

VISUALIZATION OF COLLABORATIVE NETWORKS AND TOPIC TRENDS IN PROACTIVE ENVIRONMENTAL STRATEGIES TOWARDS SUSTAINABLE DEVELOPMENT: A BIBLIOMETRIC REVIEW

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Abstract. This study aims to identify research themes and emerging trends through a systematic bibliometric literature review on proactive environmental strategies towards sustainable development, using data from the Web of Science and Scopus databases over the past 20 years from 2004 to 2024. In this paper, a bibliometric analysis, a quantitative method for evaluating academic literature, was conducted to analyze and visualize the number of documents, collaborative networks, and keyword networks. The results indicate that research on proactive environmental strategies towards sustainable development has been increasing year by year. The main research themes were identified through keyword analysis using bibliometric tools including environmental management, environmental performance, corporate social responsibility, and product life cycle assessment. Emerging trends in this field include stakeholders, human resource management, green innovation, and environmental policy. Based on the literature analysis, this study proposes a future research agenda suggesting that future studies should focus on cross-country and cross-industry comparative studies, the influence of national political policies, stakeholder-driven green innovation, and the role of government in promoting proactive corporate environmental strategies. Focusing on these areas is important as they address the multi-faceted and interconnected nature of corporate environmental strategies. By examining the comparative contexts, policy influences, stakeholder roles, and governmental support, researchers can provide comprehensive insights and actionable recommendations for promoting sustainable business practices globally.

Keywords: *sustainable development, proactive environmental strategies, bibliometric, CiteSpace, VOSviewer*

Introduction

Global environmental issues such as climate change, resource depletion, and ecosystem destruction have become a global concern (Hussain et al., 2022). In response to these global environmental challenges, sustainable development is widely supported and promoted (Tsalis et al., 2020). Sustainable development emphasizes protecting and enhancing the quality of life and ecology for future generations while meeting current needs (Hajian and Kashani, 2021). Environmental strategies play a crucial role in mitigating the negative environmental impacts of business activities and can provide a competitive advantage (Yang et al., 2019). Proactive environmental strategies are voluntary measures that go beyond regulatory requirements (Aggarwal and Agarwala, 2023). These strategies enable firms to anticipate and mitigate environmental impacts before they occur, leading to better environmental and economic performance. In contrast, reactive strategies address issues only after they arise, which can be less effective and more costly. Companies focused on sustainability are increasingly developing and implementing proactive environmental strategies, such as renewable energy adoption by corporations like Google and IKEA (Seroka-Stolka, 2023).

Iddrisu (2023) indicated that firms' environmental strategies positively and significantly influence environmental, social, and economic sustainable performance. However, the sustainable performance of firms largely depends on the active implementation of these strategies (Iddrisu, 2023; Seroka-Stolka, 2023). To encourage greater adoption of proactive environmental strategies by firms, organizations, and strategy researchers have conducted numerous studies describing proactive environmental strategies towards sustainability. A substantial number of papers and special journals cover a wide range of topics, including environmental regulations (Gu and Xie, 2022; Potrich et al., 2019; Peng et al., 2018), stakeholder pressures on firms' environmental strategy choices (Seroka-Stolka, 2023; Li et al., 2022; Sardana et al., 2020; Potrich et al., 2019), the relationship between proactive environmental strategies and sustainable performance (Mustafa et al., 2023; Frare and Beuren, 2022; Li et al., 2020; Danso et al., 2019), and the impact of different proactive environmental practices adopted by firms on sustainability (Hossain et al., 2022; Johl and Toha, 2021; Yafi et al., 2021; Del Rosario Reyes-Santiago et al., 2019).

