP was evaluated using 15 items capturing the triple bottom line (Economic, Environmental, Social) adapted from [23]. Responses were recorded on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Prior to full-scale deployment, a pilot study was conducted involving a sample of 20 industry experts (comprising R&D managers and environmental compliance officers). Feedback from this pilot phase highlighted slight ambiguities in certain technical terms related to local waste management regulations. Consequently, minor linguistic adjustments were made to enhance item clarity. Importantly, to maintain the statistical integrity of the main study, all data collected from this pilot phase were strictly excluded from the final data analysis.

3.4. Data analysis procedure

The primary data analysis was executed using Smart PLS 4.0 software, following a systematic two-stage procedure recommended for PLS-SEM [21].

Stage 1: Measurement Model Evaluation. In this phase, the reliability and validity of the first-order and second-order constructs were assessed. Indicator reliability was evaluated via outer loadings. Internal consistency was checked using Cronbach's Alpha and Composite Reliability (Rho_a, Rho_c). Convergent validity was established via the Average Variance Extracted (AVE), and discriminant validity was rigorously tested using both the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio.

Stage 2: Structural Model Assessment. Upon validating the measurement model, the structural model was examined to test the hypothesized pathways. This involved checking for multicollinearity issues using the Variance Inflation Factor (VIF). The model's explanatory power and predictive relevance were assessed via R^2 and Q^2 values, respectively, alongside the effect size (f^2). Finally, to determine the statistical significance of both direct and mediating effects, a non-parametric bootstrapping procedure with 5,000 subsamples was applied.

4. RESULTS

4.1. Respondent demographic profile

Demographic statistical results from the 162 valid respondents (Table 1) indicate a male predominance (69.14%). The most common age group is 25 to 28 years old, accounting for 48.15%, and the majority of participants hold undergraduate degrees (51.23%). This profile comprising predominantly young to middle-aged male professionals with higher education is highly consistent with the demographic realities of technical and managerial roles in the Vietnamese heavy manufacturing sector. Their direct involvement in operations, R&D, and environmental management ensures that the responses accurately reflect the strategic realities and technical complexities of the lead-acid battery industry, thereby reinforcing the relevance and reliability of the data. The detailed frequency and percentage distributions of these characteristics are summarized in Table 1.

Table 1. Demographic characteristics

Characteristics	Frequency	%	Characteristics	Frequency	%
Gender			*Working Experience*		
Male	112	69.14	*Less than 3 years*	70	43.21
Female	50	30.86	*3 - 5 years*	58	35.80
Total	***162***	***100***	*Over 5 years*	34	20.99
			Total	***162***	***100***
Age			*Education level*		
22 - 25 years	55	33.95	*Diploma*	72	44.44
25 - 28 years	78	48.15	*Undergraduate*	83	51.23
> 28 years	29	17.90	*Postgraduate*	7	4.33
Total	***162***	***100***	***Total***	***162***	***100***

Source: Authors' survey data

4.2. Measurement model evaluation

Table 2. Outer loadings, construct reliability and validity (First order)

Construct	Item	Loading	Cronbach's Alpha	Rho_a	Rho_c	AVE
EC	EC1	0.869	0.848	0.850	0.908	0.768
	EC4	0.899				
	EC5	0.859				
EN	EN1	0.854	0.898	0.900	0.925	0.711
	EN2	0.832				
	EN3	0.812				
	EN4	0.862				
	EN5	0.855				
KA	KA1	0.839	0.904	0.906	0.929	0.723
	KA2	0.839				
	KA3	0.873				
	KA4	0.818				
	KA5	0.880				
KAP	KAP1	0.836	0.879	0.884	0.917	0.734
	KAP2	0.890				
	KAP3	0.868				
	KAP4	0.832				
KS	KS1	0.851	0.891	0.892	0.920	0.697
	KS2	0.823				
	KS3	0.800				
	KS4	0.856				
	KS5	0.844				
SC	SC1	0.887	0.866	0.868	0.918	0.788
	SC2	0.911				
	SC5	0.865				

