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Bibliometrics Analysis of Green Accounting Research

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ABSTRACT

This research delves into Green Accounting, which integrates environmental considerations into traditional accounting practices. Green Accounting has garnered significant attention in the context of heightened global ecological awareness and sustainability efforts. The study examines the trends in Green Accounting publications, investigating various aspects such as subject areas, types of publications, and international dissemination. The objectives encompass analyzing publication trends from 1992 to mid-2023 and identifying influencing factors, exploring the implications of different publication types, revealing the significance of dominant subject areas, recognizing key international channels for dissemination, making global comparisons, acknowledging prominent authors' contributions, examining affiliations and roles of authors, and uncovering prevalent themes in Green Accounting publications. The methodology involves employing bibliometric analysis utilizing Scopus and VOSviewer tools to discern patterns and advancements in Green Accounting. The findings demonstrate fluctuations driven by environmental concerns, policy shifts, funding availability, and industry involvement. Dominant article types highlight interdisciplinary green economic engagement focusing on economic and ecological aspects. The research identifies global contributions to Green Accounting from developed and developing nations, driven by notable authors such as Cairns, Bartelmus, and Markandya, and spanning diverse affiliations like Universite McGill and the University of Bath, showcasing international interdisciplinary collaboration. Themes encompass environmental accounting, economics, corporate social responsibility, sustainable development, finance, and align with the Sustainable Development Goals. The study's novelty lies in its comprehensive analysis of Green Accounting's landscape, shedding light on its development, global involvement, and influences, thus providing valuable insights for stakeholders, policymakers, and researchers to advance sustainable practices. The implications underscore the need for ongoing research to address ecological challenges through Green Accounting, utilizing the understanding of trends, subject areas, and global engagement to formulate greener strategies, fostering collaboration among authors and affiliations, and enhancing overall awareness for facilitating sustainable development progress.

Keywords: Green Accounting, Corporate Social Responsibility, Ecological Awareness, Sustainability, Bibliometric Analysis

JEL Classifications: Q01, Q43, Q51, Q56

1. INTRODUCTION

Recently, there has been a growing interest in developing and implementing green accounting models that focus on environmental activities, units, and processes that are believed to impact the accuracy of financial reporting (Gonzalez and Peña-Vinces, 2022). This drive encourages entities to present information that is comprehensive and reliable. Reliability refers to the economic and environmental indicators that facilitate assessing the evolution and organizational situation for sound decision-making. Therefore, building and implementing green

accounting models that integrate environmental processes, units, and activities are crucial as they impact financial information (Gonzalez and Peña-Vinces, 2022).

Consequently, this will enable organizations to produce more comprehensive and reliable financial information based on economic and environmental indicators, facilitating the assessment of current organizational situations and evolution for decision-making. The choice of "green" following "accounting" is intriguing because this color fundamentally signifies harmony and loyalty (Sukmadilaga et al., 2023a). Accounting, designed as

a sub-discipline, aims to mitigate the negative effects of corporate exploitation on the environment measurably, allowing for a clear assessment of eco-efficiency improvements (Saputra et al., 2021a).

Green accounting reflects the environmental impact generated by companies during all productive and operational activities (Singh et al., 2019; González and Mendoza, 2020).

The modeling of Green Accounting in accounting systems is closely relevant, similar to previous models that emphasize green accounting points with important environmental parameters to be communicated in financial reports, such as good accounting practices, integration, and prevention (Nguyen et al., 2023). Various positive references to this issue's contribution to sustainable development goals have been discussed, including promoting innovation in environmentally responsible products, activities with significant environmental impacts, resource management, and others.

This study aims to map the extent to which the issue of Green Accounting is examined by experts and considered essential in various prestigious global discussions. The exploration includes the number of publications, types, subject areas, channels, and countries interested in this issue. Moreover, the most favored themes of Green Accounting, the authors, and their affiliations are the focus of this study, providing deeper insights for effective further research and formulation of environmental management strategies for policymakers.

Green Accounting, or environmental accounting, is an emerging field that integrates environmental considerations into traditional accounting practices (Ulupui et al., 2020). With the increasing global awareness of environmental challenges and the need for sustainable development, the study of Green Accounting has gained significant attention from researchers and policymakers. This research aims to analyze the fluctuations and factors impacting Green Accounting publications over the years and explore the dominant subject areas, publication types, and international channels contributing to the discourse on this topic.

Despite the growing importance of Green Accounting in addressing environmental issues and promoting sustainability, there have been fluctuations in the number of publications over the past few decades. Understanding the reasons behind these fluctuations is crucial for further advancing research and promoting the adoption of green economic practices worldwide. Additionally, identifying the key subject areas and publication channels can help stakeholders and policymakers better understand the focus and reach of Green Accounting literature.