However, there is a lack of quantitative bibliometric analyses in the field. Despite the large number of publications on this topic, the construction of the knowledge landscape in these areas remains largely unknown. Bibliometric analysis served as an effective tool for understanding the current state of research in this field. Therefore, this paper employs bibliometric methods to systematically explore the academic field of this topic, aiming to fill the gaps in current research. This study aims to explore the evolution of scientific knowledge in the field of proactive environmental strategies towards sustainability. To achieve this goal, the analysis identifies the most influential researchers and institutions, research themes, emerging trends, and future research directions. To address these issues, two bibliometric analysis tools, VOSviewer and CiteSpace, have been used to conduct a bibliometric analysis of this topic. The importance of this study lies in its comprehensive bibliometric analysis of proactive environmental strategies towards sustainable development. By visualizing collaborative networks and identifying emerging trends, this research provides a holistic view of the academic landscape. It highlights the increasing academic interest in sustainable development and proactive strategies, thus contributing significantly to the existing body of knowledge. The study also identifies future research directions, which can guide researchers and practitioners in advancing this field.

Materials and Methods

Data source

This study adopted core collections from Web of Science (WOS) and Scopus database. The reason is that both databases ensure a more comprehensive coverage of literature across various subject areas, which reduces the risk of important research missing. In addition, both database are widely used academic databases. The rigorous peer review processes are employed by these databases, which ensures the credibility and academic merit of the included publications.

Search strategy

This study searched and screened the WOS and Scopus databases for research on proactive environmental strategies towards sustainable development. The initial

screening was conducted using subject keywords. The query of search strings are listed in *Table 1*. Data were obtained on 7 June 2024 from the databases. The start time was set to 2004. Only English articles were left. In addition, conference papers, editorial materials, letters, notes, book chapters and book reviews were excluded. The initial search yielded a total of 690 documents, including 342 articles from WOS and 348 articles from Scopus. As the studies collected in the two databases may overlap, this study next de-duplicated the articles from the initial screening. After removing 3 duplicate articles, the final dataset consisted of 687 unique articles. Then, a screening process was conducted to assess the relevance and quality of the literature. Initially, all studies were assessed by reviewing their titles and abstracts, resulting in 671 potentially relevant articles. Subsequently, a thorough examination of the full text of these articles was undertaken to evaluate their quality and relevance specifically to proactive environmental strategies towards sustainable development. Articles that did not meet these criteria were manually excluded, leaving a final selection of 659 papers.

Table 1. Keywords for research searching.

| Topic | Title |
|-------------------------|--|
| Proactive | Proactiv* |
| Environment strategies | Environmental strateg* Environmental management |
| Sustainable development | Green strategy* Sustainab* Sustainable development |

*Note: *=was used at the end of some keywords to expand the range of some possible studies (e.g., “proactiv*” can be proactive or proactivity or proactively).*

Results and Discussion

Publication distribution across time

This study examines the number of publications over time (*Figure 1*). The figure illustrates that during the first decade (2004-2013), there were only 133 publications, indicating a slow but steady increase in research output. Subsequently, starting from 2015, coinciding with the establishment of the Sustainable Development Goals (SDGs) and Agenda 2030, the number of publications began to rise rapidly. Particularly noteworthy is the period from 2020 to June 2024, during which almost half of the total 659 papers were published, indicating growing academic interest in this field. Although *Figure 1* occasionally shows fluctuations, the overall trend demonstrates a consistent increase in publications. In conclusion, the study of proactive environmental strategies towards sustainable development is an emerging and increasingly popular research area.

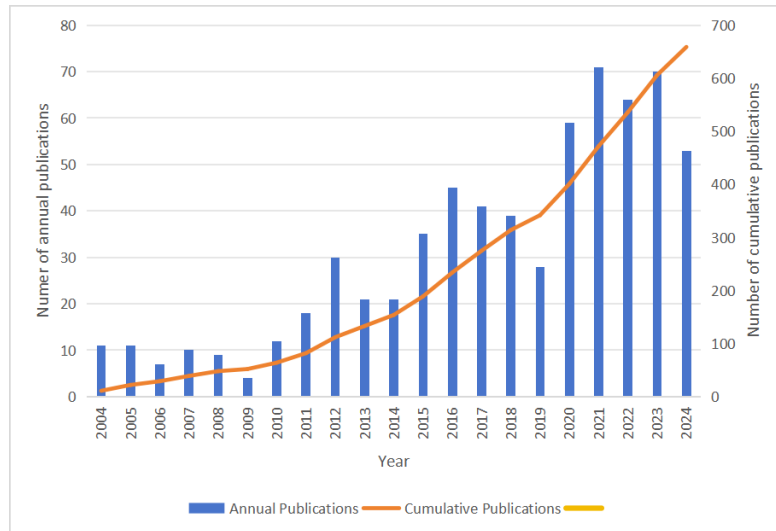


Figure 1. Publication distribution across time.

