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Determinants and Outcomes of Sustainable Environmental Performance in SMEs: A Systematic Literature Review

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ABSTRACT
Small and medium-sized enterprises (SMEs) account for 99 percent of all the businesses globally and generate 50-60% of employment. Although sustainable environmental performance is a primary imperative, these SMEs remain under-represented in sustainability writings when compared to large corporations, despite the fact that they generate large amounts of industrial waste and emissions. This systematic review aggregates empirical data on determinants and outcomes of environmental performance in SMEs. In accordance with PRISMA guidelines, we conducted a search in Scopus and Web of Science databases for peer-reviewed articles (2015-2025) that returned 63 studies out of 1,077 initial records. Six determinant categories were identified through thematic analysis: organizational (environmental leadership, green human resource management), stakeholder pressures (regulatory, market, institutional), innovation and technology (green innovation, digital systems), resource-based (human and financial capital), strategic orientation, and supply chain collaboration. Reduction of emissions, environmental outcomes, certification, and resource efficiency were the most frequently occurring, having varying operational and financial impacts. Methodological quality was 7.8/10 on average (82.5% ≥8). Studies applied predominantly quantitative methods (78%) in developed (44%) and developing (41%) economies. The most important gaps identified are longitudinal determinant interactions, SME heterogeneity, and resource constraint prevention strategies in diverse contexts.
Keywords: Environmental performance; SMEs; sustainability; determinants; systematic review; PRISMA

1. INTRODUCTION:

Sustainable environmental performance has become a primary imperative for organizations globally. Small and medium-sized enterprises (SMEs), however, remain under-represented in sustainability writings compared to big firms (Hristov et al., 2022). SMEs account for 99 percent of all the businesses globally and generate 50-60% of employment, but generate large amounts of industrial waste and emissions (Cantele & Zardini, 2020). Contrary to the large corporations with dedicated sustainability departments and enormous budgets, SMEs are constrained by means that redefine their environmental performance dynamics at their very foundation (Ashton et al., 2017).

The new meta-analytical school of thought is that environmental performance in SMEs is moderated by an intricate interplay among organizational competencies, external institutional pressures, and strategic decisions (Gao et al., 2019). Previous reviews either address general sustainability issues without SME nuance or focus on single-determinant topics like green innovation (Carfora & Scandurra, 2021). Heterogeneity in SME contexts across developing and developed economies, various sectors, and different regulatory frameworks requires integration that discerns drivers unique to resource-scarce firms.

This review responds to three research questions: (1) What are the determinants of sustainable environmental performance among SMEs? (2) What are the resulting environmental, financial, and operational outcomes from these determinants? (3) How do determinant-outcome relationships differ between geographic settings and firm types? Through systematic synthesis of empirical evidence released 2015-2025, this review determines actionable determinants for practice and research gaps for academics studying SME sustainability. Logically, limiting this review to the last 10 years ensures that the compiled evidence reflects the latest practices in sustainability, regulatory environments, and technological innovations relevant to SMEs. The field of corporate sustainability, particularly for SMEs, has evolved rapidly, potentially rendering older studies less relevant to current challenges.

2. METHODOLOGY

SEARCH STRATEGY

A thorough search was undertaken in two prominent academic databases (Web of Science and Scopus) on peer-reviewed journal articles. The selection of these two databases is because they are widely considered the two most trusted and authoritative sources for scholarly, peer-reviewed literature. This ensures that the articles retrieved are generally of high academic quality and from reputable, peer-reviewed journals, which is crucial for the validity of a systematic synthesis. The search process used Boolean operators with a mixture of controlled vocabulary and

developed keywords through initial scoping.
Search terms were developed iteratively through consultation of the included studies' terminology and controlled vocabulary in both databases.

Table 1: Search strings and records retrieved from Scopus and Web of Science databases for SME environmental performance literature.

1.DATABASE	Search String	Records Retrieved
Scopus	TITLE-ABS-KEY (("sustainable environmental performance" OR "environmental performance" OR "green performance" OR "environmental sustainability") AND ("SME*" OR "small medium enterprise*" OR "small-medium enterprise*" OR "family firm*") AND (determinant* OR driver* OR factor* OR antecedent* OR outcome* OR impact* OR effect*))	547
Web of Science	TS= (("sustainable environmental performance" OR "environmental performance" OR "green performance" OR "environmental sustainability") AND ("SME*" OR "small medium enterprise*" OR "small-medium enterprise*" OR "family firm*") AND (determinant* OR driver* OR factor* OR antecedent* OR outcome* OR impact* OR effect*))	530
Total Initial Records	-	**1,077**

INCLUSION AND EXCLUSION

Table 2: Inclusion and exclusion criteria for peer-reviewed studies on environmental performance determinants and outcomes in SMEs.

Criterion	Inclusion	Exclusion
Publication Type	Peer-reviewed journal articles	Conference proceedings, book chapters, grey literature, reports
Language	English-language publications	Non-English publications
Study Design	Empirical quantitative, qualitative, or mixed-methods studies; systematic reviews	Conceptual/theoretical papers without empirical data; editorials
Population	Small and medium-sized enterprises (SMEs <500 employees)	Large corporations (>500 employees)
Outcomes	Environmental performance: emissions reduction, resource efficiency, compliance, certification, sustainable development indicators	Studies without environmental outcome measures
Temporal	Published 2015-2025	Published before 2015

STUDY SELECTION PROCESS

This study followed the PRISMA-P guideline. This guideline offers a standardized framework that assists researchers in explicitly delineating the review objectives, eligibility criteria, search strategy, and intended methodologies before conducting the review, thereby mitigating the risk of bias, selective reporting, and arbitrary methodological choices (Moher et al., 2015). Following PRISMA-P guidelines, study selection proceeded through four stages as illustrated in Figure 1 below. Electronic searches identified 1,077 records. After deduplication, 1,059 unique records remained. Title and abstract screening excluded 970 records, retaining 89 for full-text review. Full-text assessment for detailed eligibility excluded 26 records. Sixty-three studies met all inclusion criteria and were included in qualitative synthesis.

