

Green Accounting, Environmental Accounting, and Sustainability: A Current and Future Opportunity

Khomsiyah*, Juniati Gunawan, Yuana Jatu Nilawati

FEB-Universitas Trisakti, Jakarta Indonesia
Jl. Kyai Tapa No.1, Grogol petamburan, Jakarta, 11440, Indonesia

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✉ Corresponding Author:

*Name: Khomsiah

Tel./Fax. No.

E-mail: khomsiyah@trisakti.ac.id

Abstract

Green Accounting, Environmental Accounting, and Sustainability (GAEAS) play an essential role in environmental issues. Limited studies in the field of GAEAS are challenging for accountants. Therefore, current and future opportunities are essential to be explored. The purpose of this search is to describe or present the green accounting response to the development of accounting, business and management science. The primary research method for this research is Bibliometric analysis using Scopus sources in the 1976-2022 publications. After screening based on GAEAS keywords, and the field of accounting, business, economic, and social science, there are 312 publications analysed. The results show that publications related to GAEAS have increased rapidly since 2016. The most productive journals, countries, institutions, and authors are Accounting, Auditing, and Accountability Journal, Victoria University of Wellington, and Jann Bebbington. Many studies related to GAEAS have been carried out in continental Europe such as the United Kingdom, New Zealand, Italy, Spain, France, and Germany. Research related to GAEAS in Asia is still very rare and needs to be explored more. The keywords that appear the most are environmental accounting, social and environmental accounting, sustainability, and legitimacy theory. Compared to the environmental field, research related to GAEAS is still very little in many such as IFRS, SASB, and GRI. Finally, suggestions on how to further promote the development of this research area were raised.

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1. Introduction

The popularity of social and environmental accounting has increased since the early 1990s. For more than ten years, researchers have examined how accountants may help advance information management techniques and approaches to sustainability management (Marrone et al., 2020; Sayyadi et al., 2020). Previous social accounting research provided an ethical and business basis for accountants to engage in social accounting. Previous empirical research discovered differences between accountants and those working in environmental and sustainability management, leading to the conclusion that accountants are

either not involved in or solely work on sustainability issues (Ascani et al., 2021; Lai & Stacchez-zini, 2021). However, more recent research on accountants' participation and role in social accounting is scarce (Scarpellini et al., 2020). Even though the potential benefits of adopting and implementing social accounting are acknowledged, the function of accountants in contemporary company practice remains understudied empirically.

It is necessary to increase awareness of the significance of potential difficulties, such as Green Accounting, Environmental Accounting, and Sustainability (GAEAS). Environmental challenges require accounting to identify procedures, docu-

ment them, and follow up on them in an organized manner. With the increasing priority of Environmental Accounting (EA), investors and consumers are increasingly seeking information about their business's social and environmental performance (Taqi et al., 2021; Tregidga & Laine, 2022).

Limited studies in accounting exploring the importance of green accounting (GA), environmental accounting (EA), and sustainability have been another challenge for accountants. Existing studies have been carried out in various fields, but the picture of how accounting stands is still vague. Accounting is still in the 'old paradigm' which refers to finance only, while broader needs are needed, including GA, EA, and sustainability. The three terms can be interchanged and related. This study explores the bibliography of GA, EA, and sustainability to enhance the accounting literature and provide useful insights for future studies. included to discuss the useful analysis for further study.

More specifically, the main purpose of this search is to describe or present the green accounting response to the development of accounting, business and management science. Specifically, this search presents 1) Responses from accounting, business and management science to provide research in the field of green accounting, environmental accounting and sustainability researched for 46 years; 2) Exploration results from journal publications in the fields of green accounting, environmental accounting and sustainability; 3) The most cited articles in the field of green accounting, environmental accounting and sustainability; 4) The most prolific writers in the fields of green accounting, environmental accounting and sustainability; 5) The most cited authors in the fields of green accounting, environmental accounting and sustainability; 6) The institution that conducts the most research in the field of green accounting, environmental accounting and sustainability; 7) Countries that publish the most articles on green accounting, environmental accounting and sustainability; 8) The keywords are the most frequently used by the authors for researchers in the fields of green accounting, environmental accounting and sustainability.