Publication distribution across journals

Table 2 presents the distribution of the top 20 journals with the highest number of publications related to the topic. It is notable that these top 20 journals collectively published 285 out of the 659 articles, accounting for 43.25% of all articles reviewed. This indicates significant attention across different fields. Specifically, the Journal of Cleaner Production ranks first with 66 articles. The Journal is highly ranked due to its focus on environmental management and sustainable development, high impact factor, and broad readership. Its alignment with the themes of proactive environmental strategies and sustainability makes it a preferred publication venue. Business Strategy and the Environment ranks second with 58 articles. Together with other influential journals specializing in business and sustainability, journals in this domain together contributed approximately 36% of the total articles reviewed. Furthermore, publications on this research topic have appeared in diverse fields such as education, technology and social change, and tourism management. This interdisciplinary nature highlights the appeal of the topic to scholars across various disciplines.

Table 2. Publication distribution across top 20 journals.

| Rank | Journal | Publications |
|------|---|--------------|
| 1 | Journal of cleaner production | 66 |
| 2 | Business strategy and the environment | 58 |
| 3 | Corporate social responsibility and environmental management | 29 |
| 4 | Sustainability | 20 |
| 5 | International journal of production economics | 15 |
| 6 | Journal of environmental management | 12 |
| 7 | Journal of business ethics | 10 |
| 8 | Technological forecasting and social change | 8 |
| 9 | Environmental management | 8 |
| 10 | International journal of innovation and sustainable development | 7 |
| 11 | International journal of sustainability in higher education | 7 |
| 12 | International journal of environmental research and public health | 6 |
| 13 | Heliyon | 6 |
| 14 | Marine policy | 6 |
| 15 | Journal of sustainable tourism | 5 |
| 16 | International of human resource management | 5 |
| 17 | Environmental science and pollution research | 5 |
| 18 | International journal of production research | 4 |
| 19 | Journal of competitiveness | 4 |
| 20 | Journal of manufacturing technology management | 4 |

Author collaboration network

Figure 2 illustrates the largest collaborative network in the research field of this topic. In this network, node sizes represent the productivity of authors, link thickness indicates the strength of collaboration, and different colors denote distinct groups of collaborators. The network includes 1034 authors and 820 collaborative links. The figure shows multiple core authors and intensive collaboration groups such as Chiappetta Jabbour Charbel Jose and Testa Francesco, who are influential in their fields and collaborate with multiple researchers. Authors like Gunarathne Nuwan and Knowles Harriet, while occupying large nodes in the network, maintain relatively independent collaborative networks focused on specific research directions. The graph also reveals cross-group connections, such as Guenther Edeltraud, who, while primarily affiliated with the green group, also links with other groups, suggesting a significant role in multiple collaborative networks. Smaller or isolated nodes in the graph indicate authors with fewer connections to the main collaborative network, potentially representing emerging researchers or those specializing in a specific small area.