Table 3. Discriminant Validity HTMT (First Order)

	EC	EN	KA	KAP	KS	SC
EC						
EN	0.742					
KA	0.650	0.689				
KAP	0.642	0.591	0.808			
KS	0.690	0.663	0.821	0.827		
SC	0.727	0.736	0.728	0.684	0.688	

Table 4. Discriminant Validity Fornell Larcker Criterion (First Order)

	EC	EN	KA	KAP	KS	SC
EC	0.876					
EN	0.651	0.843				
KA	0.571	0.623	0.850			
KAP	0.559	0.529	0.725	0.857		
KS	0.601	0.596	0.738	0.735	0.835	
SC	0.624	0.651	0.646	0.600	0.606	0.888

Table 5. Outer loadings, construct reliability and validity (Second Order)

Construct	Indicator	Loading	Cronbach's Alpha	Rho_a	Rho_c	AVE
GI	GI1	0.810	0.867	0.869	0.904	0.653
	GI2	0.817				
	GI3	0.792				
	GI4	0.805				
	GI5	0.816				
GKM	KA	0.908	0.892	0.892	0.933	0.822
	KAP	0.901				
	KS	0.910				
SP	EC	0.864	0.843	0.844	0.905	0.761
	EN	0.877				
	SC	0.875				

Table 6. Discriminant Validity HTMT (Second Order)

	GI	GKM	SP
GI			
GKM	0.750		
SP	0.731	0.864	

Table 7. Discriminant Validity Fornell Larcker Criterion (Second Order)

	GI	GKM	SP
GI	0.808		
GKM	0.660	0.907	
SP	0.628	0.750	0.872

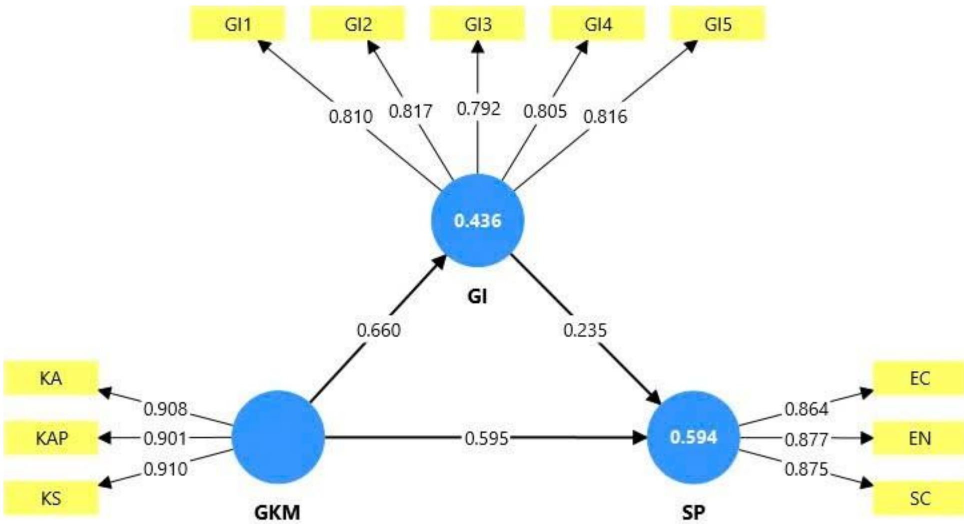

Figure 2. Structural Model Assessment. Source: own research from Smart PLS 4.0 results

In the initial measurement phase, items EC2, EC3, KAP5, SC3, and SC4 were removed. This exclusion was not solely based on low outer loadings (0.376 to 0.577). Theoretically, these specific items, which were originally developed in Western contexts, posed contextual ambiguities regarding knowledge-sharing and supply chain terminologies within the localized, highly regulated Vietnamese manufacturing environment. Thus, their removal eliminated conceptual overlap and preserved the content validity of the constructs.