2. Data and Methods

This study conducted a literature analysis aided by machine learning to identify studies in

environmental accounting that benefited from several contributions from accounting and non-accounting disciplines. The literature study follows new environmental accounting topics and trends inside and beyond the accounting discipline. This process is called bibliometric analysis. Bibliometric analysis is used to identify trends in research publications that discuss green accounting, environmental accounting, and sustainability which are relatively limited but are topics of great interest (Fregonara et al., 2017; Schaltegger et al., 2013). We chose the Scopus database because of its comprehensive coverage and indexing of important journals (Liedong et al., 2020).

The main steps in this research are prism diagrams with a systematic review by identifying what databases will be taken by reading related references and screening according to research keywords and subject areas. After the data is taken, the accuracy of the selected data is ensured and the incoming data follows the required quality and quantity. A literature review was developed covering the selection of study criteria according to the scientific background of the researcher (Donthu et al., 2021; van Eck & Waltman, 2010).

Data search started on August 12, 2022, with the first keyword "Green Accounting" OR "Environmental Accounting" with Search within, we take "Article title, Abstract, Keyword" obtained 1,643 documents. Next, we search for documents related to "Accounting" OR "economic" OR "business" OR "Sustainability" OR "Sustainable" with Search within "Source title". We obtained 577 documents. For this study, we focus on English-language journals, we found that there were 2 wasted documents, bringing the total to 575. Finally, this study derived an article that had a subject area of "business, management and accounting" and a document type of "article" so that the final data we took was 312 data articles. For the period of publication of the article, we decided to select 1976 to 2022, based on the understanding that 1976 was the starting momentum for environmental accounting (Ullmann, 1976) and 2022 is the latest period.

After that, a bibliometric analysis and comprehensive review were conducted on the final set of 312 papers. The tool used in this study is VOS Viewer Version 1.6.17. This program purposes to create and view bibliometric maps, this program provides results to produce a graphical representation of bibliometric maps (Abdullah & Naved

Khan, 2021). To eliminate bias from keywords, researchers used a tool called Open Refine Version 3.5.1. This tool has a function for cleaning data from similar data so that the data we will process is good and quality (Oni et al., 2019). In presenting the data, the researcher also uses a tableau. Tableau software is used to visualize data used in the industry to analyse data (Batt et al., 2020).

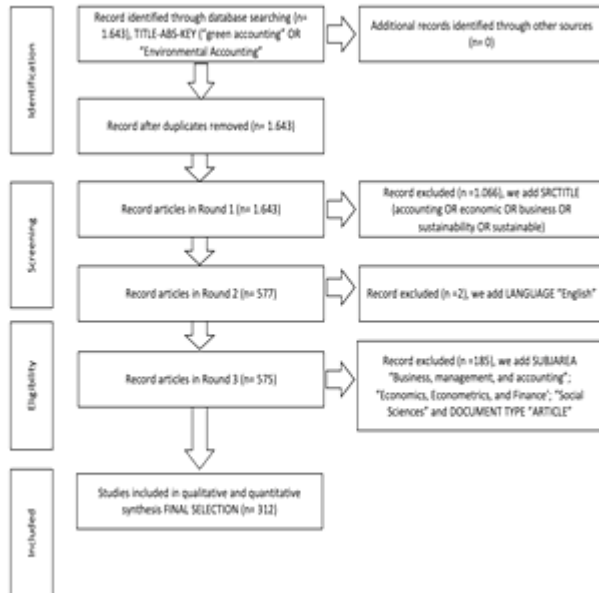


Figure 1. Step of methods

The objective of science mapping is to illustrate the structural and dynamic structure of knowledge in the research domain. Previous research has advised the use of many indicators to overcome the limitations of one synthetic indicator (Laengle et al., 2021; Radha & Arumugam, 2021). We use co-citation, bibliographic coupling, and keyword co-occurrence for our analysis. We can look into instances where two articles are cited separately by one or more using co-citation analysis. In contrast, a bibliographical merger happens when two articles cite a third, suggesting that they might cover the same topics (Arifin et al., 2021). The co-occurrence keyword analysis employed the author-provided keywords to look into the field's conceptual framework. The resulting graph depicts a network of elements as a series of circles, with the size of the circles varying depending on the significance of the elements. The network connections in contrast show the proximity of the links between the elements. Items are grouped using the spatial placement of the circles and various colour schemes.

3. Bibliometric Analysis Results

Bibliometric study has shown how accounting scholars have contributed significantly to current discussions of the SDGs and other environmental/green accounting issues, offering insightful analysis for policy debates on these topics (Ekundayo & Odhigu, 2020; Tregidga & Laine, 2022).

