

Pollution Prevention Strategies and Environmental Performance in Manufacturing Industries: A Literature Review

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Abstract. Pollution prevention has become an important managerial approach for manufacturing industries seeking to reduce environmental impacts while maintaining operational efficiency and regulatory compliance. This study aims to synthesize the literature on pollution prevention strategies and their relationship with environmental performance in manufacturing industries. A literature review was conducted by examining peer-reviewed studies related to source reduction, cleaner production, process modification, waste minimization, emission control, environmental management systems, and regulatory compliance. The synthesis indicates that pollution prevention strategies can improve environmental performance through reductions in waste generation, emissions, hazardous material use, and resource consumption, while also strengthening process efficiency and environmental compliance. The effectiveness of these strategies is influenced by several organizational and contextual factors, including management commitment, technological capability, employee competence, regulatory pressure, environmental management systems, and industry characteristics. The review also shows that pollution prevention is more effective when it is integrated into operational planning and continuous improvement rather than implemented only as an end-of-pipe response. The study concludes that manufacturing firms can achieve stronger environmental outcomes by prioritizing preventive approaches, strengthening internal environmental management mechanisms, and aligning pollution control practices with organizational strategy and regulatory requirements.

Keywords: pollution prevention; environmental performance; manufacturing industries; cleaner production; environmental management

Abstrak. Pencegahan pencemaran telah menjadi pendekatan manajerial yang penting bagi industri manufaktur dalam mengurangi dampak lingkungan sekaligus mempertahankan efisiensi operasional dan kepatuhan terhadap regulasi. Penelitian ini bertujuan untuk menyintesis literatur mengenai strategi pencegahan pencemaran dan hubungannya dengan kinerja lingkungan pada industri manufaktur. Kajian literatur dilakukan dengan menelaah artikel *peer-reviewed* yang berkaitan dengan pengurangan pencemaran dari sumber, produksi bersih, modifikasi proses, minimisasi limbah, pengendalian emisi, sistem manajemen lingkungan, dan kepatuhan regulasi. Hasil sintesis

menunjukkan bahwa strategi pencegahan pencemaran dapat meningkatkan kinerja lingkungan melalui pengurangan timbulan limbah, emisi, penggunaan bahan berbahaya, dan konsumsi sumber daya, sekaligus mendukung efisiensi proses dan kepatuhan lingkungan. Efektivitas strategi tersebut dipengaruhi oleh berbagai faktor organisasi dan kontekstual, seperti komitmen manajemen, kapabilitas teknologi, kompetensi karyawan, tekanan regulasi, sistem manajemen lingkungan, dan karakteristik industri. Kajian ini juga menunjukkan bahwa pencegahan pencemaran lebih efektif apabila diintegrasikan ke dalam perencanaan operasional dan perbaikan berkelanjutan, bukan hanya diterapkan sebagai pendekatan pengendalian di akhir proses. Penelitian ini menyimpulkan bahwa perusahaan manufaktur dapat mencapai kinerja lingkungan yang lebih baik dengan memprioritaskan pendekatan preventif, memperkuat mekanisme pengelolaan lingkungan internal, serta menyelaraskan praktik pengendalian pencemaran dengan strategi organisasi dan persyaratan regulasi.

Kata Kunci: pencegahan pencemaran; kinerja lingkungan; industri manufaktur; produksi bersih; manajemen lingkungan

1. Introduction

Manufacturing industries remain an important source of economic activity, but their production processes can also generate substantial environmental pressures through material consumption, energy use, wastewater, air emissions, hazardous substances, and solid waste. These pressures have encouraged firms to reconsider environmental management practices that focus only on treating pollutants after they have been generated. In response, pollution prevention has developed as a more proactive approach in which environmental impacts are reduced at their source through changes in materials, processes, technologies, operational practices, and organizational systems. The distinction between pollution prevention and conventional end-of-pipe treatment is therefore important because prevention attempts to avoid or minimize pollution during production rather than relying primarily on treatment after waste and emissions have already been created (Sarkis & Cordeiro, 2001).