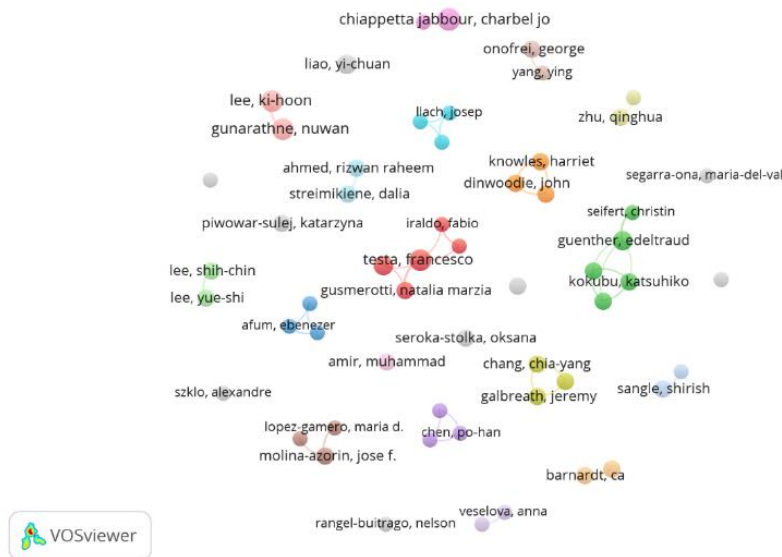


Figure 2. Visualization of author cooperation network.

Table 3 lists the top 10 authors based on the number of publications and citation frequency in the field. Chiappetta Jabbour Charbel Jose ranks first with 7 papers on the topic, followed by Gunarathne Nuwan, Lee Ki-hoon, and Testa Francesco, each contributing 6 papers. Notably, despite publishing only 4 papers each, Zhu Qinghua and Molina-Azorin José Francisco received substantial citations, with 524 and 379 citations, respectively. This suggests their work has had a significant impact in the field. Chiappetta Jabbour Charbel Jose’s publications show a balanced influence, reflected in both their number of publications and citation frequency, indicating enduring impact on subsequent research.

Table 3. Top ten contributing authors in terms of publications and citations.

| Authors | Publications | Authors | Citations |
|---------|--------------|---------|-----------|
|---------|--------------|---------|-----------|

| | | | |
|----------------------------------|---|----------------------------------|-----|
| Chiappetta Jabbour, Charbel Jose | 7 | Zhu, Qinghua | 524 |
| Gunarathne, Nuwan | 6 | Claver-Cortés, Enrique | 384 |
| Lee, Ki-hoon | 6 | Molina-Azorin, José Francisco | 379 |
| Testa, Francesco | 6 | Liao, Yichun | 274 |
| Gunarathne, Edeltraud | 5 | Chiappetta Jabbour, Charbel Jose | 269 |
| Liao, Yichun | 5 | Dinwoodie, John | 253 |
| Frey, Marco | 5 | Knowles, Harriet | 253 |
| Zhu, Qinghua | 4 | Sansom, Mark | 253 |
| Molina-Azorin, José Francisco | 4 | Seuring, Stefan | 234 |
| Dinwoodie, John | 4 | Acquah, Innocent Senyo Kwasi | 212 |

Institution collaboration network

Figure 3 shows the institutional collaboration network in the research field of this topic, highlighting the frequent collaborations among 512 institutions through 887 collaborative links. The Hong Kong Polytechnic University and the University of Pretoria emerge as central collaboration hubs, characterized by large nodes and numerous connections, indicating their key roles with extensive collaborative research projects. Additionally, the University of Czestochowa of Technology appears as another significant node with close ties to several institutions. Groups such as Curtin University, The University of Auckland, and Edith Cowan University, identified by their green color, likely represent collaborative networks within the Oceania region. Similarly, yellow groups like Chinese Culture University, National Defense University, and Fu Jen Catholic University are collaborative groups primarily within the East Asia region, indicating the influence of geographical proximity on academic collaborations.

