

## REVIEW ARTICLE

# Business Sustainability from the Ground Up: The Strategic Role of Green Accounting in SMEs – A Literature Review<sup>‡</sup>

## Sostenibilidad empresarial desde la base: el rol estratégico de la contabilidad verde en las PYMES – Una revisión de literatura

Luis Angel Sandoval Astudillo<sup>\*‡</sup> y Yasbleidy Mapallo Melenje<sup>\*¶</sup>

<sup>‡</sup>Corporación Universitaria Autónoma del Cauca, Popayán, Colombia; ORCID: <https://orcid.org/0009-0004-0334-1289>

<sup>¶</sup>Corporación Universitaria Autónoma del Cauca, Popayán, Colombia; ORCID: <https://orcid.org/0009-0003-3670-9433>

<sup>\*</sup>Correspondence to email: [Luis.sandoval.a@uniautonomo.edu.co](mailto:Luis.sandoval.a@uniautonomo.edu.co); [Yasbleidy.mapallo.m@uniautonomo.edu.co](mailto:Yasbleidy.mapallo.m@uniautonomo.edu.co)

(Received June 9, 2025; accepted November 26, 2025)

### Abstract

This study examines the role of environmental accounting in implementing sustainability in SMEs in emerging markets. The set of guidelines for reporting on systematic reviews and meta-analyses, called the PRISMA methodology in Scopus, was used, focusing on how SMEs can integrate environmental accounting practices in the face of the challenges imposed by current economic changes and technological advances. The results indicate that environmental accounting is essential to manage environmental costs and foster corporate social responsibility, offering companies a strategic tool to improve their sustainable performance. However, its effective adoption requires overcoming significant obstacles, such as the implementation of environmental management systems that align with modern management techniques, including activity-based management and process reengineering. It is concluded that, by integrating environmental criteria into accounting processes, organizations can not only improve their responsibility and public image, but also favor decision-making that aligns economic objectives with environmental ones.

**Palabras clave:** *Environmental accounting, Corporate performance, SMEs, Corporate social responsibility, Business sustainability.*

### Resumen

Este estudio examina el papel de la contabilidad ambiental en implementación de la sostenibilidad en las PYMES de mercados emergentes. Se empleó el conjunto de directrices para la presentación de informes sobre revisiones sistemáticas y metaanálisis, denominado metodología PRISMA en Scopus, enfocándose en cómo las PYMES pueden integrar prácticas de contabilidad ambiental frente a los desafíos impuestos por los cambios económicos y avances tecnológicos actuales. Los resultados indican que la contabilidad ambiental es esencial para manejar los costos ambientales y fomentar la responsabilidad social corporativa, ofreciendo a las empresas una herramienta estratégica para mejorar su desempeño sostenible. No obstante, su adopción efectiva requiere la superación de obstáculos significativos, como la implementación de sistemas de gestión ambiental que se alineen con técnicas modernas de gestión, incluyendo la gestión basada en actividades y la reingeniería de procesos. Se concluye que, al integrar criterios ambientales en los procesos contables, las organizaciones no solo pueden mejorar su responsabilidad e imagen pública, sino también favorecer una toma de decisiones que alinea los objetivos económicos con los ambientales.

<sup>‡</sup>This article is the product of the Sustainable Investments and Business Performance project, initiated and completed in 2024.

**Keywords:** *Contabilidad ambiental, Desempeño corporativo, PYMES, Responsabilidad social corporativa, Sostenibilidad empresarial.*

## 1. Introduction

The environment has acquired critical relevance and has become a central issue for the business environment, as well as for different contemporary research disciplines (Meneses et al, 2023). Accounting, as a science that reflects economic and social changes, cannot remain on the sidelines of global environmental problems. More than a passive observer, accounting should be seen as a key player in mitigating environmental impact, thanks to its ability to record and report the environmental performance of companies, thus transforming resource management and promoting sustainable practices (Kelsall, 2020). In this sense, accounting must not only adjust to new regulatory and sustainability requirements, but also has the potential to become a powerful tool to promote the transition to a more responsible economy, contributing to solutions that favour both economic development and environmental protection (Prieto & Yzaguirre, 2021a). In this sense, the integration of the environmental dimension through approaches such as green accounting makes it possible to comprehensively assess the impact of economic activities on the environment, improving business decision-making and promoting transparency towards investors, regulators and society (Alassuli, 2024). In a context marked by climate change and resource scarcity, accounting has a responsibility to innovate, incorporating tools such as life cycle assessment and environmental performance indicators, to effectively measure its contribution to sustainable development (Trisnawati et al., 2022)