Pollution prevention is closely associated with the concept of cleaner production, which emphasizes preventive environmental strategies, efficient resource utilization, waste minimization, and improvements in production processes. Within manufacturing organizations, these strategies may include source reduction, material substitution, better process control, equipment modification, energy and water efficiency, waste minimization, and improved production planning. Cleaner production and environmental management are therefore not limited to pollution-control technologies but involve organizational decisions concerning how production systems are designed and managed. Severo et al. (2017), using evidence from Brazilian industries, found a strong relationship between cleaner production and environmental management and showed that both contribute positively to sustainable product innovation.

The shift from reactive pollution control toward preventive environmental management also has important implications for organizational performance. Environmental management practices can influence not only emissions and waste but also the efficiency with which firms use materials, energy, labor, and production resources. Famiyeh et al. (2018), based on evidence from firms in a developing-country context, found that environmental management practices had a direct positive effect on overall environmental performance and also improved competitive operational performance. Their findings demonstrate that environmental management can be integrated with operational objectives rather than being treated solely as an environmental compliance activity.

More specifically, empirical evidence suggests that pollution prevention can improve environmental outcomes when it is supported by appropriate internal organizational processes. Graham and McAdam (2016) investigated pollution prevention among UK food-processing firms and showed that internal support processes strengthened the environmental performance effects of some pollution-prevention practices. Their study also found strong support for an indirect relationship in which environmental performance mediated the relationship between pollution prevention and cost performance. These findings are important because they demonstrate that pollution prevention does not operate independently; its effectiveness depends partly on organizational systems that support environmental practices.

Cleaner production has likewise been associated with environmental and economic benefits in production industries. Maama et al. (2021), examining production firms in the South African sugar industry, found that cleaner production had a positive and significant relationship with environmental and economic performance. The study indicates that preventive production practices can reduce waste and improve environmental outcomes while simultaneously supporting financial sustainability. This evidence reinforces the view that pollution prevention should not necessarily be interpreted as an additional environmental cost; when effectively implemented, it can become part of operational and sustainability strategies.

However, the implementation and outcomes of pollution-prevention practices are influenced by organizational and institutional conditions. Firms require internal managerial systems, technical capabilities, employee participation, and resources to identify pollution sources and implement preventive actions. External regulatory

pressures can also influence firms' willingness to adopt such practices. Khanna et al. (2009) found that organizational change through Total Quality Environmental Management encouraged firms to adopt pollution-prevention practices and demonstrated that anticipated regulatory pressures and complementary organizational assets were important in creating incentives and internal capacity for preventive environmental innovation. These findings suggest that regulation alone may be insufficient when organizations lack the capabilities required for implementation.

The interaction between environmental management systems and cleaner production is also increasingly important. Mora-Contreras et al. (2023), using longitudinal data from Colombian manufacturing companies, examined environmental management systems and cleaner-production practices in relation to circular and sustainability performance. Their results indicate that companies adopting environmental management systems, cleaner production, or combinations of these practices obtained selected benefits related to organizational performance, water reuse, waste-related activities, and green employment, although the effects were not uniformly positive across all sustainability indicators. This finding is particularly relevant because it cautions against assuming that every pollution-prevention intervention automatically improves every dimension of environmental performance.

Consequently, environmental performance should be understood as a multidimensional organizational outcome. In a manufacturing context, it can include reductions in waste generation, emissions, hazardous-material use, energy and water consumption, environmental incidents, and regulatory non-compliance. Improvements in environmental performance may arise from technical interventions, but they also depend on management commitment, employee competence, monitoring systems, environmental management practices, regulatory pressures, and continuous improvement. The literature therefore points toward a relationship in which pollution-prevention strategies influence environmental performance through a combination of operational and organizational mechanisms rather than through technological interventions alone (Graham & McAdam, 2016; Famiyeh et al., 2018; Mora-Contreras et al., 2023).

Despite substantial research on cleaner production and environmental management, the literature remains dispersed across pollution prevention, cleaner production, environmental management systems, sustainable manufacturing,

operational management, and environmental-performance research. Some studies focus on specific preventive practices, while others emphasize management systems, regulation, organizational capabilities, or performance consequences. This fragmentation makes it difficult to identify which pollution-prevention strategies are consistently associated with improved environmental performance and which organizational or contextual conditions determine their effectiveness.