The main objectives of this study are as follows: (1) To analyze the fluctuations in Green Accounting publications from 1992 to the first half of 2023 and identify the factors impacting these fluctuations. (2) To explore the publication types in Green Accounting research and understand their relevance and implications. (3) To explore the dominant subject areas in Green Accounting research and understand their relevance and implications. (4) To identify the top international publication channels and their role in disseminating

research related to Green Accounting. (5) To compare Green Accounting publications in different countries and recognize the global interest and involvement in this field. (6) To identify the key authors and their contributions to Green Accounting literature, acknowledging their expertise and role in advancing the research area. (7) To examine the affiliations of authors and institutional involvement in Green Accounting research to understand this field's interdisciplinary and international nature. (8) To explore the themes and concepts explored in Green Accounting publications, including environmental accounting, environmental economics, corporate social responsibility, sustainable development, finance, and economics.

Understanding the fluctuations, publication types, subject areas, and international channels in Green Accounting research will provide valuable insights for stakeholders, policymakers, and researchers to address environmental challenges effectively and promote sustainable practices in accounting and decision-making processes. The analysis of critical authors, affiliations, and themes will further enrich the understanding of Green Accounting research's interdisciplinary and global nature and its significance in achieving the Sustainable Development Goals.

2. METHODOLOGY

The bibliometric examination underscores specific inquiries and suggested considerations for researchers at each phase. The initial step entails precisely outlining the goals and extent of the bibliometric research. Before advancing to Step 2, scholars should meticulously select suitable bibliometric analysis techniques. In the third step, a scrupulous compilation of data for the bibliometric analysis holds significant importance. Lastly, during Step 4, researchers must execute the bibliometric analysis, comprehensively record, and present their findings (Donthu et al., 2021).

This scientific inquiry employs bibliometric analysis as its research method and draws data from Scopus and VOSviewer to illustrate research trends in green accounting. The investigation utilizes tools (Scopus analysis and VOSviewer) for analysis and visualization to examine patterns, associations, and advancements in electric vehicle adoption (Al Husaeni and Nandiyanto, 2022).

3. RESULTS

3.1. Analysis of Fluctuations and Factors Impacting Green Accounting Publications

Since 1992, discussions on Green Accounting have emerged in international publications, with researchers conducting observations. However, the number of publications was minimal, with at least five in 1997. The trend declined in the following 5 years until it started to increase again in 2005, but then dropped to only one publication in 2008. The subsequent year saw an increase, and by 2010, there were again five publications. The number of publications rose to eight in 2013 but then decreased over the next 6 years. However, there was a significant surge with ten publications in 2019-2020. The number of articles decreased to

seven in 2021 and five in the first half of 2023. These fluctuations were not without reason, as corporate managers' disclosure of green accounting practices in developing countries is minimal. Detailed information is presented in Figure 1.

Descriptive data analysis indicates that the interest in Green Accounting has experienced fluctuations over the past few decades. While there was a gradual increase in publications between 1992 and 1997, followed by a decline in the next 5 years, there was a subsequent resurgence in interest from 2005 to 2010. The sharp increase in 2019-2020 suggests a growing awareness and focus on green accounting issues. However, the drop in publications in 2021 and the first half of 2023 indicates that particular challenges or factors might affect the research and publication of green accounting studies.

The fluctuating pattern observed in Green Accounting publications could be attributed to various factors, including changes in global environmental concerns, shifts in policy priorities, and adopting sustainable practices by companies in different regions. Additionally, the increase and decrease in publications could also be influenced by the availability of funding for research, the presence of dedicated research centers or institutions, and the engagement of policymakers and industry stakeholders in promoting green accounting practices.

The finding that the disclosure of green accounting practices in developing countries needs to be improved points to a potential gap in knowledge dissemination and implementation. This indicates the need for further research and efforts to promote green accounting practices in developing nations to address environmental challenges effectively.

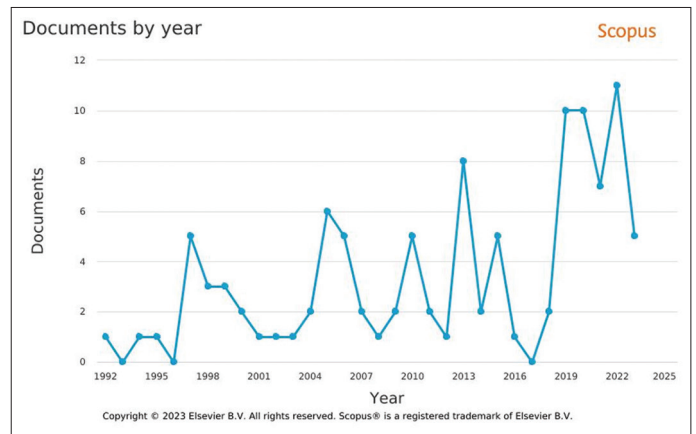
3.2. Breakdown of Green Accounting Publications by Type

The research analysis revealed 106 published articles, as presented in Figure 2, focusing on discussions related to Green Accounting. Among these publications, articles constituted the majority, accounting for 61.3%. Conference Papers followed them at 17.9%, Book Chapters at 8.5%, Books at 3.8%, Editorials at 2.8%, Reviews at 3.8%, Erratum at 0.9%, and Other Notes at 0.9%. The dominance of discussions in reputable articles suggests that this topic has garnered significant academic attention on a global scale. One of the prominent aspects of these publications is the international consideration of efforts to enhance environmental management efficiency through assessing ecological activities from the perspective of environmental costs and economic benefits.