The literature on green accounting highlights various environmental and ecological narratives that have emerged since the beginning of human consciousness, encompassing a wide variety of media and manifesting themselves in multiple forms (Tejada, 1999). This theoretical approach responds to the capitalist dehumanization and commodification of nature, which is reflected in much of traditional environmental accounting. The latter is often limited to documenting, valuing, and recording the use of natural capital without making significant efforts to address resource depletion and the environmental degradation that this entails (Atkins et al., 2023). In this way, green accounting is positioned as a critical response, promoting greater awareness of the need to integrate sustainability and the preservation of ecosystems into accounting practice, rather than treating nature as a simple economic asset (Bebbington & Larrinaga, 2024).

According to Aysanoa et al., (2022) and Pérez (2001), green or sustainable accounting is presented as an alternative to the global environmental crisis. In the context of current economic changes, rapid technological advancement, increasing intensity of competition, and the continued depletion of natural resources, environmental concerns and associated costs have become crucial challenges for businesses, especially in the industrial sector (Agyemang et al., 2023). In this sense, environmental accounting is considered a fundamental tool, as it provides key actors, such as stakeholders and decision-makers, with information not only on environmental costs, but also on financial data that allows for a more holistic view of business performance. In addition, Martínez (2022) and Endiana et al. (2020), identified a positive correlation between environmental accounting and key profitability metrics, such as net profit margin and earnings per share, suggesting that environmental actions not only contribute to sustainability, but also generate a favorable impact on the financial profitability of companies. This shows that integrating responsible environmental practices can improve both sustainability and key financial indicators.

On the other hand, Alassuli (2024) corroborated a strong and positive relationship between environmental accounting practices and CSR, suggesting that the adoption of these practices can be key to improving both professional development and the overall performance of companies. In light of these findings, it calls on companies to more rigorously implement environmental accounting practices, in order to boost their productivity and success in a global environment that faces increasingly complex

and changing challenges. Likewise, it is recommended that decision-makers strategically integrate environmental accounting concepts into their corporate policies, since this action can significantly contribute to the achievement of better economic and social results in the long term. In turn, Ardini et al., (2024) underscore the favorable effect of environmental accounting in reinforcing green supply chain management (GSCM) practices, which ultimately prove beneficial to a company's performance. This study validates the power of a circular economy approach, where resource efficiency emerges as a crucial aspect to maximize both ecological and financial outcomes. Finally, Lisnawati et al., (2024) integrates sustainable accounting with innovation as a solution that allows digital transformation to be implemented in many sectors. With digital innovation, companies can move more freely to achieve sustainable performance, because digitalization is a cross-border discipline.

In this order of ideas, the study of environmental accounting becomes essential today, since it provides a fundamental tool to face the environmental and ecological challenges of the twenty-first century (Cuevas et al., 2016), by incorporating the evaluation of environmental costs in business decision-making. This discipline not only fosters corporate social responsibility, but also improves the financial and professional performance of organizations by highlighting the importance of sustainability and effective resource management (Meneses et al., 2021). In addition, environmental accounting facilitates the implementation of green supply chain management practices and promotes a circular economy approach, which contributes to establishing more sustainable and resilient business models in the face of rapid economic and technological changes. However, in terms of Maama and Opoku (2019), it is pertinent to recognize that environmental accounting is still in an incipient stage of development and generally dominated by reputational motivations. Therefore, in order to advance in its implementation, greater regulation, integration with financial statements, and less superficial practices that reflect the real impact of business activities on the environment and society are required (Céspedes, 1993).