Following the purification process, all remaining outer loadings exceeded the acceptable 0.60 threshold [21]. The construct reliability was firmly established, with all Cronbach's Alpha coefficients exceeding 0.843. Convergent validity was also confirmed, as all Average Variance Extracted (AVE) values ranged from 0.653 to 0.822, satisfying the minimum requirement. Furthermore, discriminant validity was rigorously established at both the first-order and second-order levels using the Heterotrait-Monotrait (HTMT) ratio and the Fornell-Larcker criterion, confirming that all theoretical concepts in the model are distinctly measured without critical conceptual overlapping.

4.3. Structural model evaluation and hypothesis testing

Table 8. Collinearity Assessment (Inner VIF)

	GI	GKM	SP
GI			1.773
GKM	1.000		1.773
SP			

Table 9. Explanatory Power (R^2), Predictive Relevance (Q^2), and Effect Size (f^2)

Construct	R^2	R^2 Adjusted	Q^2	f^2 (GI)	f^2 (SP)
GI	0.436	0.433	0.423		0.077
SP	0.594	0.589	0.553		
GKM				0.773	0.492

Table 10. Hypothesis Testing

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation	T Statistics	P Values
GI -> SP	0.235	0.241	0.071	3.296	0.001
GKM -> GI	0.660	0.662	0.065	10.231	0.000
GKM -> SP	0.595	0.590	0.078	7.627	0.000
GKM -> GI -> SP	0.155	0.162	0.058	2.691	0.007

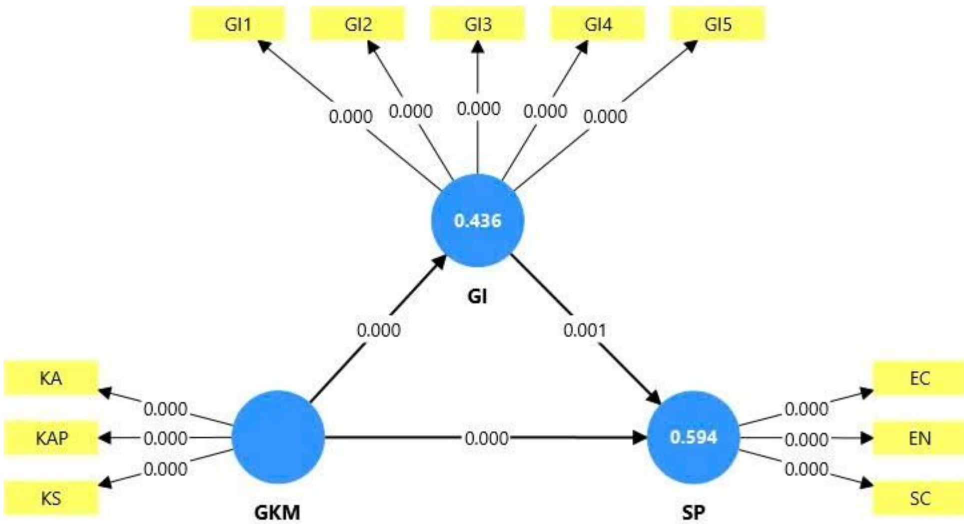

Figure 3. Bootstrapping analysis results. Source: own search from SmartPLS 4.0 results

The structural model assessment confirmed the absence of multicollinearity, as the Variance Inflation Factors (VIF) ranged from 1.000 (GKM predicting GI) to 1.773 (GKM and GI predicting SP), well below the critical threshold of 5.0.

Regarding explanatory power, the model accounts for 59.4% of the variance in Sustainable Performance ($R^2 = 0.594$) and 43.6% of the variance in Green Innovation ($R^2 = 0.436$). The predictive relevance (Q^2) values for GI (0.423) and SP (0.553) are substantially greater than zero. This indicates that the theoretical model possesses a strong predictive capacity for out-of-sample data, proving its robustness in anticipating sustainability outcomes.