Various companies apply green Accounting to assess environmental protection costs and impacts quantitatively. However, the scope of Green Accounting publications is broader than articles and conference proceedings alone. Light analyses of case studies related to these global issues are also discussed across various channels.

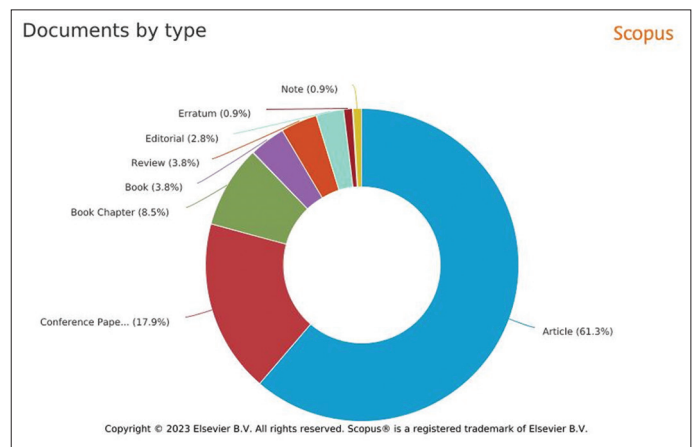
The prominence of articles in reputable sources signifies that Green Accounting has become a subject of intense academic scrutiny, highlighting its importance in addressing global

Figure 1: Publication quantity (year to year)



Sources: Data processed (2023)

Figure 2: Green accounting's publication by type



Sources: Data processed (2023)

environmental concerns. The focus on assessing ecological costs and economic benefits demonstrates the practical relevance of Green Accounting in decision-making processes for sustainable resource management.

Furthermore, including various publication types, such as conference papers, book chapters, and reviews, indicates that researchers and scholars from diverse backgrounds actively contribute to the discourse on Green Accounting. This interdisciplinary interest and engagement in the topic reflect its multi-faceted nature and the need for collaboration among experts from different fields to address environmental challenges effectively.

The analysis of Green Accounting publications demonstrates its significance and widespread attention in the academic community. The focus on articles in reputable sources, as well as the diversity of publication types, indicates the comprehensive and interdisciplinary nature of the research on Green Accounting. This academic interest and the diverse discussions on various platforms highlight the importance of continuously exploring and refining approaches to address environmental challenges through effective accounting practices.

3.3. Subject Areas Dominating Green Accounting Research

Figure 3 illustrates the findings related to the areas of Green Accounting research, which are currently dominated by Economic issues (24%), Environmental issues (17%), Social Sciences (11.8%), Energy (6.8%), Decision Science (5.4%), Engineering (5.0%), Agricultural (4.1%), Computer Science (3.6%), Earth and Plane (2.3%), and Others (5.4%). The distribution of subject areas shows that economic issues dominate the exploration and publication of Green Accounting, as integrating environmental management principles and natural conservation into accounting practices, including cost and benefit analysis, is an integral part of this topic. Green Accounting practices currently tend to focus on parallel reporting with financial accounting.

Green accounting or environmental accounting incorporates environmental costs and benefits into various accounting practices and integrates environmental costs into business decisions. As such, this fact also correlates with environmental and social areas. While not limited to economic, environmental, and social spaces, the current development of green financial discussions extends to other essential aspects.

The dominance of economic issues in Green Accounting research and publication signifies the strong emphasis on quantifying the economic impact of environmental practices and the importance of cost-benefit analysis in decision-making processes related to environmental protection and sustainability. This highlights the significance of incorporating environmental considerations into economic assessments and demonstrates a growing recognition of the importance of green economic practices.

The inclusion of environmental issues as a significant subject area further underscores the focus on the ecological aspects of Green Accounting. This is likely driven by increasing global awareness of environmental challenges and the need for organizations to account for their ecological impact and contributions to sustainability.

The presence of social sciences as a notable subject area indicates the recognition of the social dimensions of Green Accounting. It reflects the understanding that environmental management and

accounting practices have implications beyond economic and environmental factors, affecting society and stakeholders.

Furthermore, expanding Green Accounting discussions into areas such as energy, decision science, engineering, agriculture, computer science, earth, plane, and others suggests a growing interest in exploring the multidimensional aspects of green economic practices and their applications across diverse fields.