Publication Indicator

The results demonstrate how rapidly academic interest in the topic increased throughout the 2013 year (Figure 1). Specifically, the data demonstrates that since 2013, the number of scholarly articles published on green accounting, environmental accounting, and sustainability (GAEAS) has increased annually. This field's exponential expansion reflects a growing dispute within accounting studies regarding GAEAS.

Previously, in 1976, the first research with the theme of green accounting was entitled "The corporate environmental accounting system: A management tool for fighting environmental degradation", (Ullmann, 1976). From 1976-1991 there was no research related to green accounting at all. In 1992 there was immediately research that was re-examined by the journal *Accounting, Organizations and Society*, 3 articles were issued from the UK, Netherland and Canada and 1 article was removed from Germany by researcher Bartelmus (1992).

From 2016 to 2017, the number of articles published in the GAEAS study field increased sharply by 23. This article has been published 25 times in 2022, the most of any year. In addition, the Government's initiative is the main driver for the increase in various research in the GAEAS field (Munton & Collins, 1998; Zhang et al., 2021).

Leading Journal

Of the 415 journals cited, each of the 25 journals received more than 20 citations. In line with the need for a lot of exploration in the field of GAEAS considering that this area is still relatively new, it can be seen that the journals that accommodate a lot of GAEAS research are journals that accommodate qualitative research. As shown in Table 1, the *Journal of Accounting, auditing, and accountability journal (AAA)* published the most articles in the GAEAS field, name-

ly 44 manuscripts, with 3127 citations, followed by the journal *Critical Perspective on Accounting*. These two leading journals (having reputable indexes) received many articles with new topics in the accounting field with in-depth discussions. Other journals (top 5) also show the same thing.

Table 1. Leading Journal

No	Journal	Doc	Citation
1	Accounting Auditing and Accountability Journal	44	3,127
2	Critical Perspectives on Accounting Sustainability Accounting Management and Policy Journal	41	2,532
3	Sustainability Switzerland	21	380
4	Accounting Forum	21	150
5	Journal of Environmental Accounting and Management	20	1,074
6	Business Strategy and The Environment	18	146
7	Accounting Organizations and Society	15	823
8	Journal of Business Ethics	12	2,852
9	Accounting Education	10	760
10		9	273

Productive authors

Table 2 shows Productive Authors. Bebbington dan Dennis M. Patten receive the most citations for their published publications, with 1412 and 1354, respectively. Bebbington and Patten present numerous perspectives on novel accounting and business concepts and arguments for previously studied theories, especially legitimacy and stakeholder theory.

Country Analysis

Empirical evidence that authors, educational institutions, journal publications, and citations in the field of GAEAS stems from the high attention paid by most European countries Table 3. The UK is ranked first in conducting a lot of research in GAEAS, followed by Australia and United States. These findings are relevant to the fact that Europe is considered as a central country which lead and put high concerns These findings are relevant to the fact that Europe is considered as a central country which lead and put high concerns.

Most Cited Articles

Since 2002, over two decades ago, Cho et al. (2007) most referenced articles have gotten the most citations (Table 4). In accordance with the

growth of the topic of GAEAS at the beginning of the twenty-first century, other scholars often cite this research. In addition, Cho's research presents numerous concepts that are highly relevant and valuable for the development of future research, including the disclosure of environmental aspects in financial statement.

Table 2. Productive Authors

No	Author	Document	Citations
1	Bebbington J.	9	1,412
2	Lehman G.	9	444
3	Brown J.	8	894
4	Cho C.H	8	1,343
5	Thomson I	8	599
6	Dillard J	7	480
7	Gray R	6	1,107
8	Patten D.M	6	1,354
9	Robert R.W	6	570
10	Freedman M	5	570

Table 3 Country Analysis

No	Country	Doc	Citation
1	United Kingdom	86	5,690
2	Australia	55	3,496
3	United States	53	2,294
4	New Zealand	30	2,226
5	Italy	27	820
6	Spain	19	1,564
7	Canada	18	1,529
8	France	17	679
9	Germany	11	804
10	Netherlands	10	968

Table 4. Cited articles

Author and Year	Citation
Cho & Patten (2007)	925
R. Gray (2010)	604
Parker (2005)	446
Kolk & Perego (2010)	373
de Villiers & van Staden (2006)	333
Moneva et al. (2006)	328
Bebbington & Unerman (2018)	304
Owen (2008)	277
Muller et al. (2011)	274
Tukker et al. (2013)	272

Productive and Influential Institutions

Table 5 shows that the most articles in the GAEAS field are from the UK, followed by US, and Australia. Up to the top 5 universities that publish a lot of GAEAS articles are still in Europe. Macquarie University in Sydney also seems to be actively publishing GAEAS articles in line with the direction of research that is being carried out in Europe. According to GAEAS research comes from Europe and the science of sustainability ac-

counting is also advancing rapidly in Commonwealth countries, including Australia (Blomqvist et al., 2016; Krockenberger et al., 2000).