Accordingly, this study aims to review the literature concerning pollution prevention strategies and environmental performance in manufacturing industries. Specifically, the study seeks to identify (1) the principal pollution-prevention strategies applied in manufacturing organizations; (2) the mechanisms through which preventive environmental practices contribute to environmental performance; and (3) the organizational and contextual factors that strengthen or constrain their effectiveness. By synthesizing evidence across cleaner production, environmental management, pollution prevention, and manufacturing-performance research, this review seeks to provide a clearer understanding of pollution prevention as a strategic environmental-management approach rather than merely an end-of-pipe pollution-control activity.

2. Method

2.1 Review Design

This study employed a structured literature review to examine pollution prevention strategies and their relationship with environmental performance in manufacturing industries. The review was designed to provide a transparent synthesis of empirical and conceptual evidence rather than to estimate a pooled statistical effect. Literature reviews used as a research method require an explicit process for identifying, evaluating, and synthesizing relevant studies to reduce ad hoc interpretation and improve methodological transparency (Snyder, 2019).

The review adopted principles of evidence-informed management research by organizing the search, selection, and synthesis stages systematically. Such an approach is appropriate for management research in which evidence is often heterogeneous in terms of research design, organizational context, and performance measurement (Tranfield et al., 2003).

2.2 Literature Search and Selection

The literature search focused primarily on peer-reviewed journal articles published between 2016 and 2026. Earlier studies were retained when they provided important conceptual foundations concerning pollution prevention, cleaner production, environmental management, or regulatory influences.

Search terms were developed from the main concepts of the review and included combinations of “pollution prevention,” “pollution prevention strategy,” “cleaner production,” “source reduction,” “waste minimization,” “environmental management,” “environmental management system,” “manufacturing industry,” “environmental performance,” “regulatory pressure,” “operational performance,” and “sustainable manufacturing.”

Studies were considered relevant when they met the following criteria: (1) publication in a peer-reviewed journal; (2) examination of pollution prevention, cleaner production, environmental management, or closely related preventive environmental practices; (3) relevance to manufacturing or production organizations; and (4) reporting of environmental, operational, compliance, or organizational outcomes. Studies focusing exclusively on technical treatment processes without managerial or organizational implications, non-peer-reviewed sources, duplicate records, and publications whose bibliographic information could not be verified were excluded.

No fixed number of publications was predetermined, and no PRISMA-style article count was reported because this study was designed as a structured literature review rather than a systematic review with a formal meta-analytic screening protocol.

Table 1. Literature Review Protocol

Component	Review Criteria
Review approach	Structured literature review
Main topic	Pollution prevention strategies and environmental performance
Main period	2016–2026
Earlier literature	Included for essential conceptual foundations
Source type	Peer-reviewed journal articles
Main context	Manufacturing and production industries

Core concepts	Pollution prevention, cleaner production, source reduction, waste minimization, environmental management
Main outcomes	Environmental performance, operational efficiency, regulatory compliance, resource efficiency
Main exclusions	Purely technical treatment studies without managerial relevance, non-peer-reviewed publications, duplicates, and unverifiable sources
Analysis	Thematic and comparative synthesis
Verification	Bibliographic information checked against official journal or publisher records

2.3 Data Extraction and Thematic Synthesis

Relevant information from each publication was organized according to the study context, pollution-prevention practice, organizational mechanism, environmental-performance outcome, contextual factor, and principal finding. Particular attention was given to distinguishing preventive approaches from end-of-pipe pollution treatment.

The reviewed evidence was synthesized into four major themes: (1) pollution prevention and cleaner-production strategies, (2) organizational mechanisms supporting implementation, (3) effects on environmental and operational performance, and (4) contextual conditions influencing effectiveness. Studies reporting positive outcomes were compared with evidence showing conditional or mixed effects to avoid assuming that all pollution-prevention interventions generate identical environmental benefits.

A meta-analysis was not conducted because the reviewed studies differed substantially in industrial context, environmental-management practices, methodological design, and measures of environmental performance. The results were therefore synthesized thematically and comparatively.