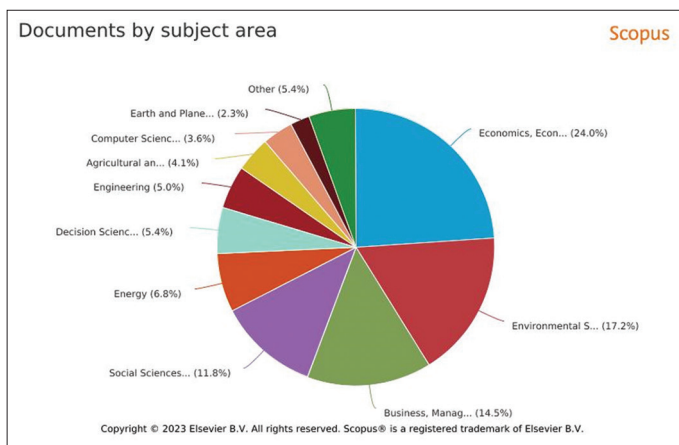
The analyzing subject areas in Green Accounting research reveals the dominance of economic and environmental issues. Integrating environmental considerations into economic assessments and decision-making processes is a significant focus. However, the presence of various other subject areas indicates the recognition of the multidimensional nature of Green Accounting and its relevance in diverse fields. This expansion of discussions underscores the importance of adopting green economic practices in addressing environmental challenges and promoting sustainability across different sectors and industries.

3.4. Top 5 International Publication Channels for Green Accounting

Information on the top 5 international publication channels for Green Accounting, which are consistently prominent, is presented in Figure 4. These channels include Ecological Economics, International Journal of Energy Economics and Policy, Environment and Development Economics, and Environment Development and Sustainability Journal. These publications highlight how implementing green accounting can drive the ability to minimize environmental issues companies face. Environmental accounting aims to enhance ecological management efficiency by assessing environmental activities from the perspective of costs and benefits. This enables stakeholders to obtain factual, valuable information for the sustainability of their business governance.

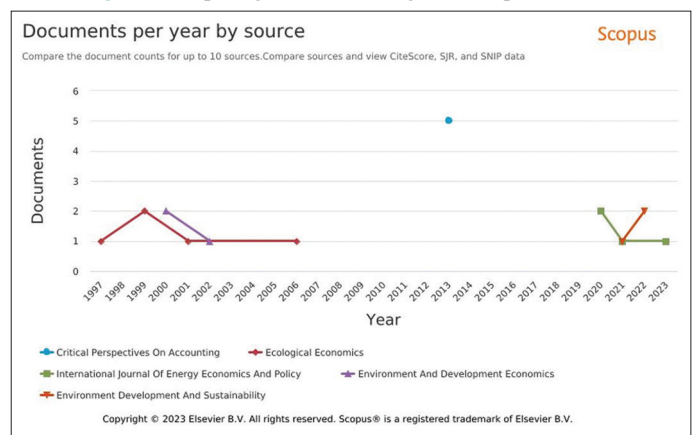
Crucial information required includes understanding the significant impact of environmental crises, where accounting is considered a contributing factor due to the lack of environmental accounting information. Green accounting emerges as an accounting solution to address these ecological crises effectively.

Figure 3: Green accounting’s subject area



Sources: Data processed (2023)

Figure 4: Top 10 green accounting channel publications



Sources: Data processed (2023)

The prominence of *Critical Perspectives on Accounting* (Cho and Patten, 2013; Thornton, 2013; Deegan, 2013; Spence et al., 2013), *Ecological Economics* (Cairns and Lasserre, 2006a; Cairns, 2001a; Turner and Tschirhart, 1999; Bartelmus, 1999a; Al-Dhaimesh, 2020a), *International Journal of Energy Economics and Policy* (Sukmadilaga et al., 2023b; Saputra et al., 2021b; Riyadh et al., 2020; Al-Dhaimesh, 2020b), *Environment and Development Economics* (Cairns, 2002a; Vincent, 2000; Cairns, 2000a), and *Environment Development and Sustainability* (Toke and Kalpande, 2022; Gonzalez and Peña-Vinces, 2022; Gonzalez and Peña-Vinces, 2022) in Green Accounting publications indicates that these journals play a vital role in disseminating research and knowledge related to green economic practices. The consistent presence of these channels signifies their established reputation and influence within the academic community, encouraging researchers to contribute their findings and insights on green accounting.

The focus on enhancing environmental management efficiency through cost-benefit analysis aligns with the growing importance of sustainability in business practices. Companies and organizations increasingly recognize the need to account for their environmental impact and integrate environmental considerations into their decision-making processes.

Furthermore, the availability of factual and relevant information from green accounting practices facilitates better stakeholder decision-making, leading to more sustainable and environmentally responsible business governance. This supports the notion that green accounting not only aids in addressing environmental crises but also contributes to long-term sustainability and responsible resource management.

The top 5 international publication channels for Green Accounting underscore the significance of this field and its relevance in driving environmental responsibility in business practices. Implementing green accounting provides valuable insights for stakeholders, aiding their efforts to minimize environmental challenges and contribute to sustainable business governance. Recognizing green accounting as a solution to ecological crises highlights its potential to shape a more environmentally conscious and sustainable future.

3.5. Comparison of Green Accounting Publications in Different Countries

The United Kingdom and the United States exhibit similarities in dominating the publications on Green Accounting from prestigious global databases, each contributing 15 articles. The next line is Indonesia, with 13 pieces, followed by Canada and China, with 11 articles each. India and Taiwan each have six articles, while Italy and Malaysia have five. Lastly, Australia has contributed three articles.