From the existing keywords, it appears that the GAEAS area of accounting is very diverse so that the interrelationships between sciences are also a challenge and opportunity for researchers. Likewise, research areas are increasingly cross boundaries, both in the fields of accounting, business, management, even to the environment and socio-politics (Blomqvist et al., 2016; Lee' et al., 2020). The most common keywords are environmental accounting, sustainability, environmental economics, sustainability reporting, sustainable development, and social. The co-occurrence between these terms is provided through a network diagram and keyword density to round out the

results of the keyword analysis. This analysis reveals the six clusters into which the GAEAS study is divided (Table 6).

Table 5 Productive and Influential Institutions

No	University	Doc.
1	Victoria University of Wellington	16
2	University of South Australia	16
3	University of Central Florida	14
4	University of Dundee	12
5	University of St Andrews	11
6	The Australian National University	9
7	Macquarie University	9
8	Sheffield University Management School	9
9	The University of Sheffield	8
10	RMIT University	8

Table 6. Keyword Clustering

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
Accountability	Carbon emission	Corporate social responsibility	Ecological economics	Corporate governance	Environmental
Accounting	Corporate strategy	Environmental economic	Ecosystem services	Decision making	Public interest
Climate change	Developing world	Environmental impact assessment	Green accounting	Environmental accounting	Social
Disclosure	Environmental assessment	Environmental management	Green economy	Natural resources	Sustainability
environment	Environmental disclosure	European union	Natural capital	Social accounting	
Environment reporting	Environmental legislation	Innovation	Sustainable development	Sustainability accounting	
Financial reporting	Environmental performance	Life cycle analysis			
Institutional theory	Environmental policy	Life cycle assessment			
legitimacy	Performance assessment				
Legitimacy theory	Policy making				
Social and environmental accounting					

4. Discussion

Publication Indicator

GAEAS provides corporate management and governmental authorities with a comprehensive framework for assessing the annual environmental effects of a company's routine business activities. As a tool to limit the impact of an economy on the physical environment, it contributes to a higher quality of life. The increasing trend

every year occurs in line with the increasing demands from stakeholders for GAEAS disclosure. This pressure is especially true for large, multinational, or companies with high environmental risks (Riyadh et al., 2020; Rounaghi, 2019; Ulupui et al., 2020). The increasing pressure from stakeholders in the company causes more and more demands to conduct research in this area, especially empirical and qualitative exploratory research (Chamorro Gonzalez & Herrera Mendoza,

2021; Iskandar et al., 2021; Wahyuni et al., 2019). According to Iskandar et al. (2021), research in the field of business and accounting will grow following the conditions in the business itself.

Leading Journal

When multiple articles reference the same source, co-citation analysis is performed. This statistic is interpreted as evidence that the co-cited publications include information that is closely connected. This section includes an examination of journal, article, and author co-citations.

Productive authors

The analysis is carried out using a limit where the number of documents from each author is 3 and the minimum number of citations is 10. Based on the results of the analysis, there are 223 authors who meet the criteria. Table 3 shows the most prolific authors in the GAEAS field. Jan Bebbington has consistently written many articles throughout the year 2000-2021 with 9 publications followed by Glen Lehman, with 9 articles. These two researchers provide many insights in the world of accounting, especially in providing new views on the relationship between environmental and social aspects and their impact on the world of accounting. This view has changed many paradigms along with the increasing environmental, social, and governance (ESG) risks and the importance of maintaining business sustainability, so that sustainable business has been a 'new' term to replace 'business as usual' (Beckmann et al., 2014; Ziolo et al., 2019).