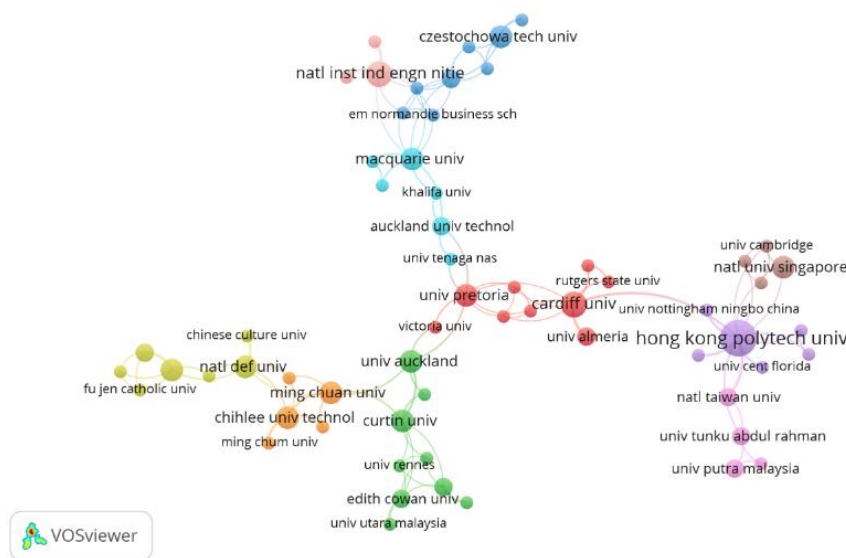


Figure 3. Visualization of institution cooperation network.

Country collaborative network

Figure 4 depicts the collaboration network of countries or regions engaged in this research topic from 2004 to 2024. The national collaboration network includes 65 countries as nodes connected by 240 links. China, the US, and the UK emerge as central hubs in the diagram, characterized by large nodes and extensive connections, highlighting their key roles in international research cooperation. Germany and Australia are also important nodes, indicating their international collaboration activities.

changes reflect the complexity and diversity of environmental problems, as well as the evolving ideas and methods of researchers in dealing with these problems.

Keyword clustering analysis

Through cluster analysis, this study identified 14 main research clusters and constructed a timeline keyword cluster diagram (Figure 6). The clustering values of $Q=0.7396$ and $S=0.9103$ indicate a significant confidence level in the generated clusters (Chen, 2017). Figure 6 displays multiple clusters numbered from #0 to #14, each representing distinct research topics. The color gradient in the diagram reflects the passage of time, transitioning from red for earlier periods to blue for more recent ones. The largest cluster #0 includes 54 articles with a Silhouette of 0.934. This cluster highlights the application of environmental management practices within project-based organizations and the construction industry. Within specific industry or organizational contexts, the cluster explores creating a green work climate, managerial attitudes, and strategic intent as crucial internal drivers and barriers to advancing environmental management (Zhuang et al., 2021). Effective implementation of environmental management strategies not only reduces environmental footprints but also enhances market competitiveness (Adomako and Tran, 2022). Based on this analysis, future research directions could include further exploration of environmental management in small and medium-sized enterprises (SMEs), comparative studies across industries, and interventions aimed at shifting managerial attitudes.

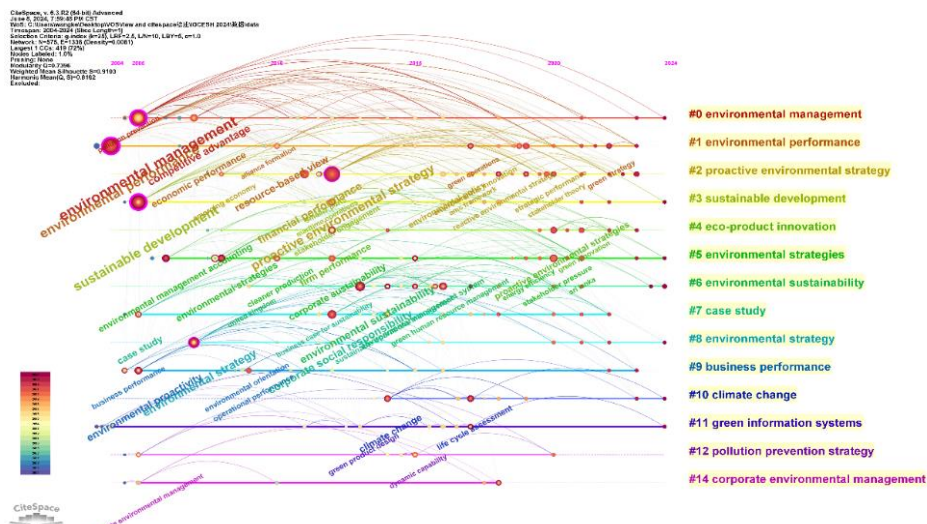


Figure 6. Visualization of timeline keyword clustering.