2.4 Source Verification

To improve traceability and reduce citation errors, each publication used in the review was checked against its official journal or publisher record. Author names, article titles, publication years, journal names, volume and issue information, page ranges or article numbers, and DOI information were compared before the source was incorporated into the manuscript. Findings were reported only to the extent supported

by the original publications; sample sizes, statistical relationships, and causal interpretations were not introduced unless explicitly reported by the respective studies.

3. Results and Discussion

3.1 Pollution Prevention as a Preventive Environmental Strategy

The literature indicates a clear distinction between pollution prevention and conventional end-of-pipe environmental control. Pollution prevention emphasizes reducing environmental burdens before waste, emissions, or other pollutants are generated, whereas end-of-pipe approaches primarily manage pollutants after they have emerged from production activities. Within manufacturing industries, preventive practices commonly involve source reduction, process improvement, material substitution, better resource management, cleaner production, waste minimization, and improvements in operational control.

The strategic relevance of prevention is demonstrated by Graham and McAdam (2016), who examined pollution-prevention practices in UK food-processing firms. Their study showed that pollution-prevention practices can contribute to environmental performance, although the effectiveness of individual practices depends on the presence of internal support processes. The study also identified environmental performance as an important mechanism linking pollution prevention with cost performance. This suggests that pollution prevention should not be treated solely as a technical environmental activity. Organizational support determines whether preventive practices are translated into measurable performance improvements.

Environmental management practices provide a broader organizational structure for prevention. Famiyeh et al. (2018) found that environmental management practices positively affected environmental performance and competitive operational performance. Taken together, these findings indicate that pollution prevention becomes more effective when preventive activities are embedded in organizational routines rather than implemented as isolated responses to specific environmental problems.

3.2 Effects on Environmental and Operational Performance

The reviewed evidence generally supports a positive relationship between preventive environmental practices and organizational environmental outcomes. Cleaner production is particularly important because it combines pollution reduction with more efficient use of production resources. Maama et al. (2021), studying

production firms in the South African sugar industry, reported positive relationships between cleaner production and both environmental and economic sustainability. This evidence suggests that reducing environmental burdens can coexist with improvements in economic performance when prevention is integrated into production management.

Similar patterns are found in broader green-manufacturing research. Afum et al. (2020), using data from 158 manufacturing firms, found that green manufacturing practices positively affected environmental, economic, and social performance. The same study also showed that not every proposed mediating relationship was significant, highlighting that environmental practices do not necessarily influence all dimensions of performance through identical mechanisms. This is important for interpreting pollution prevention because environmental improvements should not automatically be assumed to generate equal operational or economic benefits in every organization.

The synthesis therefore suggests that environmental performance can be observed through several connected outcomes, including reduced pollution, waste reduction, improved resource efficiency, better environmental compliance, and more efficient manufacturing processes. Operational benefits can arise when preventive practices reduce unnecessary material use, minimize process losses, and improve production discipline.

Table 2. Selected Evidence on Pollution Prevention and Environmental Performance

Study		Context	Main Environmental Practice	Key Finding
Graham McAdam (2016)	and UK food- processing firms		Pollution prevention	Pollution-prevention practices contribute to performance, while internal support processes influence their effectiveness
Famiyeh et al. (2018)	Developing- country firms		Environmental management practices	Environmental management practices improve environmental

				performance and operational competitiveness
Afum et al. (2020)	158 manufacturing firms	Green manufacturing practices	Green manufacturing positively affects environmental, economic, and social performance	
Maama et al. (2021)	South African production firms	Cleaner production	Cleaner production is positively related to environmental and economic sustainability	
Bananuka et al. (2021)	303 manufacturing firms in Uganda	Environmental management practices	Environmental management practices and institutional pressures predict environmental performance	
Maldonado-Guzmán and Garza-Reyes (2023)	460 automotive-industry managers in Mexico	Lean manufacturing and circular practices	Lean manufacturing and circular-economy practices contribute positively to sustainable performance	
Mora-Contreras et al. (2023)	Colombian manufacturing firms	Environmental management systems and cleaner production	Environmental and cleaner-production practices generate selected sustainability benefits, although effects differ across indicators	

3.3 Organizational Mechanisms Supporting Pollution Prevention

A recurring result in the literature is that preventive environmental strategies require organizational mechanisms that support implementation. These mechanisms include management commitment, formal environmental management practices, employee participation, monitoring, process control, organizational learning, and

continuous improvement. Pollution prevention is therefore not simply determined by the availability of cleaner technology.