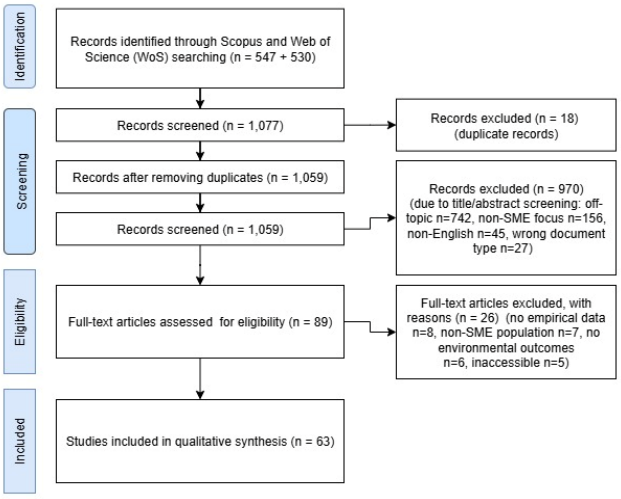

Figure 1: PRISMA Flow Diagram

DATA EXTRACTION AND QUALTY ASSESSMENT

Standardized data extraction forms recorded: author(s), year of publication, journal, country/region, study design, sample size, environmental performance definitions, determinants found, reported results, and effect sizes. Quality assessment used modified Effective Public Health Practice Project (EPHPP) criteria, assessing appropriateness of study design, sampling strategy, response rates, measurement validity, control of confounding, and statistical analyses. Studies were rated 0-10, with ≥8 as high quality. Mean quality score was 7.8 (SD=0.9); 52 studies (82.5%) had a score ≥8.

2. RESULTS

STUDY CHARACTERISTICS

The 63 studies included range in publication years between 2015 and 2025, with their distribution in more recent years. There were 41 articles (65.1%) in Scopus, and 22 articles (34.9%) in Web of Science. The database distribution is shown in Figure 2 below. Geographic distribution indicates representation from developed, developing, and transition economies as outlined in Table 4.

The following pie chart shows Scopus covers 65.1% of the studies included (n=41) compared to Web of Science, which covers 34.9% (n=22) or 63 articles. The division reflects the wider scope of indexing of Scopus in studies on sustainability and SMEs, particularly in emerging economy environments.

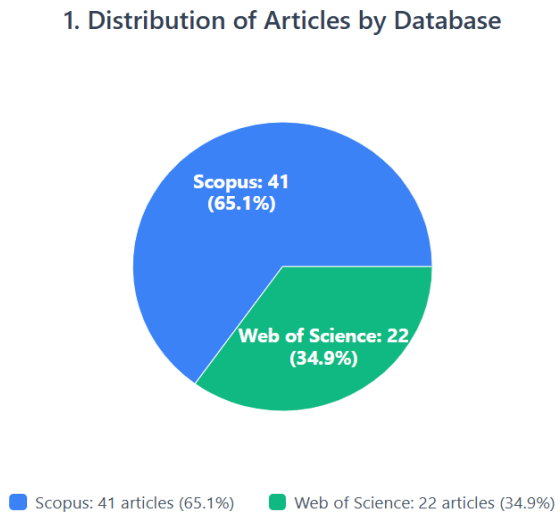

Figure 2: Database Distribution of Included Studies

As Figure 3 below shows, Scopus database publications exhibit temporal clustering with a peak of publications in 2021-2022 (n=9 in each year), then in 2023 (n=7). Activity in earlier years (2015-2018) was very limited (n=1-2 yearly), while in 2019-2020, activity levels were moderate (n=4 and n=3 respectively). The latest years, 2024-2025, have sustained research interest (n=2 and n=1). This temporal trend demonstrates increased scholarly focus on SME environmental performance after 2019.

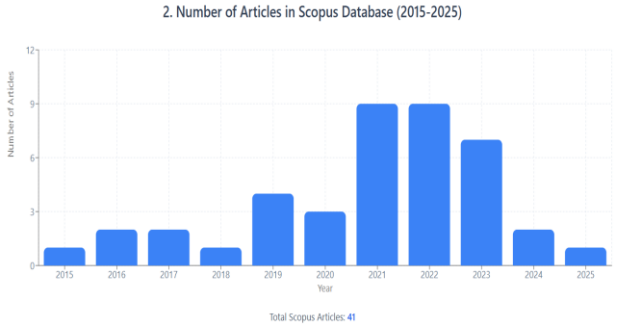

Figure 3: Temporal Distribution - Scopus Database (2015-2025)

Figure 4 below illustrates that Web of Science publications are found densely in 2017-2019 (n=5, n=4, n=4 respectively), which is the peak period for the database in terms of SME sustainability studies. The earlier foundational years (2015-2016) yielded moderately (n=1-1), with 2021-2023 revealing diminishing but continuous activity (n=1, n=1, n=5). This pattern indicates that Web of Science took early foundational studies, while Scopus covers more recent studies.