Crucially, the evaluation of effect sizes (f^2) reveals the relative importance of the constructs. The effect size of GKM on SP is substantial ($f^2 = 0.492$), demonstrating that foundational knowledge capabilities exert a dominant, direct influence on sustainability outcomes. In contrast, the effect size of GI on SP is moderate ($f^2 = 0.077$). This comparison implies that while eco-innovation is a valuable strategic step, the underlying structural knowledge infrastructure is the primary engine driving long-term sustainable performance in this sector.

Path analysis via a bootstrapping procedure (5,000 subsamples) confirmed the hypothesized relationships. GKM positively and significantly impacts GI ($\beta = 0.660$, $p = 0.000$) and SP ($\beta = 0.595$, $p = 0.000$), supporting H1 and H3. GI also positively influences SP ($\beta = 0.235$, $p = 0.001$), supporting H2. Finally, the mediating role of green innovation in the causal chain from GKM to SP (H4) was confirmed as a partial mediation ($\beta = 0.155$, $p = 0.007$).

5. DISCUSSION

This study investigated the intricate linkages between Green Knowledge Management (GKM), Green Innovation (GI), and Sustainable Performance (SP) within Southeast Vietnam's lead-acid battery manufacturing sector. The empirical results provide robust support for the proposed conceptual framework, confirming the critical role of knowledge-driven capabilities in high-risk environmental contexts.

Theoretical reflections on the findings offer deep insights. The substantial direct impact of GKM on sustainable performance validates the Knowledge-Based View (KBV). It confirms that the systematic acquisition, sharing, and application of environmental knowledge act as a critical intangible asset. However, this study pushes beyond the static resource view by validating the dynamic capabilities view (DCV). The partial mediation of GI illustrates that while GKM provides the intellectual foundation, translating this knowledge into actionable green innovations serves as the vital dynamic mechanism that fully optimizes an organization's sustainability outcomes [12].

Contextually, these findings shed light on the unique institutional pressures in emerging markets like Vietnam. In a rapidly industrializing economy, manufacturers in hazardous sectors face strict domestic regulations and international standards (e.g., ISO 14001, lead waste management policies). The results imply that firms cannot rely solely on reactive compliance. Instead, to remain competitive and socially legitimate, they must proactively build internal knowledge structures to navigate these institutional voids and pressures.

This study makes a distinct, original contribution by unpacking the 'black box' of how sustainability is achieved in context specific, high-risk manufacturing sectors. It proves that knowledge management is not merely an administrative tool, but a core strategic imperative that links regulatory compliance with long-term ecological and economic resilience.

6. CONCLUSION

6.1. Conclusion

The strategic function of green knowledge management (GKM) in promoting green innovation (GI) and enhancing sustainable performance (SP) in battery manufacturing enterprises in the Southeast region of Vietnam is clarified in this study. The positive and direct impact of GKM on both green innovation and the sustainable performance of enterprises is confirmed by Structural Equation Modelling (SEM) analysis. In particular, the activities of acquiring, sharing, and utilizing environmental knowledge establish a critical foundation for the development of ecological initiatives. Moreover, the research illustrates that green innovation functions as a mediating variable, converting intangible knowledge resources into tangible sustainable economic, environmental, and social outcomes. This confirms that the capacity to manage green knowledge is a fundamental factor in the pursuit of sustainable competitive advantage for enterprises in an industry with high environmental risks.

6.2. Implications

Theoretically, the research contributes to the theoretical framework by incorporating resource-based view (RBV), Knowledge-based View (KBV), and dynamic capabilites view (DCV) perspectives to elucidate the mechanisms of green knowledge's impact in a specific industry in an emerging market. A more comprehensive comprehension of the operation of green knowledge within organizations is achieved by separating the dimensions of green knowledge.