Bananuka et al. (2021), based on survey evidence from 303 manufacturing firms in Uganda, found that environmental management practices and institutional pressures significantly predicted environmental performance. Environmental management practices also partially mediated the relationship between institutional pressures and environmental performance. This finding indicates that external pressure becomes more effective when it is translated into internal managerial practices.

The evidence from Graham and McAdam (2016) leads to a similar conclusion. Internal support processes enhanced the environmental-performance effects of some pollution-prevention practices. Consequently, management commitment should extend beyond approving environmental policies. Firms need procedures for identifying pollution sources, assigning environmental responsibilities, monitoring performance, training employees, and integrating environmental targets into production decisions.

This organizational perspective is especially relevant for manufacturing industries because pollution is often generated through routine production decisions. Preventive environmental management therefore requires cooperation among production, maintenance, quality control, environmental management, procurement, and senior management. Without such integration, pollution prevention may remain an environmental-department initiative rather than become part of organizational operations.

3.4 Regulatory and Institutional Pressures

External pressure is another important factor influencing environmental practices. Manufacturing firms respond not only to internal efficiency objectives but also to regulations, stakeholder expectations, customers, and broader institutional requirements. The findings of Bananuka et al. (2021) demonstrate that institutional pressures are significant predictors of environmental performance and that part of this effect operates through environmental management practices.

This relationship suggests that regulatory pressure can stimulate environmental improvement, but regulation alone does not guarantee strong environmental performance. Firms must possess internal systems capable of converting external requirements into operational practices. Compliance mechanisms, environmental

monitoring, documentation, employee responsibilities, and preventive production practices therefore become important organizational responses to regulatory requirements.

For managers, this distinction is significant. A compliance-oriented firm may focus primarily on meeting minimum discharge or emission standards, whereas a prevention-oriented firm seeks to reduce pollution generation before regulatory limits become the principal concern. The latter approach is more consistent with continuous environmental improvement because it treats regulatory compliance as a minimum requirement rather than the final objective.

3.5 Integration with Cleaner Production and Continuous Improvement

Cleaner production provides one of the strongest operational pathways for implementing pollution prevention. It shifts environmental attention toward production processes and encourages firms to examine where materials, energy, water, and other resources are lost or converted into waste.

Mora-Contreras et al. (2023) examined environmental management systems and cleaner-production practices using evidence from Colombian manufacturing firms. Their findings showed selected improvements related to sustainability and circular performance, but the effects were not consistently positive across every indicator. This mixed evidence demonstrates why pollution-prevention strategies should be evaluated according to actual environmental outcomes rather than the mere existence of an environmental program or certification.

Broader manufacturing evidence also supports the integration of environmental practices with process improvement. Maldonado-Guzmán and Garza-Reyes (2023), studying 460 managers in the Mexican automotive industry, found that lean-manufacturing practices positively influenced sustainable performance and circular-economy practices, while circular-economy practices also contributed positively to sustainable performance. Although lean manufacturing and pollution prevention are distinct concepts, this evidence demonstrates the potential value of integrating waste reduction, process efficiency, and environmental objectives within a continuous-improvement system.

Consequently, pollution prevention is more likely to generate sustained environmental benefits when it is incorporated into routine production improvement.

One-time interventions may reduce a specific pollution source, but continuous monitoring and improvement allow firms to identify new inefficiencies as production technologies, materials, products, and environmental requirements change.