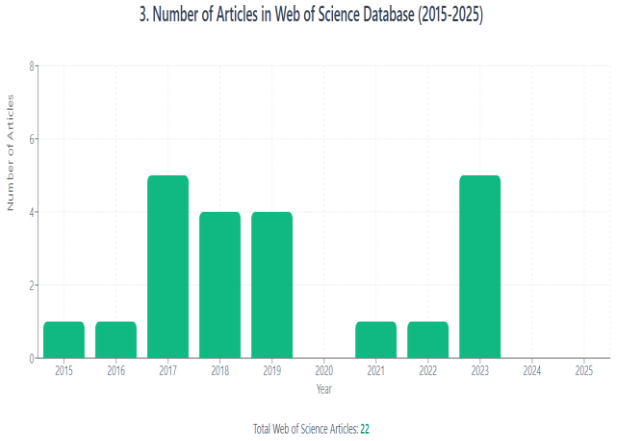

Figure 4: Temporal Distribution - Web of Science Database (2015-2025)

Methodologically, as shown in Table 3, the reviewed literature is predominantly quantitative in design, with 49 studies (77.8%) relying mainly on cross-sectional surveys, indicating a strong preference for survey-based empirical analysis. While qualitative and mixed-methods studies are comparatively limited (9.5% each), systematic literature reviews account for only a small share (3.2%).

In terms of sample size, most studies used medium (51–300) or large (301–800) samples, reflecting reasonably powered quantitative research, whereas very large samples were mainly associated with multinational or multi-sector analyses.

The quality assessment suggests overall strong methodological rigor, with more than 80% of studies rated as high quality, a small proportion showing moderate rigor, and very few classified as lower-quality or conceptual work. Overall, the table highlights a field dominated by high-quality, quantitative, survey-based research, with relatively limited use of qualitative, mixed-methods, and review approaches.

Table 3: Study Design Characteristics

Characteristic	Count	Percentage	Details
Study Design			
Quantitative	49	77.8%	Cross-sectional survey (n=31), Longitudinal (n=12), Secondary data (n=6)
Qualitative	6	9.5%	Case studies (n=6)
Mixed Methods	6	9.5%	Quantitative + qualitative integration (n=6)
Literature Review	2	3.2%	Systematic review (n=2)
Sample Size Distribution			
Small (≤50)	8	12.7%	Qualitative-dominant studies
Medium (51-300)	24	38.1%	Typical quantitative samples
Large (301-800)	22	34.9%	Well-powered surveys
Very Large (>800)	9	14.3%	Multi-national/sector studies
Quality Score Distribution			
High (8-10)	52	82.5%	Rigorously conducted studies
Medium (7)	10	15.9%	Moderate methodological rigor
Lower (<7)	1	1.6%	Conceptual/preliminary research

Table 4 below illustrates the geographic spread of included studies by economic development contexts. The close balance of developed (44.4%) and developing (41.3%) economies permits comparative analysis of contextual drivers of SME environmental performance, with transition economies underrepresented (14.3%).

Table 4: Geographic and Contextual Distribution

Economic Development	Count	Percentage	Key Regions
Developed Economies	28	44.4%	Europe (n=14), North America (n=10), East Asia developed (n=4)
Developing Economies	26	41.3%	South Asia (n=10), Southeast Asia (n=8), Africa (n=5), Latin America (n=3)
Transitioning/Emerging	9	14.3%	Eastern Europe (n=4), China (n=3), Middle East/Central Asia (n=2)
Total	**63**	**100%**	

ENVIRONMENTAL PERFORMANCE DETERMINANTS

To begin with, it should be mentioned that the thematic analysis was conducted using a systematic, inductive synthesis approach. Following PRISMA-based study selection, all included articles were reviewed in full, and relevant determinants of environmental performance were extracted from empirical findings.

Determinants were initially coded at the construct level (e.g., green human resource management, regulatory pressure, green innovation) and then iteratively compared across studies. Through constant comparison and conceptual clustering, related constructs were aggregated into higher-order themes based on theoretical similarity, frequency of occurrence, and consistency of effect mechanisms. This process resulted in six coherent determinant categories—organizational, stakeholder pressures, technology and innovation, resource-based, supply chain collaboration, and strategic orientation—each supported by multiple studies and clearly differentiated in terms of underlying drivers and pathways to environmental performance. The approach follows established procedures for thematic synthesis to ensure transparency, replicability, and analytical rigor.

As mentioned in the previous paragraph the thematic analysis blended determinants into six main categories. Organizational elements, including GHRM, environmental leadership, and corporate culture, appeared as key enablers across 32 studies. GHRM practices such as environmental training, performance incentives, and recruitment based on environmental consciousness surfaced most extensively across 14 studies, with mechanisms facilitated through employee involvement and environmental competency building (Aftab et al., 2023; Afzal et al., 2023; El-Kassar & Singh, 2019; Hameed et al., 2023; Khamdamov et al., 2023). Environmental leadership and commitment to management moderated interactions between pressures from the environment and organizational reaction, as shown in 11 studies (Cadez et al., 2019; El-Kassar & Singh, 2019; Gao et al., 2019; Hameed et al., 2023). Corporate culture dimensions such as norms, values, and beliefs related to environmental stewardship shaped the implementation of sustainability in production environments (Isensee et al., 2023; Cantele & Zardini, 2020), seven of which also explored the effect of culture on environmental performance directly.

Stakeholder pressures formed the second cluster of determinants, cited in 28 studies. The environmental

authorities and compliance pressures led to adoption in areas with tight control, cited in 12 studies (Cadez et al., 2019; Hartmann et al., 2015). Market and customer pressures, as green product demand and supply chain expectations, exerted the drivers of environmental activity, particularly in developing economies (Yu et al., 2017; Paulraj et al., 2017), with 10 studies identifying these impacts. Institutional pressures (regulatory, mimetic, and normative) exerted their pressure through multiple avenues (Gao et al., 2019; El-Garaihy et al., 2022), with interacting pressures of different types having non-linear impacts. Some companies responded to built-up pressures through strategic integration (Gao et al., 2019), whereas some others showed compliance reduction or resistance (Shubham et al., 2018).