In practical terms, managers must prioritize the development of green information exchange platforms and the investment in knowledge infrastructure to enhance the management of lead waste and wastewater. Businesses should foster an organizational culture that is open and trusting in order to encourage employee engagement in the development of environmentally responsible products and processes. The application and compliance with standards such as ISO 14001 should be perceived as a strategic knowledge management tool, rather than solely regulatory compliance.

6.3. Limitations

The study still has some limitations that need to be addressed in future studies, despite its significant contributions:

Sample size and scope: The investigation was conducted in the Southeast region, with 162 valid responses. Consequently, the capacity to extrapolate the findings to the entire manufacturing sector in Vietnam or other nations may be restricted.

Self-assessment method: Data was gathered through self-assessment surveys from managers and experts, which may introduce bias as a result of subjectivity. Objective data from corporate sustainability reports should be incorporated into subsequent studies.

Research model: The primary focus of the present investigation is on internal factors (GKM, GI). In order to obtain a more comprehensive perspective, future research should expand the scope of external factors, including government pressure, ecological incentive policies, and changes in consumer behaviour.

Research design: The paper only reflects the relationship at a specific point in time with a cross-sectional design. A more precise evaluation of the long-term changes and impacts of green knowledge governance on sustainability would be facilitated by conducting a longitudinal study.

Acknowledgement: This research received no external funding.

REFERENCES

[1] M. Geissdoerfer, P. Savaget, N. M. P. Bocken, and E. J. Hultink, “The circular economy – A new sustainability paradigm?” *Journal of Cleaner Production*, vol. 143, pp. 757–768, 2017, doi: https://doi.org/10.1016/j.jclepro.2016.12.048

[2] W. Cai and G. Li, “The drivers of eco-innovation and its impact on performance: Evidence from China,” *Journal of Cleaner Production*, vol. 176, pp. 110–118, 2018, doi: https://doi.org/10.1016/j.jclepro.2017.12.109

[3] A. Mardani, S. Nikoosokhan, M. Moradi, and M. Doustar, “The relationship between knowledge management and innovation performance,” *The Journal of High Technology Management Research*, vol. 29, no. 1, pp. 12–26, 2018, doi: https://doi.org/10.1016/j.hitech.2018.04.002

[4] J. Darroch, “Knowledge management, innovation and firm performance,” *Journal of Knowledge Management*, vol. 9, no. 3, pp. 101–115, 2005, doi: https://doi.org/10.1108/13673270510602809

[5] P. T. Cong, “The role of knowledge management and green innovation in sustainable performance,” *iRASD Journal of Management*, vol. 5, no. 3, pp. 161–176, 2023, doi: https://doi.org/10.52131/jom.2023.0503.0115

[6] A. Nasir, N. Zakaria, N. Do, and S. Velasquez, “The impact of knowledge management on sustainable performance with mediation effect of green innovation in Malaysian SMEs,” *VINE Journal of Information and Knowledge Management Systems*, 2024, doi: https://doi.org/10.1108/VJIKMS-02-2024-0066

[7] J. B. Barney and D. N. Clark, “Firm resources and sustained competitive advantage,” in *Resource-Based Theory: Creating and Sustaining Competitive Advantage*, Oxford, U.K.: Oxford University Press, 2007, pp. 49–75, doi: 10.1093/oso/9780199277681.003.0003

[8] R. M. Grant, “Toward a knowledge-based theory of the firm,” *Strategic Management Journal*, vol. 17, no. SUPPL. WINTER, pp. 109–122, 1996, doi: https://doi.org/10.1002/smj.4250171110

[9] C. A. Kero and A. T. Bogale, “A systematic review of resource-based view and dynamic capabilities of firms and future research avenues,” *International Journal of Sustainable Development and Planning*, vol. 18, no. 10, pp. 3137–3154, 2023, doi: https://doi.org/10.18280/ijsdp.181016

[10] S. E. Stan, M. A. Țîțu, and C. Paraschiv, “The role of intangible resources in driving value creation and sustained competitive advantage for businesses,” *Management of Sustainable Development*, vol. 16, no. 1, pp. 106–115, 2024, doi: https://doi.org/10.54989/msd-2024-0010