The comparable number of publications between the United Kingdom and the United States reflects their strong interest and involvement in Green Accounting research. It indicates the significance of this topic in both countries. The many publications from Indonesia, a country moving towards development,

highlight its growing environmental consciousness. Indonesian stakeholders are increasingly considering the environmental impact on the sustainability of their businesses. This is a positive trend as pollution, whether direct or indirect, can cause environmental damage, leading to imbalances and vulnerability in the environment and disrupting the lives of humans and other living creatures. Such ecological damage also affects the optimal utilization of resources for companies.

Notably, both developed and developing countries are actively contributing to Green Accounting research. This global interest signifies the growing awareness of environmental challenges and the importance of adopting sustainable practices in accounting and decision-making processes. Including countries like Indonesia in the list of top contributors indicates their efforts to align with global environmental sustainability goals and integrate environmental considerations into their business practices.

The increasing publications from developing countries like Indonesia, China, and India suggest a positive shift towards sustainable practices and recognition of the importance of accounting for environmental impacts in business operations. This aligns with the global trend of promoting environmentally responsible practices and indicates a collective effort towards addressing environmental challenges.

The analysis of Green Accounting publications from various countries reveals a diverse and widespread interest in the topic. Both developed, and developing countries actively contribute to the research and discussions on Green Accounting, reflecting a global commitment to sustainability and environmental responsibility. The growing number of publications from developing countries like Indonesia highlights their efforts to enhance ecological consciousness and incorporate sustainable practices in their business operations. This bodes well for the future as a collective effort towards addressing environmental challenges is essential for the planet's and its inhabitants' well-being.

3.6. Key Authors and Their Contributions to Green Accounting Literature

It is essential to identify the sources and authors of Green Accounting publications to facilitate further research and provide a benchmark for researchers to write and analyze. Mapping 106 Scopus publications in 2023 revealed that Cairns produced the highest number of articles, contributing to 7 that dominated the field (Cairns, 2009), (Cairns and Lasserre, 2006b), (Cairns, 2004a), (Cairns, 2004b), (Cairns, 2002b), (Cairns, 2001b), (Cairns, 2000b). Bartelmus and Markandya followed closely, each with four articles. Additionally, Aronsson, Astawa, El Serafy, Gray, Huang, Hunt, and Kim each contributed two articles, as depicted in Figure 5. Their discussions primarily revolved around the comprehensive connections of Green Accounting with Environmental Accounting, Management, and Economics. Sustainability and finance were also prominent themes that they addressed.

The dominance of Cairns as the most prolific author in the Green Accounting field suggests their significant contributions to developing and advancing this research area. Their extensive

output signifies expertise and substantial involvement in producing scholarly works related to Green Accounting.

The presence of Bartelmus (Bartelmus, 2018), (Bartelmus, 2014), (Bartelmus, 1999b), (Bartelmus, 1994) and Markandya (Markandya et al., 2005c), (Markandya et al., 2005a), (Markandya and Tamborra, 2005a) (Markandya and Tamborra, 2005b) as other significant contributors highlights their active engagement and dedication to advancing the understanding and discourse on Green Accounting. Their multiple publications consistently focus on this subject and signify their expertise in the field.

The multiple authors, each with two publications, indicate a group of researchers who have made meaningful contributions to Green Accounting literature. Aronsson (Aronsson, 1998; Aronsson and Löfgren, 1998), Astawa (Raka Sukawati et al., 2020; Astawa et al., 2018), El Serafy (El Serafy, 2006; El Serafy, 1997), Gray (Gray and Laughlin, 2012; Owen et al., 1997), Huang (Tu et al., 2015; Tu and Huang, 2015), Hunt (Markandya et al., 2005b; Markandya et al., 2005d), and Kim's (Kim and Todorovic, 2016; Kim and Todorovic, 2013) involvement demonstrates diverse perspectives and expertise within the field.

The comprehensive discussions of these authors encompassing Environmental Accounting, Management, and Economics reflect the interdisciplinary nature of Green Accounting research. This indicates the importance of integrating various disciplines to address environmental challenges and promote sustainable practices in accounting and management.

The consideration of sustainability and finance as significant themes in their discussions highlights the relevance of Green Accounting in achieving long-term sustainability goals while also emphasizing the economic implications of environmental practices.

Understanding the sources and authors of Green Accounting publications is essential for tracking the development of the field and recognizing the contributions of different researchers. The dominance of specific authors, such as Cairns, Bartelmus, and Markandya, showcases their significant role in advancing

the field. Additionally, the involvement of multiple authors with diverse perspectives indicates the collaborative effort in addressing environmental challenges through Green Accounting research. Their comprehensive discussions demonstrate the field's interdisciplinary nature, emphasizing its relevance in ecological accounting, management, and economic aspects and its connection to sustainability and finance considerations. This collective effort is vital for fostering sustainable practices and environmental responsibility in various sectors and industries.