Technology and innovation were the third theme, present in 31 studies with acute heterogeneity in effect mechanisms. Green innovation, process innovation, product innovation, and technology acquisition for environmental quality all had strong positive correlations with environmental performance in 17 studies (Makhloufi et al., 2024; Aftab et al., 2022; Carfora & Scandurra, 2021; El-Kassar & Singh, 2019; Fatima & Elbanna, 2023). Eco-design initiatives were identified in six studies (Iranmanesh et al., 2019; Chaudhry et al., 2020) and environmental management systems (ISO 14001) in five studies (de Nadae et al., 2021). Digital technologies (AI, IoT, cloud computing) also had variable impacts in six recent studies (Hansen & Bøgh, 2021; Al-Sharafi et al., 2023; Hameed et al., 2023), with varying direct effects pointing towards context-dependent moderating mechanisms. Finance constraints within emerging markets restricted technology adoption (Esfahbodi et al., 2016; Yadegaridehkordi et al., 2023), while developed-country SMEs readily adopted digital environmental solutions (Hansen & Bøgh, 2021; Lee, 2021).

Resource-based drivers formed the fourth thematic cluster, covering 19 studies. Financial resources were limiting environmental investments, especially in emerging economies where capital scarcity forced environmental-performance trade-offs (Esfahbodi et al., 2016; Dang et al., 2019), as evidenced in 12 developing-economy studies. Human capital, in the form of management, technical, and environmental capabilities, enabled more efficient environmental strategy implementation (Paulraj et al., 2017; Haleem et al., 2021). Green intellectual capital, in the form of environmental knowledge, pools of expertise, and absorptive capacity, enabled innovation implementation and attainment of performance (Raman & Jeedigunta, 2024; Shahbaz et al., 2025), which was achieved in seven studies of the South Asian setting.

Supply chain and collaboration drivers occurred in 18 studies. Green supply chain management (GSCM) practices such as supplier involvement, joint environmental activities, and supply chain integration showed performance impacts (Micheli et al., 2020; Novitasari et al., 2023), with 12 studies reporting GSCM practices. Inter-firm collaboration, network membership, and partnership ties enabled knowledge transfer and innovation diffusion (Liu et al., 2018; Paulraj et al., 2017), as reported in six studies. Vertical supply chain integration had more intense environmental impacts than horizontal network involvement (Micheli et al., 2020; Laari et al., 2017), as evidenced by five studies on the impact of supply chain structure.

Strategic orientation was the last category found in 15 studies. Environmental entrepreneurial orientation and proactive, risk-taking environmental approaches directly and indirectly impacted performance through innovation in eight studies (Guo & Wang, 2022; Makhloufi et al., 2024; Bıçakcıoğlu-Peynirci & Tanyeri, 2022). Competitive strategy decisions (cost-leadership or differentiation) moderated environmental initiative performance, and seven studies showed differential performance trajectories (Laari et al., 2017; Dangelico & Pontrandolfo, 2015; Shrivastava & Tamvada, 2019). The integration of corporate social responsibility into strategic choice emerged in five studies as facilitating stakeholder consideration and environmental priority setting (Gazi et al., 2024; Lu et al., 2021; Afzal et al., 2023).

ENVIRONMENTAL, FINANCIAL, AND OPERATIONAL OUTCOMES

Environmental consequences were the most prevalent reported measures, occurring in 32 studies with varying operationalizations. Emission reduction was the most commonly measured environmental consequence (n=8 studies), operationalized as greenhouse gas reductions, carbon footprint reduction, or scope 1-3 emission reductions (Lewandowski, 2017). Resource efficiency measures (water use, waste minimization, energy consumption) were found in 11 studies as frequently measured environmental consequences. Environmental compliance and certification achievement (ISO 14001, establishment of environmental management system) were direct measures of environmental performance in seven studies (He et al., 2022; Martin-de Castro et al., 2017). Composite indicators of sustainability, such as a number of aspects related to the environment, appeared in six studies.

Financial performance was quantified in 18 firm performance relationship studies. Profitability (operating margins, return on assets), revenue growth, and firm valuation were the key financial indicators. Relationships between financial and environmental performance demonstrated immense diversity. Positive relationships were reported in certain studies, particularly when environmental activities led to differentiation or premium prices (Baggia et al., 2019; Bassi & Dias, 2020). Other studies reported trade-offs, such as in resource-constrained developing-economy contexts where environmental investments limited operational efficiency (Chang et al., 2019; Del Río et al., 2016). Effect sizes were far from similar across contexts and suggested moderation by firm resources, market conditions, and institutional environments (Khizar et al., 2024).

Operational impacts were achieved in 21 studies, such as implementation success, process effectiveness, and sustainability of operations (Dvorsky et al., 2021). GSCM implementation, as measured by the rate of adoption and level of integration, was an average outcome (Graham et al., 2023; Purwandani & Michaud, 2021). Improvement of process efficiency in the forms of waste reduction, cycle time reduction, and quality improvement were realized in operational assessments (Baeshen et al., 2021; Gast et al.,

2017). Indicators of sustainability adoption, stakeholders' satisfaction measurement, market reputation, and sustainable permanence are conveyed through composite performance indicators (Almagtome et al., 2020; Olarewaju et al., 2023). The integration results demonstrated systematic embedding of sustainability in organizational activities, while stakeholders' pressure and innovation ability were the most important moderators in organizational contexts (Rubio-Andrés et al., 2023; Vishwakarma et al., 2018; Xiao et al., 2018; Szász et al., 2021).