3.6 Integrated Framework of Pollution Prevention and Environmental Performance

Based on the reviewed evidence, the relationship between pollution prevention and environmental performance can be represented through three interconnected stages:

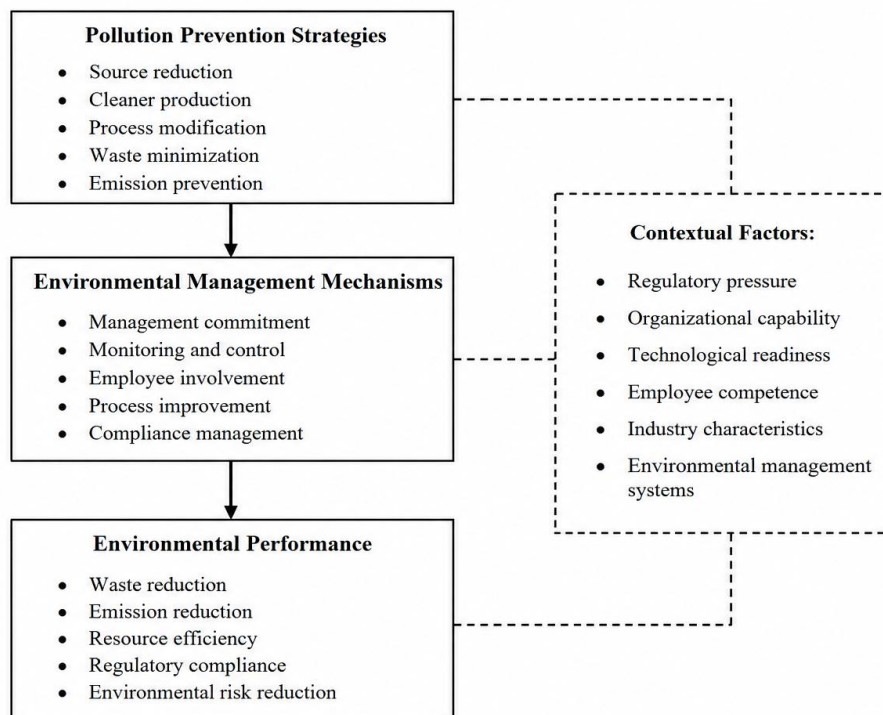


Figure 1. Framework of Pollution Prevention Strategies and Environmental Performance

The framework indicates that preventive strategies influence environmental performance largely through organizational and operational mechanisms. External conditions such as regulation can encourage adoption, while internal environmental-management capabilities determine whether preventive practices are consistently implemented. This interpretation is supported by evidence showing the importance of internal support processes, environmental management practices, institutional pressures, and cleaner-production systems.

From a managerial perspective, manufacturing firms should therefore move beyond a predominantly reactive approach to pollution control. Pollution prevention should be incorporated into production planning, process evaluation, employee responsibilities, performance monitoring, and continuous-improvement programs. The evidence does not imply that end-of-pipe treatment can always be eliminated; certain residual wastes and emissions will continue to require treatment. Rather, the strategic priority should be to minimize pollution generation before treatment becomes necessary. Such an approach can strengthen environmental performance while also supporting more efficient and disciplined manufacturing operations.

4. Conclusion

This literature review demonstrates that pollution prevention represents a proactive environmental management strategy that can improve environmental performance in manufacturing industries. Preventive approaches such as source reduction, cleaner production, process modification, waste minimization, and emission prevention can reduce environmental burdens before pollutants are generated. The reviewed evidence also indicates that these practices can contribute to improved resource efficiency, stronger regulatory compliance, lower environmental risk, and more disciplined production processes.

However, the effectiveness of pollution prevention depends on more than the adoption of individual technical measures. Internal organizational mechanisms, including management commitment, environmental monitoring, employee involvement, process control, environmental management systems, and continuous improvement, play an important role in translating preventive practices into measurable environmental outcomes. External factors such as regulatory pressure, industry characteristics, technological readiness, and institutional expectations can further influence the extent to which manufacturing firms adopt and sustain pollution-prevention practices.

The synthesis therefore suggests that pollution prevention should be integrated into operational and managerial decision-making rather than treated solely as an environmental compliance activity. Manufacturing firms can strengthen environmental performance by prioritizing pollution reduction at the source, embedding preventive practices into routine production management, and linking environmental objectives

with organizational control and continuous-improvement processes. End-of-pipe treatment may remain necessary for residual waste and emissions, but preventive strategies should become the primary approach whenever technically and organizationally feasible.