In this context, the present article aims to broaden the research agenda in environmental and ecological accounting, focusing on various dimensions that promote a historical understanding and an adequate definition of accounting to face the environmental challenges of the twenty-first century, especially from the perspective of small and medium-sized enterprises (SMEs). Since SMEs make up a significant part of the economy, their environmental impact is relevant. The adoption of environmental accounting practices allows them to efficiently manage their costs and improve their sustainability, which in turn increases their operational efficiency and profitability (Susanto & Meiryani, 2019). The growing demand for transparency from consumers and regulators forces these companies to integrate sustainability into their business models, thus facilitating their differentiation in the market and their access to sustainable financing. In addition, by implementing sustainable practices, SMEs can increase their resilience to economic and environmental challenges, ensuring their long-term viability (Javed et al., 2022). The article is organized into five sections. The bibliographic review is developed in the second part, followed by the description of the methodology used. The fourth section presents the main results obtained in the research. Finally, the conclusions derived from the study are detailed.

## 2. Theoretical Foundation

Green, environmental, or sustainable accounting refers to an accounting approach that integrates environmental considerations into the measurement and reporting of an organization's economic activity. According to Wood (1981), this accounting approach extends the concept of profit or loss beyond a purely monetary scope, allowing for a rigorous and standardized assessment of the environmental impact of corporate actions. In addition, according to Vega (2011) and Gomes et al. (2020), green accounting makes it possible to recognize and reveal the effects of business decisions on the environment, contributing to corporate social responsibility.

The topic of green accounting has been addressed in the accounting field from different perspectives, through debates, studies, discourses, and categories involving management, finance, and accounting, mostly in functional terms and oriented towards business dynamics and their practices of unsustainability

and denaturalization (Quijano, 2021). Other studies, such as those by Martínez et al. (2021), Hummel et al. (2021), Andrian & Pangestu (2022) and Dhar & Chowdhury (2021) underline that sustainability is, above all, a battle for life, and not only for the stability of capital or the corporate business world. Therefore, they reiterate the need to integrate sustainability into accounting and business management to face the current challenges at the level of society as a whole.

According to Nyahuna & Doorasamy (2021) and Álvarez et al. (20217) although SMEs face increasing pressure to address environmental issues, their role in sustainability is unclear, and the application of environmental management accounting (EMC) in these companies has been little studied, especially in emerging markets, in contrast to the majority approach in large companies. For Susanto & Meiryani (2019), environmental management accounting (EMC) in SMEs is positively influenced by profit expectations and regulatory pressure, and its adoption has a significant impact on improving the environmental and operational performance of these companies.

The implementation of green accounting offers numerous benefits for SMEs. According to Lisnawati et al., (20214) green accounting allows companies to identify and reduce the costs associated with waste and excessive consumption of resources, which can translate into significant financial savings. In addition, improved resource efficiency can increase the competitiveness of SMEs in the market. For their part, Nuela-Sevilla et al., (2022) highlight that green accounting is an indispensable tool for business management, as it provides key information for strategic decision-making, improves the company's comprehensive knowledge and contributes significantly to operational efficiency and effectiveness.

In terms of the limitations or barriers to the implementation of environmental accounting in the context of SMEs, Wilmshurst & Frost (2001) recognize that while executives of major companies recognize the importance of the environment and the need to respond to environmental challenges, there is limited participation of accountants in Environmental Management Systems (EMS). suggesting a lack of understanding about the crucial role that accounting and accountants could play in these systems. According to Javed et al., (2022) the adoption of environmental management accounting (EMC) in SMEs is limited due to barriers such as lack of strict legislation and flexible financing options. In turn, Jamil et al., (2015) argue that small and medium-sized enterprises (SMEs) face various barriers to adopting environmental management accounting (EMC), with coercive pressures from the government being a key factor that can encourage this practice. This latest study suggests that government and professional accounting organisations should play an active role in promoting CMA through the creation of guidelines and the provision of tax incentives, as well as in improving the training and resources available to SMEs.

Overall, the literature reviewed indicates that green accounting is a valuable tool for SMEs looking to improve their business sustainability. Although there are different studies and significant challenges in its implementation. In this regard, it is confirmed that business sustainability, especially in the context of small and medium-sized enterprises (SMEs), is essential to ensure an economically, environmentally and socially balanced future. In that sense, adopting sustainable practices from the ground up allows SMEs to not only comply with environmental regulations and expectations, but also benefit in various ways, including reducing operating costs, improving reputation, and accessing new markets.