3. DISCUSSION

THEORETICAL LANDSCAPE

The review indicates that research on environmental performance has drawn on a broad range of theoretical perspectives, reflecting the multidimensional and complex nature of the concept. Among these perspectives, Resource-Based Theory (RBT) clearly emerges as the dominant framework, having been employed in 16 studies. This dominance suggests that much of the existing literature conceptualizes environmental performance primarily as an outcome of firms' internal resources, capabilities, and strategic assets. Institutional Theory also features prominently, appearing in 9 studies, highlighting the importance of regulatory pressures, norms, and external institutional forces in shaping firms' environmental outcomes.

In contrast, several theoretical perspectives have been applied only once in this review, including Dynamic Capability View (DCV), Real Options Theory, Contingency Theory, Learning Theory, the Technology–Organization–Environment framework, Ability–Motivation–Opportunity Theory (AMOT), Slack Resources Theory, Circular Economy Theory (CET), Theory of Creative Destruction, Diffusion of Innovations Theory (DOIT), Social Exchange Theory (SET), and Transaction Cost Economics Theory. The limited application of these frameworks indicates that dynamic, behavioral, organizational, and systemic dimensions of environmental performance remain insufficiently explored. Moreover, a number of prior studies did not explicitly rely on any theoretical foundation, underscoring the need for stronger theoretical grounding in future research. Please see Appendix A to view previous studies that have used each theory in this review Overall, while RBT dominate the field, the findings point to a clear need for greater theoretical diversity. Future studies would benefit from integrating more dynamic and process-oriented theories, such as DCV, DIT, and CET, to better capture the evolving, innovation-driven, and systemic nature of environmental performance. Likewise, incorporating behavioral and organizational theories, including SET and AMOT, can provide deeper insights into how human, organizational, and institutional factors influence sustainability outcomes. Expanding theoretical pluralism in this manner will enhance explanatory power and support the development of more comprehensive and robust models of environmental performance.

SYNTHESIS OF FINDINGS

SME environmental performance emerges as the result of complex interactions between organizational capacities, external pressures, and strategic choices. Unlike large firms insulated by resource abundance and formal structure, SME environmental performance is particularly vulnerable to resource scarcity and stakeholder diversity. Organizational features, environmental leadership, and GHRM serve as enablers at the grassroots. Pressure from stakeholders are external sources of motivation, but effectiveness is dependent on internal absorptive capacity to make pressure strategic action (Gao et al., 2019; Shubham et al., 2018).

Innovation and technology adoption follow two different routes. Green innovation has positive direct impacts across all 17 studies, while digital technologies have inconsistent relationships and suggest context-dependent moderating effects. Heterogeneity is explained by the resource-based theory: technology-smart SMEs with sufficient resources leverage technology for environmental advantages, while resource-constrained firms face implementation challenges (Esfahbodi et al., 2016; Yadegaridehkordi et al., 2023; Alinasab et al., 2022).

Supply chain integration effects remain underspecified. While practices of GSCM are effective (Micheli et al., 2020; Ahmed et al., 2019), the difference between internal vs. external collaboration mechanisms has to be explained. Strategic orientation outcome findings provide that effects of environmental performance are reliant on strategic positioning, cost-leadership vs. differentiation decision, whether environmental activities are contributing to competitive advantage or are imposing pure costs (Laari et al., 2017).

GEOGRAPHIC AND CONTEXTUAL PATTERNS

Studies of industrialized economies (28 studies) regularly state environmental action and resulting performance improvement, especially in concert with efforts at innovation and quality. Developing economy studies (26 studies) less often state shortages of resources, uncertainty of regulation, and decreases in performance. This difference reflects variations in institutional maturity: clear systems of regulation, customer demands for environmentally friendly products, and easy access to financial channels enable environmental performance in industrialized settings. In contrast, regulatory uncertainty, conservative consumption bases, and capital shortages induce trade-offs in developing settings. Transition economy research (9 studies) demonstrates institutional disruption, raising the challenge of implementing environmental strategy, a critical research gap.

RESEARCH GAPS AND LIMITATIONS

Critical gaps arise: (1) Longitudinal studies following determinant-outcome relationships over time are still rare; longitudinal designs were used by only 12 studies. (2) Mechanistic accounts of interactions among determinants are poorly developed; most studies examine single determinants rather than interaction effects. (3) Heterogeneity of SMEs receives too little emphasis; studies rarely differentiate micro, small, and medium-sized enterprises, each facing differentiated constraints. (4) Qualitative research severely underestimates sector-specific mechanisms.

Literature quality strengths are strong representation in high-impact journals (44% of the articles in Business Strategy and the Environment, Journal of Cleaner Production, and Sustainability) and methodological rigor (82.5% of quality score ≥8). Publication bias towards positive outcomes will exaggerate reported performance benefits.

4. CONCLUSION

The systematic synthesis pools 63 empirical articles examining determinants and outcomes of sustainable environmental performance in SMEs. There are six main categories of determinants: organizational, stakeholder pressures, innovation and technology, resource-based, supply chain cooperation, and strategic orientation. Environmental consequences are more prominent than financial ones, with marked variation between developed and developing environments.

Practitioners ought to emphasize environmental leadership development and GHRM as core competencies and utilize stakeholder engagement for external governance. Policy makers should recognize that SME limited resources require technical and financial support specifically, particularly in developing economies. Researchers must conduct longitudinal analyses of determinant interaction, sectoral mechanistic analysis, and qualitative research in underrepresented regions. Future research needs to identify resource constraint mitigation measures facilitating environmental performance in capital-scarce environments.

From a theoretical perspective, the review shows that RBT and institutional theory dominate environmental performance research in SMEs, framing performance mainly as a function of internal resources and external pressures. However, the limited use of dynamic, behavioral, and systemic theories—such as DCV, DOIT, CET, AMOT, and SET indicates that processes of learning, adaptation, innovation diffusion, and human behavior remain insufficiently examined. Future research should therefore adopt more integrative and multi-theoretical approaches to better capture the dynamic, context-dependent, and resource-constrained nature of environmental performance in SMEs.