3.7. Affiliations of Authors and Institutional Involvement in Green Accounting Research

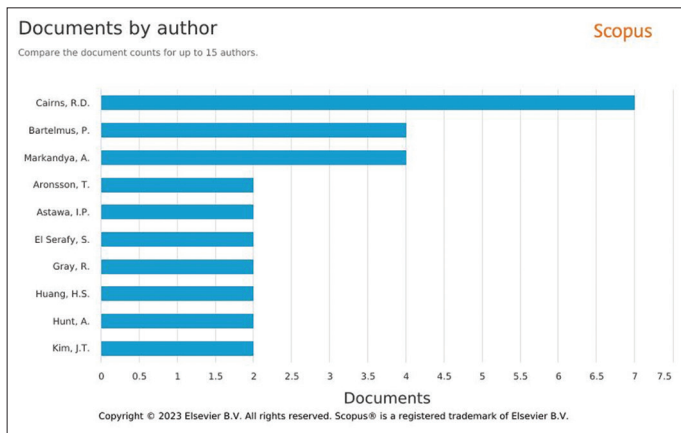
The authors of Green Accounting publications exhibit a diverse perspective in exploring this field, both in practical and academic aspects. However, generally, they publish with academic backgrounds and affiliations. For instance, Universite McGill has eight articles affiliated with it, followed by four articles each for the University of Bath and Fondazione Eni Enrico Mattei, which is an economic institute. Additionally, three papers are affiliated with Umea Universitet, the University of Belgrade, and Bina Nusantara University. The last four affiliations have two articles each, namely Kyung Hee University, Universiti Teknologi MARA, Beijing Forestry University, and National Yunlin University of Science and Technology, as presented in Figure 6.

The diverse affiliations of the authors indicate a wide range of institutional involvements in Green Accounting research. This demonstrates the field's interdisciplinary nature, involving researchers from various academic backgrounds, such as economics, environmental studies, and business management.

The high number of articles affiliated with Universite McGill suggests the significant role of this institution in contributing to the advancement of Green Accounting research. Their involvement may signify dedicated research centers or expertise in the field, leading to multiple publications.

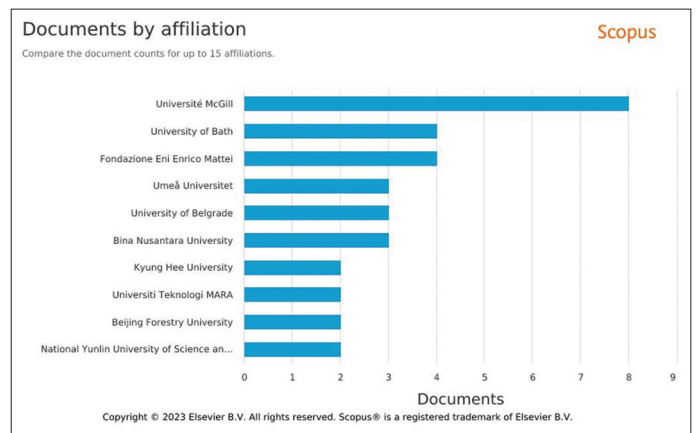
The presence of institutions like the University of Bath, University of Belgrade, and Bina Nusantara University with multiple publications highlights their active engagement in Green Accounting research. These institutions may have established

Figure 5: Top 15 authors of green accounting issues



Sources: Data processed (2023)

Figure 6: Top 15 author's affiliation of green accounting issues



Sources: Data processed (2023)

research programs or faculty members dedicated to environmental accounting and sustainability issues.

Fondazione Eni Enrico Mattei’s affiliation suggests an economic focus in their Green Accounting publications, reflecting their emphasis on the economic implications of environmental practices and accounting methods.

The presence of affiliations from different countries, such as Kyung Hee University from South Korea, Universiti Teknologi MARA from Malaysia, Beijing Forestry University from China, and National Yunlin University of Science and Technology from Taiwan, emphasizes the global interest and involvement in Green Accounting research.

The analysis of the authors’ affiliations complements the information about the countries of Green Accounting publications in Figure 7, which the United Kingdom and the United States dominate. Representing various affiliations from different countries further underscores the international importance and collaboration in advancing Green Accounting research.