### 3. Method

To carry out this systematic review of the literature, the PRISMA method was used, the Scopus database was used, covering the period from 2019 to 2024. Scopus was selected due to its broad reach across diverse academic disciplines and its ability to provide access to a wide range of scientific journals and academic papers focused on environmental accounting (Giang et al., 2020).

A search formula was then designed to identify relevant articles that addressed the intersection between green accounting and sustainability at the SME level. The search formula used was as follows:

*"GREEN ACCOUNTING" OR "ENVIRONMENTAL ACCOUNTING" OR "SUSTAINABLE ACCOUNTING" OR "GREEN ACCOUNTING"*

This formula was developed to capture any article that mentioned terms related to environmental accounting, sustainable accounting, including synonyms and relevant keyword combinations. The articles of the study were selected according to the following inclusion and exclusion criteria:

**Inclusion Criteria:**

1. *Thematic relevance:* Studies that address the relationship between green accounting, environmental accounting or sustainable accounting and sustainability in SMEs will be included, directly and explicitly.
2. *Publication period:* Only articles published between 2019 and 2024 will be considered, ensuring the relevance and timeliness of the research.
3. *Access to full text:* Only those articles with access to full text will be included, allowing a deep and complete analysis of the contents.
4. *Peer-reviewed publications:* Articles from peer-reviewed academic journals will be included exclusively, ensuring the quality and scientific validity of the studies.

**Exclusion Criteria:**

1. *Lack of focus on SMEs:* Studies that, although they address green or environmental accounting, do not focus on the application of these practices in SMEs will be excluded.
2. *Publications outside the analysis period:* Articles published before 2019 or after 2024 will be excluded from the analysis.
3. *Abstracts or articles without access to full text:* Documents that only have an abstract or do not offer access to the full text will be discarded.
4. *Indirect thematic approach:* Articles that mention green accounting or sustainability tangentially, but do not develop a detailed analysis of these topics in the context of SMEs, will be excluded.

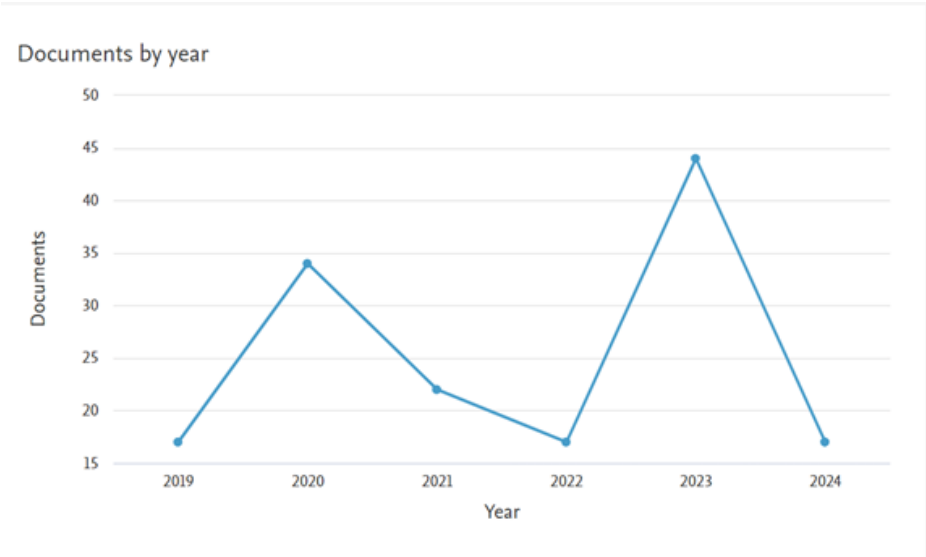
After applying the search and exclusion criteria, 151 articles were identified that met the defined parameters and presented thematic relevance around green accounting and sustainability in SMEs. However, after a thorough review of the content of the documents, 10 studies that did not fully meet the established parameters were discarded, such as the lack of direct focus on SMEs, different observation window or the absence of access to the full text. This process allowed refining and ensuring that only the most pertinent articles were considered for analysis, thus ensuring the robustness and consistency of the review.