[11] S. Sahoo, A. Kumar, and A. Upadhyay, “How do green knowledge management and green technology innovation impact corporate environmental performance? Understanding the role of green knowledge acquisition,” *Business Strategy and the Environment*, vol. 32, no. 1, pp. 551–569, 2023, doi: https://doi.org/10.1002/bse.3160

[12] R. A. Al-Husain et al., “Optimizing sustainability performance through digital dynamic capabilities, green knowledge management, and green technology innovation,” *Scientific Reports*, vol. 15, no. 1, pp. 1–16, 2025, doi: https://doi.org/10.1038/s41598-025-04912-6

[13] H. Al Halbusi, S. Popa, S. M. Alshibani, and P. Soto-Acosta, “Greening the future: analyzing green entrepreneurial orientation, green knowledge management and digital transformation for sustainable innovation and circular economy,” *European Journal of Innovation Management*, 2024, doi: https://doi.org/10.1108/EJIM-02-2024-0169

[14] S. Yu, J. Abbas, S. Álvarez-Otero, and J. Cherian, “Green knowledge management: Scale development and validation,” *Journal of Innovation & Knowledge*, vol. 7, no. 4, 2022, doi: https://doi.org/10.1016/j.jik.2022.100244

[15] A. N. Khan, K. Mehmood, and H. K. Kwan, “Green knowledge management: A key driver of green technology innovation and sustainable performance in the construction organizations,” *Journal of Innovation & Knowledge*, vol. 9, no. 1, p. 100455, 2024, doi: https://doi.org/10.1016/j.jik.2023.100455

[16] P. Cisneros Chavira, A. Shamsuzzoha, H. Kuusniemi, and B. Jovanovski, “Defining green innovation, its impact, and cycle – A literature analysis,” *Cleaner Engineering and Technology*, vol. 17, p. 100693, 2023, doi: https://doi.org/10.1016/j.clet.2023.100693

[17] T. Čater, B. Čater, P. Milić, and V. Žabkar, “Drivers of corporate environmental and social responsibility practices: A comparison of two moderated mediation models,”

Journal of Business Research, vol. 159, p. 113652, 2023, doi: https://doi.org/10.1016/j.jbusres.2023.113652

[18] N. A. A. Abdelwahed, M. A. Al Doghan, U. N. Saraih, and B. A. Soomro, "Green knowledge management practices and green innovation: unveiling the mediating influence of green culture and green entrepreneurial self-efficacy," *VINE Journal of Information and Knowledge Management Systems*, 2025, doi: https://doi.org/10.1108/VJIKMS-07-2023-0180

[19] M. Ghorbani, "Green knowledge management and innovation for sustainable development: A comprehensive framework," *Proc. Eur. Conf. Knowl. Manag. ECKM*, vol. 1, pp. 394–399, 2023, doi: https://doi.org/10.34190/eckm.24.1.1753

[20] B. C. B. R. Rodrigues, C. F. Gohr, and A. M. B. Calazans, "Dynamic capabilities for sustainable innovation: the case of a footwear company in Brazil," *Production*, vol. 30, pp. 1–15, 2020, doi: https://doi.org/10.1590/0103-6513.20190108

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

[22] H. Cao and Z. Chen, "The driving effect of internal and external environment on green innovation strategy - The moderating role of top management's environmental awareness," *Nankai Business Review International*, vol. 10, no. 3, pp. 342–361, 2019, doi: https://doi.org/10.1108/NBRI-05-2018-0028

[23] A. Sabino, A. Moreira, F. Cesário, and M. P. Coelho, "Measuring sustainability: A validation study of a triple bottom line (TBL) scale in Portugal," *Emerging Science Journal*, vol. 8, no. 3, pp. 899–916, 2024, doi: https://doi.org/10.28991/esj-2024-08-03-06