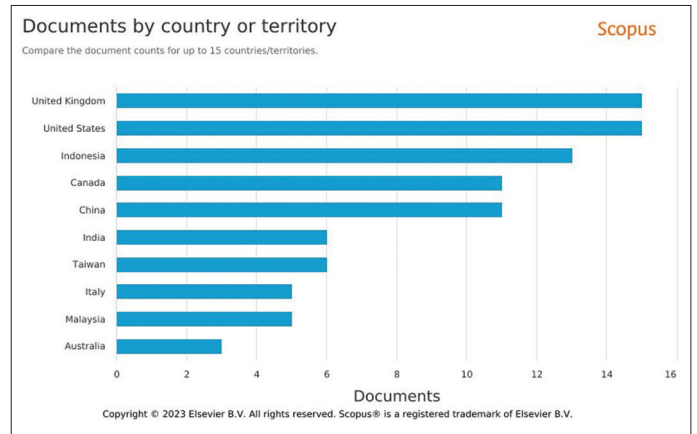
The diverse authors’ affiliations in Green Accounting publications highlight this field’s interdisciplinary and international nature. The involvement of various academic institutions from different countries signifies the collective effort to address environmental challenges through research and promoting sustainable accounting practices. The many articles affiliated with certain institutions reflect their significant contributions to the field. At the same time, multiple affiliations indicate the broad interest and engagement of researchers from various backgrounds in Green Accounting research. This collaborative effort is crucial for driving sustainability and environmental responsibility in accounting practices globally.

3.8. Themes and Concepts Explored in Green Accounting Publications

A more detailed overview of the global themes discussing Green Accounting can be seen in Figures 8 and 9 through various colored illustrations and images. The main themes include Environmental Accounting, Environmental Economics, Corporate Social Responsibility, Sustainable Development, Finance, and Economics. The concept of a Green Economy within Green Accounting is one of the global strategies related to social, economic, and environmental crises. Establishing a paradigm shift towards a green economy methodologically, conceptually, in implementation, and criticism leads to the challenges of global strategies aimed at sustainability, poverty alleviation, and inclusion of vulnerable social sectors. Therefore, the relevance to the above topics is closely intertwined, all culminating in implementing the Sustainable Development Goals (SDGs).

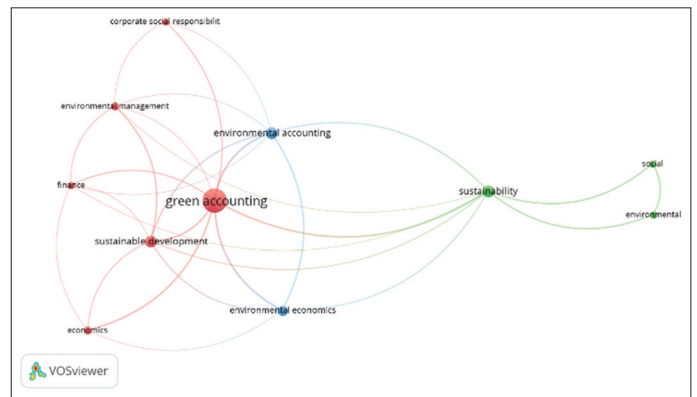
The green economy’s growth aligns with the SDGs concept, which comprises 17 crucial points of a new development agreement that advocates changes towards sustainable development based on human rights and equality to promote social, economic, and environmental development. Notably, Green Accounting will continue to be a subject of intense discussion for decades in

Figure 7: Top 10 countries of green accounting publications



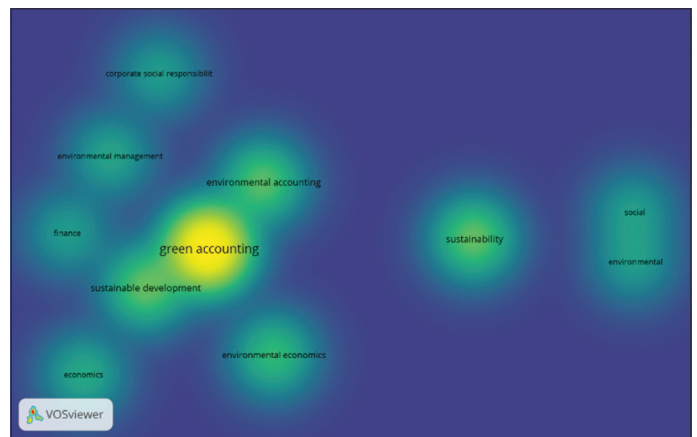
Sources: Data processed (2023)

Figure 8: Green accounting themes



Sources: Data processed (2023)

Figure 9: Green accounting themes



Sources: Data processed (2023)

implementing the four pillars of Social Development, Economic Development, Environmental Development, and Legal and Governance Development.

The results of the co-occurrence analysis of all keywords using VOSviewer have yielded three distinct clusters and a total of eleven items, as depicted in Figure 8. This outcome signifies a need for more research publications on green accounting. A mere 106 publications have been identified within the Scopus dataset.

Cluster 1, consisting of six items, encompasses the following terms: Corporate social responsibility, economics, environmental management, finance, green accounting, and sustainable development. This cluster amalgamates keywords intricately linked to corporate social responsibility, economic considerations, environmental stewardship, financial aspects, the practice of green accounting, and the pursuit of sustainable development. This confluence of terms accentuates the interconnectedness of these concepts within the sphere of sustainable accounting practices. It may indicate the significance of incorporating diverse facets for effective reporting and accounting practices that accentuate a company's environmental and social impacts.

Cluster 2, comprising three items, encompasses environmental, social, and sustainability. This cluster likely underscores the core aspects that frequently constitute the focal points of publications related to sustainable accounting. These keywords may serve as foundational pillars for analyzing sustainable accounting practices, encapsulating the measurement and reporting of environmental and social impacts.