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REFERENCES

1. Aftab, J., Abid, N., Cucari, N., & Savastano, M. (2023). Green human resource management and environmental performance: The role of green innovation and environmental strategy in a developing country. Business Strategy and the Environment, 32(4), 1782-1798. https://doi.org/10.1002/bse.3219
2. Aftab, J., Abid, N., Sarwar, H., & Veneziani, M. (2022). Environmental ethics, green innovation, and sustainable performance: Exploring the role of environmental leadership and environmental strategy. Journal of Cleaner Production, 378, 134639. https://doi.org/10.1016/j.jclepro.2022.134639
3. Afzal, C. M., Khan, S. N., Baig, F. J., & Ashraf, M. U. (2023). Impact of green human resource management on environmental performance: The mediating role of green innovation and environmental strategy in Pakistan. Review of Applied Management and Social Sciences, 6(2), 227-242.
4. Ahmed, M. U., Gölgeci, I., Bayraktar, E., & Tatoglu, E. (2019). Environmental practices and firm performance in emerging markets: The mediating role of product quality. Production Planning & Control, 30(5-6), 315-328. https://doi.org/10.1080/09537287.2018.1542514
5. Alinasab, J., Mirahmadi, S. M. R., Ghorbani, H., & Caputo, F. (2022). Discovering knowledge and cognitive based drivers for SMEs internationalization. Journal of the Knowledge Economy, 13(3), 2490-2518. https://doi.org/10.1007/s13132-021-00801-1
6. Almagtome, A., Khaghaany, M., & Önce, S. (2020). Corporate governance quality, stakeholders' pressure, and sustainable development: An integrated approach. International Journal of Mathematical Engineering and Management Sciences, 5(6), 1077-1090. https://doi.org/10.33889/ijmems.2020.5.6.082
7. Al-Sharafi, M. A., Iranmanesh, M., Al-Emran, M., Alzahrani, A. I., Herzallah, F., & Jamil, N. (2023). Determinants of cloud computing integration and its impact on sustainable performance in SMEs: An empirical investigation using the SEM-ANN approach. Heliyon, 9(5).
8. Ashton, W., Russell, S., & Futch, E. (2017). The adoption of green business practices among small US Midwestern manufacturing enterprises. Journal of Environmental Planning and Management, 60(12), 2133-2149. https://doi.org/10.1080/09640568.2017.1281107
9. Baeshen, Y., Soomro, Y. A., & Bhutto, M. Y. (2021). Determinants of green innovation to achieve sustainable business performance: Evidence from SMEs. Frontiers in Psychology, 12, 767968. https://doi.org/10.3389/fpsyg.2021.767968
10. Baggia, A., Maletič, M., Žnidaršič, A., & Brezavšček, A. (2019). Drivers and outcomes of green IS adoption in small and medium-sized enterprises. Sustainability, 11(6), 1575. https://doi.org/10.3390/su11061575
11. Bassi, F., & Dias, J. G. (2020). Sustainable development of small-and medium-sized enterprises in the European Union: A taxonomy of circular economy practices. Business Strategy and the Environment, 29(6), 2528-2541. https://doi.org/10.1002/bse.2518
12. Bıçakcıoğlu-Peynirci, N., & Tanyeri, M. (2022). Stakeholder and resource-based antecedents and performance outcomes of green export business strategy: Insights from an emerging economy. International Journal of Emerging Markets, 17(1), 1-46. https://doi.org/10.1108/IJOEM-03-2020-0245