#### 4. Results

Figure 1 shows the evolution in the number of publications on environmental accounting in SMEs between 2019 and 2024. A fluctuating behavior is observed, with a significant peak in 2020 (around 35 documents) and a more pronounced one in 2023 (more than 45 documents). These increases could be linked to international environmental events or regulations that drove interest in this topic during those years. However, a decline is observed in 2021 and 2022, indicating that, despite the growing importance of environmental accounting, academic attention and interest in this topic still faces ups and downs. These patterns may reflect the difficulties of implementing sustainable environmental policies in SMEs, as well as a reaction to legislative or economic changes at the global level. The general trend suggests that although environmental accounting is emerging as a key tool for SMEs, there are still significant challenges to consolidate it as a common management and control practice.

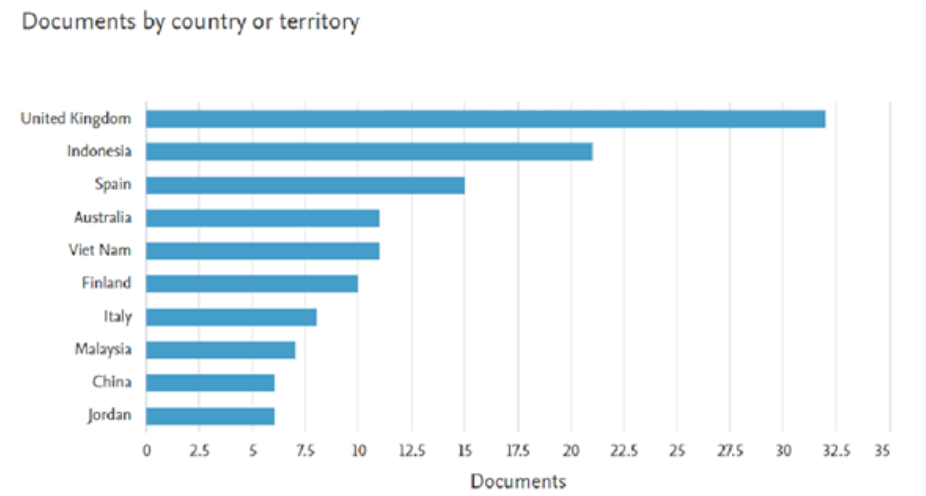
Figure 2 shows the global distribution of publications on environmental accounting in SMEs, with the United Kingdom standing out as the leading country in this field, followed by Indonesia and Spain. This pattern suggests that countries with a higher number of publications have environments more conducive to research and implementation of green accounting practices, driven by robust environmental policies and a higher level of awareness about sustainability. The prominence of these nations reflects their commitment to the adoption of sustainable practices, which is associated with

Figure 1. Articles published per year



Source: Authors' elaboration based on Scopus (2024).

Figure 2. Articles published by country



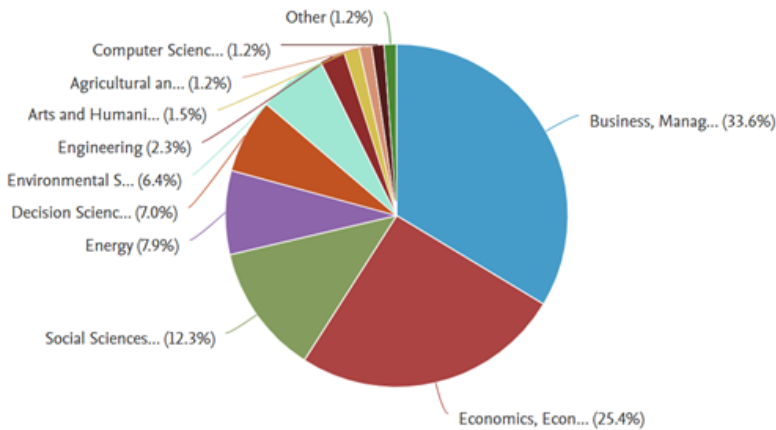
Source: Authors' elaboration based on Scopus (2024).

advanced regulatory frameworks and increased social pressure for environmental transparency. On the other hand, the presence of a lower number of publications in other countries indicates a lower penetration of these practices in their business contexts. This means that there are still barriers, such as a lack of specific policies, less access to resources or a low level of environmental awareness, that must be overcome to promote sustainability in SMEs in these countries. Consequently, promoting international collaboration, as well as the exchange of experiences and knowledge, can play a crucial role in accelerating the global adoption of environmental accounting, thus contributing to a more sustainable and equitable development.