Cluster 3, comprising two items, involves environmental accounting and economics. This cluster potentially signifies a specific focus on the accounting aspects that pertain to ecological considerations and the economics of the environment. This could encompass the evaluation of how accounting information can be employed to quantify the value and environmental impact of corporations, in addition to elucidating how economic factors influence decision-making processes within sustainability.

The co-occurrence analysis indicates that publications concerning green accounting still need to be expanded, predominantly concentrating on key clusters that mirror vital aspects of sustainable accounting. The presence of only 106 publications within the Scopus dataset suggests that the field of green accounting still harbors the untapped potential for further development and more profound research endeavors. These could explore the implications, challenges, and opportunities of integrating environmental and social aspects into corporate accounting practices.

Figure 9 presents the outcome of the VOSviewer analysis, providing insights into the density visualization of conducted research studies. The density map within the figure serves as a visual representation of the frequency of keyword occurrences within the research landscape. It operates on a color spectrum where the intensity of yellow coloring corresponds to the density of a particular keyword. Specifically, as the diameter of the largest circle containing the keyword increases in yellow intensity, it indicates a higher occurrence frequency of that keyword within the analyzed research (Al Husaeni and Nandiyanto, 2022).

In contrast, as the color shifts towards a lighter shade and eventually merges with the green background, it signifies a decrease in the keyword occurrence frequency (Al Husaeni and Nandiyanto, 2022). This visual depiction aids in identifying trends and patterns in the distribution of keywords, thereby highlighting

the prominence and scarcity of specific concepts within the realm of green accounting research.

Regarding Figure 9 itself, it reveals a noteworthy observation. While research on green accounting has gained substantial traction, there still needs to be more studies investigating closely related variables. For instance, keywords like corporate social responsibility, economics, environmental management, finance, sustainable development, environmental, social, sustainability, and environmental accounting are found within green accounting. However, despite the growing body of research, these interrelated variables have been subject to limited exploration.

This observation suggests an opportunity for further research attention to be directed toward these interconnected concepts. This can contribute to a more comprehensive understanding of how green accounting operates within the broader framework of corporate social responsibility, economic considerations, environmental management, and sustainability practices.

4. CONCLUSION

In conclusion, this research provides a comprehensive analysis of Green Accounting research, shedding light on its development, global involvement, and influences. The study's findings indicate fluctuations in Green Accounting publications over the years, driven by environmental concerns, policy shifts, funding availability, and industry involvement. Dominant article types focus on interdisciplinary green economic engagement, while subject areas span economics, environmental issues, and social sciences. Top international channels for dissemination, key authors have significantly advanced the field, and institutions that play a vital role in Green Accounting research. The themes explored align with sustainable development goals and emphasize environmental accounting, economics, corporate social responsibility, and more. Exploring themes and concepts in Green Accounting publications highlights its multidimensional nature and intersection with various fields. The main themes include Environmental Accounting, Environmental Economics, Corporate Social Responsibility, Sustainable Development, Finance, and Economics. The concept of a Green Economy within Green Accounting aligns with global strategies for sustainability, poverty alleviation, and social inclusion, ultimately contributing to the Sustainable Development Goals. The co-occurrence analysis demonstrates the interconnectedness of these concepts and suggests the need for further research in specific clusters.

This study has certain limitations. The bibliometric analysis might only encompass some available publications, as it relies on data from specific databases. Additionally, the analysis is limited to the scope of the selected tools and databases. The results might not capture research published in other languages or non-indexed sources.

The implications of this study highlight the need for ongoing research to address ecological challenges through Green Accounting. The insights into trends, subject areas, and global engagement can guide stakeholders and policymakers

in formulating environmentally sustainable strategies. The collaborative efforts among authors and affiliations underscore the interdisciplinary and international nature of the field.

The findings emphasize the significance of addressing environmental and social impacts in accounting practices and decision-making. The interconnectedness of concepts underscores the need for holistic approaches in sustainable accounting practices. The alignment with Sustainable Development Goals highlights the role of Green Accounting in achieving global sustainability objectives.

For future research, several key areas could be explored in Green Accounting. Firstly, a deeper investigation into the underlying reasons for the fluctuations in Green Accounting publications, including factors like policy shifts and funding availability, would provide a more nuanced understanding of the field's dynamics. Moreover, there is a need to examine the practical application of Green Accounting principles across different industries and geographic regions, shedding light on both the challenges faced and the benefits gained. Comparative studies encompassing various countries or industries would offer valuable insights into the efficacy and adaptability of Green Accounting practices in diverse settings.

Future research should also focus on the clusters that emerged as less explored in the co-occurrence analysis. By delving into the intricate interrelationships among concepts such as corporate social responsibility, economics, environmental management, finance, sustainable development, and related variables, a more holistic comprehension of their implications for Green Accounting can be attained. This exploration could contribute to theoretical advancement and practical implementation within the field.

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