13. Cadez, S., Czerny, A., & Letmathe, P. (2019). Stakeholder pressures and corporate climate change mitigation strategies. Business Strategy and the Environment, 28(1), 1-14. https://doi.org/10.1002/bse.2070
14. Cantele, S., & Zardini, A. (2020). What drives small and medium enterprises towards sustainability? Role of interactions between pressures, barriers, and benefits. Corporate Social Responsibility and Environmental Management, 27(1), 126-136. https://doi.org/10.1002/csr.1778
15. Carfora, A., & Scandurra, G. (2021). Determinants of environmental innovations supporting small-and medium-sized enterprises sustainable development. Business Strategy and the Environment, 30(5), 2453-2467. https://doi.org/10.1002/bse.2767
16. Chang, A. Y., & Cheng, Y. T. (2019). Analysis model of the sustainability development of manufacturing small and medium-sized enterprises in Taiwan. Journal of Cleaner Production, 207, 458-473. https://doi.org/10.1016/j.jclepro.2018.10.025
17. Chaudhry, N. I., Asad, H., & Hussain, R. I. (2020). Environmental innovation and financial performance: Mediating role of environmental management accounting and firm's environmental strategy. Pakistan Journal of Commerce and Social Sciences (PJCSS), 14(3), 715-737.
18. Dang, V. T., Nguyen, N., Bu, X., & Wang, J. (2019). The relationship between corporate environmental responsibility and firm performance: A moderated mediation model of strategic similarity and organization slack. Sustainability, 11(12), 3395. https://doi.org/10.3390/su11123395
19. Dangelico, R. M., & Pontrandolfo, P. (2015). Being 'green and competitive': The impact of environmental actions and collaborations on firm performance. Business Strategy and the Environment, 24(6), 413-430. https://doi.org/10.1002/bse.1828
20. de Nadae, J., Carvalho, M. M., & Vieira, D. R. (2021). Integrated management systems as a driver of sustainability performance: Exploring evidence from multiple-case studies. International Journal of Quality & Reliability Management, 38(4), 800-821. https://doi.org/10.1108/IJQRM-12-2019-0386
21. Del Río, P., Carrillo-Hermosilla, J., Könnölä, T., & Bleda, M. (2016). Resources, capabilities and competences for eco-innovation. Technological and Economic Development of Economy, 22(2), 274-292. https://doi.org/10.3846/20294913.2015.1070301
22. Dvorsky, J., Belas, J., Gavurova, B., & Brabenec, T. (2021). Business risk management in the context of small and medium-sized enterprises. Economic Research-Ekonomska Istraživanja, 34(1), 1690-1708. https://doi.org/10.1080/1331677X.2020.1844588
23. El-Garaihy, W. H., Badawi, U. A., Seddik, W. A., & Torky, M. S. (2022). Investigating performance outcomes under institutional pressures and environmental orientation motivated green supply chain management practices. Sustainability, 14(3), 1523. https://doi.org/10.3390/su14031523
24. El-Kassar, A.-N., & Singh, S. K. (2019). Green innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices. Technological Forecasting and Social Change, 144, 483-498. https://doi.org/10.1016/j.techfore.2017.12.016
25. Esfahbodi, A., Zhang, Y., & Watson, G. (2016). Sustainable supply chain management in emerging economies: Trade-offs between environmental and cost performance. International Journal of Production Economics, 181, 350-366. https://doi.org/10.1016/j.ijpe.2016.02.013
26. Fatima, T., & Elbanna, S. (2023). Environmental strategy and firm performance: The role of dynamic capabilities. Management Decision, 61(1), 1-20. https://doi.org/10.1108/MD-02-2022-0185
27. Gao, Y., Gu, J., & Liu, H. (2019). Interactive effects of various institutional pressures on corporate environmental responsibility: Institutional theory and multilevel analysis. Business Strategy and the Environment, 28(4), 724-736. https://doi.org/10.1002/bse.2276
28. Gast, J., Gundolf, K., & Cesinger, B. (2017). Doing business in a green way: A systematic review of the ecological sustainability entrepreneurship literature and future research directions. Journal of cleaner production, 147, 44-56.
29. Gazi, M. A. I., Hossain, M. M., Islam, S., Masud, A. A., & Amin, M. B. (2024). CSR and sustainable environmental performance: An exploration of mediating and moderating factors. Sustainability, 16(19), 8499. https://doi.org/10.3390/su16198499
30. Graham, S., Cadden, T., & Treacy, R. (2023). Examining the influence of employee engagement in supporting the implementation of green supply chain management practices: A green human resource management perspective. Business Strategy and the Environment, 32(8), 4750-4766. https://doi.org/10.1002/bse.3391
31. Guo, Y., & Wang, L. (2022). Environmental entrepreneurial orientation and firm performance: The role of environmental innovation and stakeholder pressure. SAGE Open, 12(1). https://doi.org/10.1177/21582440211061354
32. Haleem, F., Farooq, S., & Boer, H. (2021). The impact of country of origin and operation on sustainability practices and performance. Journal of Cleaner Production, 304, 127097. https://doi.org/10.1016/j.jclepro.2021.127097
33. Hameed, Z., Naeem, R. M., Misra, P., Chotia, V., & Malibari, A. (2023). Ethical leadership and environmental performance: The role of green IT capital, green technology innovation, and technological orientation. Technological Forecasting and Social Change, 194, 122739.
34. Hansen, E. B., & Bøgh, S. (2021). Artificial intelligence and internet of things in small and medium-sized enterprises: A survey. Journal of Manufacturing Systems, 58, 362-372. https://doi.org/10.1016/j.jmsy.2020.08.009
35. Hartmann, J., Germain, R., & Grobecker, A. (2015). Antecedents of environmentally conscious