Figure 3 shows the distribution of publications by subject area in environmental accounting for

Figure 3. Articles published by Thematic Area.

Documents by subject area



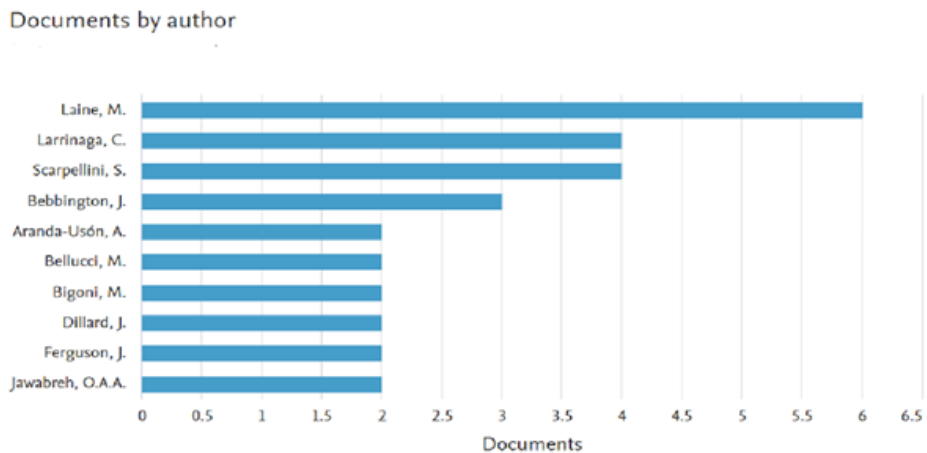
Source: Authors' elaboration based on Scopus (2024).

SMEs. The focus on business management and economic aspects predominates, which shows the importance of quantifying and demonstrating the financial benefits derived from the adoption of sustainable practices. Likewise, the notable representation of social sciences and energy underscores the need to integrate sociocultural and energy efficiency factors into the implementation of green accounting, reflecting how these areas influence the acceptance and success of sustainable strategies in companies. Likewise, the involvement of technical and scientific areas indicates a growing interest in the development of practical tools and solutions that facilitate the transition to sustainability. This multidisciplinary approach is essential to address the complex challenges faced by SMEs on their path to sustainable business development, highlighting the importance of collaboration between different disciplines to create more comprehensive and effective approaches. In this sense, these results suggest that environmental accounting in SMEs requires a holistic approach, integrating economic, social and technical perspectives.

Figure 4 shows the authors and their publications in the field of environmental accounting in SMEs. An active and diversified research landscape is observed. Laine, M. stands out as a leader with the largest number of publications, while other authors such as Larrinaga, C., and Scarpellini, S also contribute significantly. The diversity of authors and the number of publications suggest a robust research community, with multiple perspectives that enrich the field. Research collaborations and networks are crucial for the advancement of knowledge, and authors with fewer publications present opportunities for future innovations. These data indicate a dynamic and growing field, with a strong potential to contribute to the sustainability of SMEs through environmental accounting.

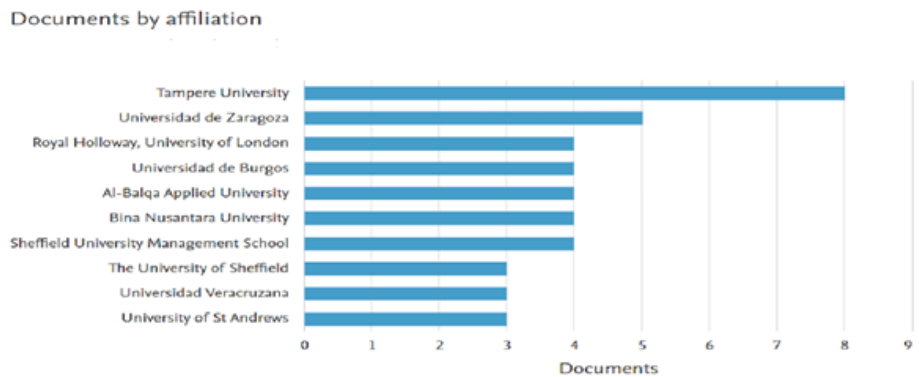
Figure 5 presents data on institutional affiliations and the number of publications related to environmental accounting in SMEs, revealing an active and globally distributed research landscape. Tampere University (Finland) stands out as the institution with the highest academic production in this field, followed by other renowned universities, such as the University of Zaragoza (Spain) and Royal Holloway–University of London (United Kingdom), which also have a significant participation. The diversity of institutions and their geographical distribution reflects a collaborative and multidisciplinary approach to the study of environmental accounting. This approach not only enriches academic knowledge, but