Future research should examine how pollution-prevention strategies differ across manufacturing subsectors, regulatory environments, and levels of technological maturity. Longitudinal studies are also needed to evaluate whether preventive environmental practices generate sustained improvements in environmental and operational performance over time.

References

- Afum, E., Agyabeng-Mensah, Y., Sun, Z., Frimpong, B., Kusi, L. Y., & Acquah, I. S. K. (2020). Exploring the link between green manufacturing, operational competitiveness, firm reputation and sustainable performance dimensions: A mediated approach. *Journal of Manufacturing Technology Management*, 31(7), 1417–1438. <https://www.emerald.com/jmtm/article/31/7/1417/238859/Exploring-the-link-between-green-manufacturing>
- Bananuka, J., Bakalikwira, L., Nuwagaba, P., & Tumwebaze, Z. (2021). Institutional pressures, environmental management practices, firm characteristics and environmental performance. *Accounting Research Journal*, 34(6), 637–665. <https://www.emerald.com/arj/article/34/6/637/133048/Institutional-pressures-environmental-management>
- Famiyeh, S., Adaku, E., Amoako-Gyampah, K., Asante-Darko, D., & Amoatey, C. T. (2018). Environmental management practices, operational competitiveness and environmental performance: Empirical evidence from a developing country. *Journal of Manufacturing Technology Management*, 29(3), 588–607. <https://www.emerald.com/jmtm/article/29/3/588/228788/Environmental-management-practices-operational>
- Graham, S., & McAdam, R. (2016). The effects of pollution prevention on performance. *International Journal of Operations & Production Management*, 36(10), 1333–1358. <https://www.emerald.com/ijopm/article/36/10/1333/303524/The-effects-of-pollution-prevention-on-performance>

- Khanna, M., Deltas, G., & Harrington, D. R. (2009). Adoption of pollution prevention techniques: The role of management systems and regulatory pressures. *Environmental and Resource Economics*, 44, 85–106. <https://link.springer.com/article/10.1007/s10640-009-9263-y>
- Maama, H., Doorasamy, M., & Rajaram, R. (2021). Cleaner production, environmental and economic sustainability of production firms in South Africa. *Journal of Cleaner Production*, 298, 126707. <https://www.sciencedirect.com/science/article/pii/S0959652621009276>
- Maldonado-Guzmán, G., & Garza-Reyes, J. A. (2023). Beyond lean manufacturing and sustainable performance: Are the circular economy practices worth pursuing? *Management of Environmental Quality: An International Journal*, 34(5), 1332–1351. <https://www.emerald.com/meq/article/34/5/1332/283170/Beyond-lean-manufacturing-and-sustainable>
- Mora-Contreras, R., Ormazabal, M., Hernández-Salazar, G., Torres-Guevara, L. E., Mejia-Villa, A., Prieto-Sandoval, V., & Carrillo-Hermosilla, J. (2023). Do environmental and cleaner production practices lead to circular and sustainability performance? Evidence from Colombian manufacturing firms. *Sustainable Production and Consumption*, 40, 77–88. <https://www.sciencedirect.com/science/article/pii/S2352550923001367>
- Sarkis, J., & Cordeiro, J. J. (2001). An empirical evaluation of environmental efficiencies and firm performance: Pollution prevention versus end-of-pipe practice. *European Journal of Operational Research*, 135(1), 102–113. <https://www.sciencedirect.com/science/article/pii/S0377221700003064>
- Severo, E. A., de Guimarães, J. C. F., & Dorion, E. C. H. (2017). Cleaner production and environmental management as sustainable product innovation antecedents: A survey in Brazilian industries. *Journal of Cleaner Production*, 142, 87–97. <https://www.sciencedirect.com/science/article/pii/S0959652616307673>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. <https://www.sciencedirect.com/science/article/pii/S0148296319304564>
- Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review.

British Journal of Management, 14(3), 207–222.

<https://onlinelibrary.wiley.com/doi/10.1111/1467-8551.00375>