The second largest cluster #1 includes 51 articles with a Silhouette of 0.841. This cluster draws on classical management and organizational theories, as evidenced by the keywords Resource-Based View (RBV). Researchers in this cluster employ the Structural Equation Model (SEM) to analyze the factors influencing environmental performance and their interrelationships. The hospitality industry is a significant focus within this cluster. Investigating the environmental practices and challenges within this sector not only aims to enhance its overall environmental performance but also offers valuable insights for other industries. The cluster also indicate that by improving the green capabilities, motivations, and opportunities of organizations, companies can

systematically enhance their environmental performance (Yafi et al., 2021). Future studies should continue to delve into these areas to further develop and refine environmental management practices. The third largest cluster #1 with 43 articles and a Silhouette of 0.88, examines how enterprises can enhance their competitiveness and performance through proactive environmental strategies and environmental innovations. This cluster highlights the role of technology in advancing environmental strategies, as indicated by keywords such as environmental innovation and technology push. The keyword government subsidy stresses the significant influence of governmental support in fostering corporate environmental management. Emerging economies are the research objects of this cluster. Understanding how businesses in these countries implement environmental strategies within different economic and policy contexts is crucial for grasping the global diversity in environmental management. Based on this analysis, future research should delve into cross-national comparative studies, the impact of policies, and the role of government in promoting corporate proactive environmental strategies and environmental innovation.

Keyword burst detection analysis

To reveal the research themes and evolutionary trends in the field of proactive environmental strategies towards sustainable development, this paper employs keyword burst detection analysis in the literature. According to the keyword emergence results (Figure 7), 15 keywords were identified. The emergence time span of these keywords is broad, highlighting significant changes and development trends in the field over the past two decades. The keyword burst chart highlights the main research hotspots across different periods. In the early period (2004 to 2010), the focus was on environmental impact and pollution control. In the mid-term period from 2011 to 2016, it shifted to enterprise and strategy. Most recently, from 2017 to 2024, the emphasis has been on environmental policy and green innovation. This progression demonstrates a gradual shift from fundamental research to application and strategic research, reflecting the continuous development and evolution of the research field.

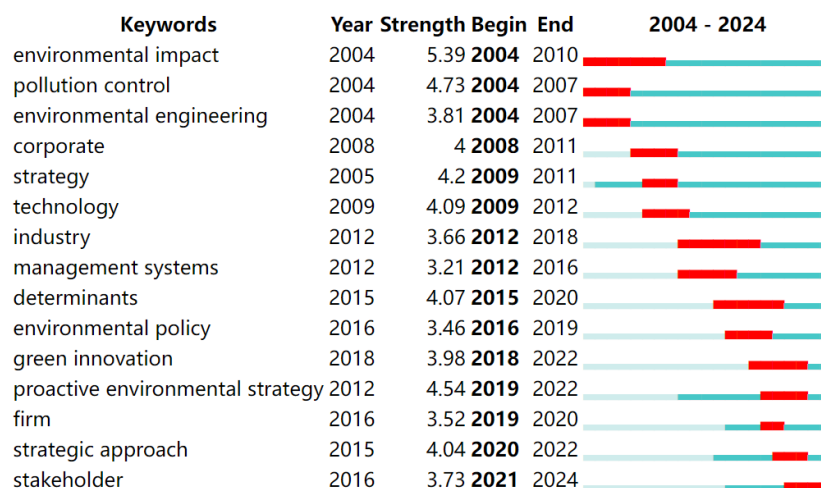


Figure 7. Top 15 keywords with the strongest citation Bursts.