Figure 4. Articles Published by Author



Source: Authors' elaboration based on Scopus (2024).

Figure 5. Articles published by Affiliation



Source: Authors' elaboration based on Scopus (2024).

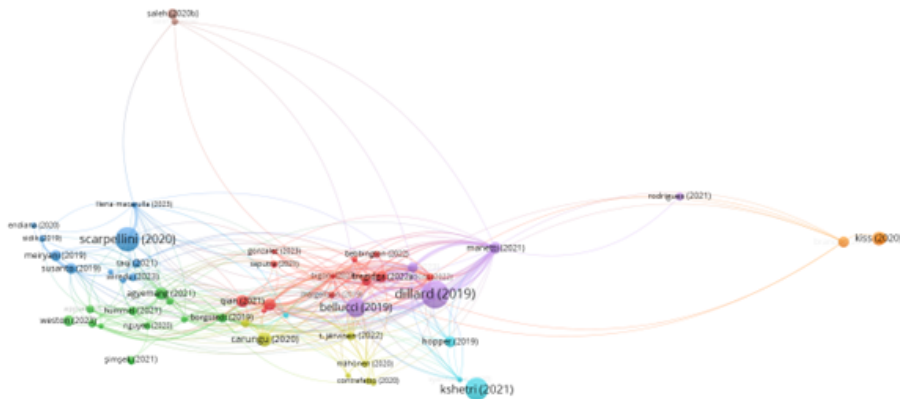
can also have a considerable impact on business practices and public policy development globally.

Graph 6 of the cocitation of authors in the field of green accounting reveals a diverse research structure, with several nuclei of influence and different thematic currents. Authors such as Dillard (2019), Scarplini (2020) and Kiss (2020) stand out for their high citation, which indicates that their works are foundational or central in this field. Dillard (2019), in particular, appears as a key author within the network, linked to other influential authors, such as Bellucci (2019) and Giani (2021), suggesting that his contributions have influenced various currents of thought in green accounting. On the other hand, Kiss (2020), although he appears slightly disconnected from the main group, positions himself as a relevant author in a specific subcurrent. The different groupings in the graph, such as those led by Kshetri (2021) and Scarplini (2020), suggest that there are diverse lines of research, ranging from technological approaches to the circular economy and sustainability. The connections between these groups indicate active academic collaboration and a shared research base, which is driving the evolution of green accounting towards interdisciplinary and more complex approaches. This map, in short, reflects an expanding field, with recent authors such as Gonzalez (2023) or Saleh (2020) bringing new perspectives to an increasingly relevant debate in business and environmental management.

Figure 7 of co-occurrence of keywords in green accounting reveals a centralized structure around