Country Analysis

The GAEAS topics widely researched by the Chinese state are green accounting, corporate social responsibility (CSR), and environmental disclosure. This difference occurs because of environmental situations, both natural and social needs, including different ways of education in each country. These studies have analyzed controversial aspects of the GAEAS topic in several countries. Research related to GAEAS in Asia needs to be improved. According to Dutta et al. (2020), the culture of each country is different and this will lead to differences in education, including research conducted because the research results are expected to be useful for business development and the welfare of society at large. . These findings are relevant to the fact that Europe is considered as a central country which lead and put high

concerns in environment and therefore, many GAEAS studies come from this continent (la Notte et al., 2017; Serrano et al., 2016). mostly about environmental accounting, while in America, researchers mostly take sustainability topics.

Most Cited Articles

This concept was further discussed by Gray R. in 2010 and received 604 citations, followed by who began to discuss more specifically the area of sustainability and sustainable development. Previously, Parker (2005) also suggested a new phenomenon in the accounting field, namely by Laufer (2003) conveying 'beyond' traditional accounting, shifting to social and environmental accounting. Followed by (Owen, 2008), this study was widely cited by other researchers and used as the basis for developing the GAEAS area. Even though the research area has a relatively small number of eminent authors, they frequently engage and inspire co-authors (the PhD student) to participate to GAEAS research.

Based on the analysis of the top 10 cited articles, most of the papers are still qualitative. The most widely used research methods qualitatively are content analysis and exploratory. The literature review method is also widely used. Literature review can be understood as content analysis, where qualitative and quantitative aspects are mixed to assess structural (descriptive) as well as content analysis (Perrotti & Stremke, 2020; Toxopeus & Polzin, 2021). Research related to qualitative uses a lot of environmental values. Currently, green accounting/environmental accounting has been developed mainly in developing and developed countries.

Productive and Influential Institutions

Table 5 shows that can be said that universities in the European region have taken up the field of GAEAS a lot because this science really emerged and was introduced by (Bebbington et al., 2014; Deegan, 2013) in Europe. In line with the development of universities in Europe, educational institutions in Australia have also shown rapid progress in the field of GAEAS. These writers built a research centre in the field of GAEAS and held many international conferences to develop knowledge in the field of GAEAS.

Keyword Analysis

One of the most frequently mentioned theories in the subject of social and environmental

accounting is legitimacy theory. Legitimacy theory is a method of business management that emphasizes siding with the public, the government, private citizens, and community organizations (Gray et al, 1996). This indicates the existence of a social contract between the company and the community and the existence of social and environmental disclosures. Companies running a social contract must adapt to the prevailing values and norms in order to run in harmony. The foundation of the legitimacy theory is the existence of social contact between a community and an institution, which necessitates an aim for the institution that is consistent with societal values. This theory holds that an institution's actions must involve behaviours and output that are regarded favourably by the general public.

5. Conclusion And Suggestion

Conclusin

With rapid economic development and increasing climate change, it is critical to assess sustainability and environmental governance. The concept of Green Accounting, Environmental Accounting, and Sustainability (GAEAS), is needed to follow up on environmental issues. Under these circumstances, this paper adopts bibliometric analysis to analyze the academic features of English publications indexed by Scopus during 1976-2022. The results show that research in this field is gradually increasing due to increasing attention to environmental issues, especially in 2016-2017. The most productive journal is the Accounting Auditing and Accountability Journal with 45 articles and 2822 citations. Meanwhile, the most productive author is Bebbington J with a total of 9 documents and 1412 citations. In addition, most of the article contributors come from Europe (United Kingdom, New Zealand, Italy, Spain, France, Germany, Netherlands) and Australia. Similar to institutions, Victoria University of Wellington and University of South Australia contributed 16 research documents. According to keyword analysis, words such as environmental accounting, sustainability, and legitimacy theory were the most widely used. Finally, this study finds that theories such as political theory and stakeholder theory can have an influence on the GAEAS study. Articles in the GAEAS field are also mostly analysed using qualitative methods.

There is a need for an overview of the indicators used and a review of the reported results and experiences. Content analysis is usually done by giving scoring, calculating costs, and company value.

Suggestions

The suggestion of the observed results reveal that there is an urgent need for scholars to contribute to the development and intensity of research in environmental accounting research clusters so as to enhance the fulfilment of sustainable development goals and literature development for this emerging field of knowledge. On the other hand, accounting field seems need to be improved and revised in accordance with the development of environmental and social aspects, including sustainable finance, climate change finance related, environment and social accounting and auditing, waste accounting, or water accounting.

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