operations in transitioning economies: Insights from Russia. International Journal of Operations & Production Management, 35(6), 843-865. https://doi.org/10.1108/IJOPM-02-2014-0050
36. He, D., Ren, S., & Zeng, H. (2022). Environmental labeling certification and firm environmental and financial performance: A resource management perspective. Business Strategy and the Environment, 31(2), 751-767. https://doi.org/10.1002/bse.2915
37. Hristov, I., Chirico, A., & Ranalli, F. (2022). Corporate strategies oriented towards sustainable governance: Advantages, managerial practices and main challenges. Journal of Management and Governance, 26(1), 75-97.
38. Iranmanesh, M., Fayezi, S., Hanim, S., & Hyun, S. S. (2019). Drivers and outcomes of eco-design initiatives: A cross-country study of Malaysia and Australia. Review of Managerial Science, 13(5), 1121-1142. https://doi.org/10.1007/s11846-018-0282-3
39. Isensee, C., Teuteberg, F., & Griese, K. M. (2023). How can corporate culture contribute to emission reduction in the construction sector? An SME case study on beliefs, actions, and outcomes. Corporate Social Responsibility and Environmental Management, 30(2), 1005-1022.
40. Khamdamov, A., Tang, Z., & Hussain, M. A. (2023). Unpacking parallel mediation processes between green HRM practices and sustainable environmental performance: Evidence from Uzbekistan. Sustainability, 15(2), 1434. https://doi.org/10.3390/su15021434
41. Khizar, H. M. U., Iqbal, M. J., Murshed, F., & Tanveer, M. A. (2024). Sustainability outcomes in SMEs: A configurational view of the interplay of strategic orientations and environmental conditions. Journal of Macromarketing, 44(1), 45-64. https://doi.org/10.1177/02761467231203311
42. Laari, S., Töyli, J., & Ojala, L. (2017). Supply chain perspective on competitive strategies and green supply chain management strategies. Journal of Cleaner Production, 141, 1303-1315. https://doi.org/10.1016/j.jclepro.2016.09.114
43. Lee, K. H. (2021). Corporate social responsibility and firm performance: The mediating role of environmental innovation. Review of Managerial Science, 15(5), 1345-1367. https://doi.org/10.1007/s11846-020-00385-2
44. Lewandowski, S. (2017). Corporate carbon and financial performance: The role of emission reductions. Business Strategy and the Environment, 26(8), 1196-1211. https://doi.org/10.1002/bse.1978
45. Liu, L., Zhang, M., Hendry, L. C., Bu, M., & Wang, S. (2018). Supplier development practices for sustainability: A multi-stakeholder perspective. Business Strategy and the Environment, 27(1), 100-116. https://doi.org/10.1002/bse.1987
46. Lu, J., Liang, M., Zhang, C., Rong, D., Guan, H., Mazeikaite, K., & Streimikis, J. (2021). Assessment of corporate social responsibility by addressing sustainable development goals. Corporate Social Responsibility and Environmental Management, 28(2), 686-703.
47. Makhloufi, L., Djermani, F., & Meirun, T. (2024). Mediation-moderation model of green absorptive capacity and green entrepreneurship orientation for corporate environmental performance. Management of Environmental Quality: An International Journal, 35(1), 139-157.
48. Martin-de Castro, G., Amores-Salvado, J., Navas-López, J. E., & Balarezo-Nuñez, R. M. (2017). Exploring the nature, antecedents and consequences of symbolic corporate environmental certification. Journal of Cleaner Production, 164, 664-675. https://doi.org/10.1016/j.jclepro.2017.06.238
49. Micheli, G. J. L., Cagno, E., Mustillo, G., & Trianni, A. (2020). Green supply chain management drivers, practices and performance: A comprehensive study on the moderators. Journal of Cleaner Production, 259, 121024. https://doi.org/10.1016/j.jclepro.2020.121024
50. Novitasari, M., Wijaya, A. L., Agustin, N. M., Gunardi, A., & Dana, L. P. (2023). Corporate social responsibility and firm performance: Green supply chain management as a mediating variable. Corporate Social Responsibility and Environmental Management, 30(1), 267-276.
51. Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., ... & Prisma-P Group. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Systematic reviews, 4(1), 1.
52. Olarewaju, T., Dani, S., & Jabbar, A. (2023). A comprehensive model for developing SME net zero capability incorporating grey literature. Sustainability, 15(5), 4459. https://doi.org/10.3390/su15054459
53. Paulraj, A., Chen, I. J., & Blome, C. (2017). Motives and performance outcomes of sustainable supply chain management practices: A multi-theoretical perspective. Journal of Business Ethics, 145(2), 239-258. https://doi.org/10.1007/s10551-015-2857-0
54. Purwandani, J. A., & Michaud, G. (2021). What are the drivers and barriers for green business practice adoption for SMEs? Environment Systems and Decisions, 41(4), 577-593. https://doi.org/10.1007/s10669-021-09821-3
55. Raman, M., & Jeedigunta, N. V. R. (2024). Green intellectual capital and entrepreneurial orientation enabling environmental performance: Mediating role of innovation capability in Indian manufacturing SMEs. International Journal of Learning and Intellectual Capital, 21(2), 123-145. https://doi.org/10.1504/IJLIC.2024.138686
56. Rubio-Andrés, M., del Mar Ramos-González, M., Sastre-Castillo, M. Á., & Gutiérrez-Broncano, S. (2023). Stakeholder pressure and innovation capacity of SMEs in the COVID-19 pandemic: Mediating and multigroup analysis. Technological Forecasting and Social Change, 190, 122432. https://doi.org/10.1016/j.techfore.2023.122432
57. Shahbaz, M. H., Ahmad, S., & Malik, S. A. (2025). Green intellectual capital heading towards green innovation and environmental performance: Assessing the moderating effect of green creativity in SMEs of Pakistan. International Journal of

Innovation Science. https://doi.org/10.1108/IJIS-08-2023-0169

58. Shrivastava, M., & Tamvada, J. P. (2019). Which green matters for whom? Greening and firm performance across age and size distribution of firms. Small Business Economics, 52(4), 951-968. https://doi.org/10.1007/s11187-017-9942-y
59. Shubham, Charan, P., & Murty, L. S. (2018). Secondary stakeholder pressures and organizational adoption of sustainable operations practices: The mediating role of primary stakeholders. Business Strategy and the Environment, 27(4), 910-923. https://doi.org/10.1002/bse.2041
60. Szász, L., Csíki, O., & Rácz, B.-G. (2021). Sustainability management in the global automotive industry: A theoretical model and survey study. International Journal of Production Economics, 235, 108085. https://doi.org/10.1016/j.ijpe.2021.108085
61. Vishwakarma, A. K., Nema, A. K., & Sangle, S. (2018). Study of determinants of proactive environmental strategies in India's power sector. Journal of Cleaner Production, 194, 43-53. https://doi.org/10.1016/j.jclepro.2018.05.135
62. Xiao, C., Wang, Q., van Donk, D. P., & van der Vaart, T. (2018). When are stakeholder pressures effective? An extension of slack resources theory. International Journal of Production Economics, 199, 138-149. https://doi.org/10.1016/j.ijpe.2018.03.002
63. Yadegaridehkordi, E., Foroughi, B., Iranmanesh, M., Nikbin, D., & Hyun, S. S. (2023). Determinants of environmental, financial, and social sustainable performance of manufacturing SMEs in Malaysia. Sustainable Production and Consumption, 35, 16-30. https://doi.org/10.1016/j.spc.2022.10.029
64. Yu, W., Ramanathan, R., & Nath, P. (2017). Environmental pressures and performance: An analysis of the roles of environmental innovation strategy and marketing capability. Technological Forecasting and Social Change, 117, 160-169. https://doi.org/10.1016/j.techfore.2016.12.005.

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