Conclusion

This study investigates proactive environmental strategies towards sustainable development from 2004 to 2024. VOSViewer and CiteSpace software were used for bibliometric analysis. This study reveals that proactive environmental strategies towards sustainable development have become a prominent topic in the academic community, gradually evolving to shape current practices and policies in environmental management with a shift towards more proactive and preventive measures over the past two decades. Collaboration analysis uncovers patterns of teamwork among authors, institutions, and countries. Notable collaborations include partnerships between leading institutions like The Hong Kong Polytechnic University and the University of Pretoria, which have significantly contributed to advancing research in this field. Keyword burst analysis points out that early research mainly focused on environmental impacts and pollution control. In recent years, however, the focus has shifted to corporate environmental management strategies and green innovation practices. Key drivers influencing the shift in research focus include the establishment of the Sustainable Development Goals (SDGs) and global environmental policies promoting sustainability and green innovation. Keyword clustering analysis indicates significant differences in the implementation and influencing factors of environmental strategies across industries and countries. The study also proposes directions for future direction. Future research should explore the comparative effectiveness of proactive strategies across different industries and regions, the impact of government policies on corporate environmental practices, and the role of stakeholder engagement in driving sustainability initiatives. The findings of this study are significant for both the academic community and industry practitioners, as they provide a comprehensive overview of the field, highlight key research trends, and suggest practical applications for improving environmental strategies. By understanding key research themes and trends, organizations can better align their practices with proactive environmental measures. The next steps for researchers and practitioners include exploring new proactive strategies, fostering international collaborations, and leveraging innovative technologies to address emerging environmental challenges.

Several limitations are acknowledged in this study. This study's scope is limited to articles from the Web of Science and Scopus databases, and methodological constraints include the use of VOSviewer and CiteSpace for analysis. The temporal scope is from 2004 to 2024, which may exclude significant trends outside this range. The generalizability of the findings may be limited to similar contexts.

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Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

REFERENCES

- [1] Abdelhalim, K., Eldin, A.G. (2019): Can CSR help achieve sustainable development? Applying a new assessment model to CSR cases from Egypt. – *International Journal of Sociology and Social Policy* 39(9/10): 773-795.
- [2] Adomako, S., Tran, M.D. (2022): Sustainable environmental strategy, firm competitiveness, and financial performance: Evidence from the mining industry. – *Resources Policy* 75: 8p.
- [3] Aggarwal, P., Agarwala, T. (2023): Relationship of environmental strategy and performance: Role of green human resource management. – *International Journal of Business Environment* 14(1): 37-66.
- [4] Chen, C. (2017): Science mapping: a systematic review of the literature. – *Journal of Data and Information Science* 2(2): 1-40.
- [5] Danso, A., Adomako, S., Amankwah-Amoah, J., Owusu-Agyei, S., Konadu, R. (2019): Environmental sustainability orientation, competitive strategy and financial performance. – *Business Strategy and the Environment* 28(5): 885-895.
- [6] Del Rosario Reyes-Santiago, M., Sánchez-Medina, P.S., Díaz-Pichardo, R. (2019): The influence of environmental dynamic capabilities on organizational and environmental performance of hotels: Evidence from Mexico. – *Journal of Cleaner Production* 227: 414-423.
- [7] Frare, A.B., Beuren, I.M. (2022): The role of green process innovation translating green entrepreneurial orientation and proactive sustainability strategy into environmental performance. – *Journal of Small Business and Enterprise Development* 29(5): 789-806.
- [8] Gu, F., Xie, Y. (2022): The differential impacts of coercive pressure from environmental law and proactive environmental strategy on corporate environmental performance: The case study of a pulp and paper company. – *Corporate Social Responsibility and Environmental Management* 29(5): 1909-1925.
- [9] Hajian, M., Kashani, S.J. (2021): Evolution of the concept of sustainability. From Brundtland Report to sustainable development goals. – In *Sustainable Resource Management*, Elsevier 24p.
- [10] Hartmann, J., Vachon, S. (2018): Linking environmental management to environmental performance: The interactive role of industry context. – *Business Strategy and the Environment* 27(3): 359-374.
- [11] Hossain, M.I., Teh, B.H., Chong, L.L., Ong, T.S., Islam, M.T. (2022): Green human resource management, top management commitment, green culture, and green performance of Malaysian palm oil companies. – *International Journal of Technology* 13(5): 1106-1114.
- [12] Hussain, Z., Jusoh, A., Jamil, K., Rehman, A.U., Gul, R.F. (2022): Analyzing the role of knowledge management process to enhance sustainable corporate performance: A mediation moderation model. – *Knowledge and Process Management* 29(3): 205-220.
- [13] Iddrisu, S. (2023): Sustain or perish: can environmental supply chain strategies predict sustainable performance of manufacturing firms? A third world nation's perspective. – *Management of Environmental Quality: An International Journal* 34(1): 99-118.
- [14] Johl, S.K., Toha, M.A. (2021): The nexus between proactive eco-innovation and firm financial performance: a circular economy perspective. – *Sustainability* 13(11): 25p.
- [15] Li, D., Liao, Y.C., Ma, P. (2022): Contingent view on the relationship between proactive environmental strategy and corporate performance: Toward stakeholder engagement. – *Corporate Social Responsibility and Environmental Management* 29(5): 1605-1616.
- [16] Li, S., Qiao, J., Cui, H., Wang, S. (2020): Realizing the environmental benefits of proactive environmental strategy: The roles of green supply chain integration and relational capability. – *Sustainability* 12(7): 18p.