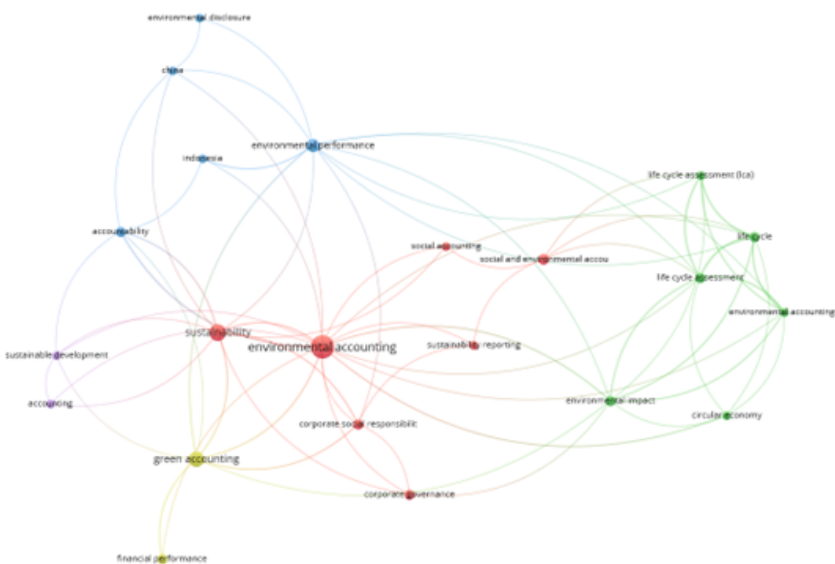


Figure 6. Author Analysis



Source: Authors' elaboration based on Scopus and VOSviewer (2024).

Figure 7. Keyword analysis



Source: Authors' elaboration based on Scopus and VOSviewer (2024).

"environmental accounting", which connects with key concepts such as "sustainability", "green accounting" and "corporate social responsibility", indicating an interdisciplinary approach in the integration of sustainability and accountability in companies. In addition, terms such as "life cycle assessment" and "circular economy" highlight the growing importance of environmental analysis methodologies and sustainable business practices. Likewise, concepts such as "environmental performance" and "environmental disclosure" reflect the interest in the measurement and communication of corporate environmental impact. The presence of terms such as "social accounting" and "corporate governance" underscores the social and governance dimension within green accounting. Finally, the appearance of geographical references such as "China" and "Indonesia" indicates an interest in green accounting practices in different regional contexts. In that order, Figure 7 reflects a broad and evolving field that

encompasses environmental, social and governance aspects of corporate sustainability.

## 5. Conclusions

This study seeks to enrich the research agenda in the field of environmental and ecological accounting, consolidating a conceptual framework that supports the response to current environmental and ecological challenges. Literature review indicates that, in the context of economic transformations and technological advances, environmental concerns and related costs represent significant challenges for small and medium-sized enterprises. In this sense, environmental accounting stands as a fundamental tool to provide information on environmental costs and promote corporate social responsibility. This approach optimizes corporate performance and favors sustainability by implementing green supply chain management practices and the circular economy.

The accounting literature shows that green accounting allows SMEs to identify and reduce costs associated with waste and consumption of resources, increasing their competitiveness in the market. However, the implementation of these practices requires overcoming significant challenges, including the need to establish environmental management and control systems aligned with new management techniques such as activity-based management and process reengineering. In addition, it points out that environmental accounting and business sustainability are intrinsically linked to corporate social responsibility, reinforcing the need to integrate these concepts to improve productivity and organizational success in an interconnected and rapidly changing world.

Research in environmental accounting and its implementation in SMEs is key to promoting business sustainability. Studies indicate that adopting sustainable practices from the ground up allows SMEs to comply with environmental regulations, improve their reputation and access new markets, ensuring an economically, environmentally and socially balanced future. In that sense, this review underscores the need for a comprehensive and multidisciplinary approach to advance business sustainability, especially in the context of SMEs in emerging markets.

The article focused on publications in Scopus between 2019 and 2024 from the perspective of SMEs, limiting its applicability to a broader context. Future research opportunities in the area include conducting international comparative studies on green accounting, analyzing success stories in the implementation of these practices, exploring the impact of emerging technologies, developing specific sustainability indicators for SMEs, and exploring how perception and awareness of sustainability affect its adoption. These initiatives can contribute significantly to the advancement of the knowledge and practice of green accounting in corporate sustainability at a global level.

## Authors' contributions

Luis Angel Sandoval Astudillo: [Conceptualization](#), [research](#), [formal analysis](#), [methodology](#), [writing](#), [review and editing](#)

Yasbleidy Mapallo Melenje: [Data curation](#), [formal analysis](#), [validation](#), [visualization](#), [revision](#), and [editing](#)

## Financing

Self-financing

## Conflict of interest

The authors declare that they have no conflict of interest.

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