- [17] Mustafa, N., MansoorAsghar, M., Mustafa, R., Ahmed, Z., Rjoub, H., Alvarado, R. (2023): The nexus between environmental strategy and environmental performance: analyzing the roles of green product innovation and mechanistic/organic organizational structure. – *Environmental Science and Pollution Research* 30(2): 4219-4229.
- [18] Peng, B., Tu, Y., Elahi, E., Wei, G. (2018): Extended Producer Responsibility and corporate performance: Effects of environmental regulation and environmental strategy. – *Journal of Environmental Management* 218: 181-189.
- [19] Potrich, L., Cortimiglia, M.N., de Medeiros, J.F. (2019): A systematic literature review on firm-level proactive environmental management. – *Journal of Environmental Management* 243: 273-286.
- [20] Reslan, M., Last, N., Mathur, N., Morris, K.C., Ferrero, V. (2022): Circular economy: a product life cycle perspective on engineering and manufacturing practices. – *Procedia CIRP* 105: 851-858.
- [21] Sahoo, S., Kumar, A., Upadhyay, A. (2023): 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* 32(1): 551-569.
- [22] Sardana, D., Gupta, N., Kumar, V., Terziovski, M. (2020): CSR ‘sustainability’ practices and firm performance in an emerging economy. – *Journal of Cleaner Production* 258(3): 10p.
- [23] Seroka-Stolka, O. (2023): Towards sustainability: An environmental strategy choice, environmental performance, and the moderating role of stakeholder pressure. – *Business Strategy and the Environment* 32(8): 5992-6007.
- [24] Tsalis, T.A., Malamateniou, K.E., Koulouriotis, D., Nikolaou, I.E. (2020): New challenges for corporate sustainability reporting: United Nations' 2030 Agenda for sustainable development and the sustainable development goals. – *Corporate Social Responsibility and Environmental Management* 27(4): 1617-1629.
- [25] Walker, A.M., Opferkuch, K., Roos Lindgreen, E., Raggi, A., Simboli, A., Vermeulen, W.J., Caeiro, S., Salomone, R. (2022): What is the relation between circular economy and sustainability? Answers from frontrunner companies engaged with circular economy practices. – *Circular Economy and Sustainability* 2(2): 731-758.
- [26] Yafi, E., Tehseen, S., Haider, S.A. (2021): Impact of green training on environmental performance through mediating role of competencies and motivation. – *Sustainability* 13(10): 15p.
- [27] Yang, D., Jiang, W., Zhao, W. (2019): Proactive environmental strategy, innovation capability, and stakeholder integration capability: A mediation analysis. – *Business Strategy and the Environment* 28(8): 1534-1547.
- [28] Zhuang, Y., Zhu, Q., Sarkis, J. (2021): Examining antecedents, consequences, and contingencies of proactive environmental strategy. – *Sustainable Production and Consumption* 28: 1475-1490.