

ENVIRONMENTAL PERFORMANCE IN ACCOUNTING LITERATURE: A BIBLIOMETRIC APPROACH

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Abstract: One of the factors that cause environmental performance articles is debated because many researchers generate different results. This study aims to map research topics, identify keyword definitions, theory, methodology, and research settings, and give the agenda for further research. This research is a bibliometric analysis design. A total of 55 articles use from 1996-2020. The fifth stage of bibliometric analysis is defining keywords, initial search results, refining search results, compiling initial data, and analysing data. It raised 3 clusters VOSviewer, the red, green, and blue clusters. The results show that the main point on the VOSviewer map is environmental performance (research topic) in the red zone cluster one. Define environmental performance as the results of the organization in managing its environmental impact. The theoretical point of view, the theory of legitimacy and stakeholder, has been used to explain this phenomenon. This study identifies the predominance of quantitative approaches to environmental performance and finds the most typical subjects are the United States and developed countries. The articles reviewed were mainly carried out in developed countries (60%) and to a lesser extent in developing countries (40%), mainly Asian countries such as Indonesia, Malaysia, and China.

Keywords: Bibliometric analysis, decision-making, environmental performance, mapping, VOSviewer

Abstrak: Salah satu faktor yang menyebabkan artikel kinerja lingkungan terdapat pro dan kontra dikarenakan banyak peneliti yang menghasilkan hasil yang beragam. Penelitian ini memiliki tujuan memetakan topik penelitian, mengidentifikasi variasi penelitian dalam hal definisi kata kunci, teori, metodologi dan pengaturan penelitian, serta memberikan agenda penelitian kedepannya. Penelitian ini merupakan penelitian survei yang bersifat deskriptif kuantitatif dengan desain analisis bibliometrika. Sebanyak 55 artikel digunakan dari tahun 1996-2020. Terdapat tahapan analisis bibliometrika yaitu, mendefinisikan kata kunci, hasil pencarian awal, menyempurnakan hasil pencarian, menyusun data awal, dan menganalisis data. Terdapat 3 kluster yang dimunculkan oleh VOSviewer; kluster merah, hijau, dan biru. Hasil penelitian menunjukkan bahwa titik utama pada peta VOSviewer adalah kinerja lingkungan (topik penelitian) yang berada pada kluster satu zona merah. Kinerja lingkungan didefinisikan sebagai hasil organisasi (perusahaan) dalam pengelolaan dampak lingkungannya. Dari sudut pandang teoritis, teori dibidang ekonomi yaitu teori legitimasi dan stakeholder telah digunakan untuk menjelaskan fenomena tersebut. Penelitian ini mengidentifikasi dominasi dari pendekatan kuantitatif pada kinerja lingkungan dan menemukan bahwa subyek yang paling khas adalah Amerika Serikat dan negara-negara maju. Artikel yang ditinjau khususnya dilakukan di negara-negara maju (60%) dan bagian yang lebih kecil di negara-negara berkembang (40%), khususnya negara-negara Asia seperti, Indonesia, Malaysia, dan Cina.

Kata kunci: Analisis bibliometrik, kinerja lingkungan, pemetaan, pengambilan keputusan, VOSviewer

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INTRODUCTION

Accounting science only provides information about a company's activities. Nevertheless, accounting science is currently becoming more important for its environment. According to Alfitman et al. (2019), bibliometric analysis refers to any activities related to the technical use of supporting software presented in a structured and sequential manner in the form of figures and tables. Since 1997, the Ministry of Environment has organized the Company Performance Rating Program in Environmental Management (PROPER) for environmental impact control. In PROPER, a company's environmental performance can be measured by five colors: gold (best), green, blue, red, and black (worst). Based on the latest ranking data in Indonesia in 2018-2019, out of 2045 companies, only 26 companies received the gold color, 174 companies received the green color, 1507 companies received the blue color, 303 companies received the red color, and two companies received the black color. Meanwhile, 13 companies were not announced, and 20 companies were not operating.

In terms of environmental pollution, the awareness of manufacturing industry companies has increased to seek efforts to overcome and provide solutions to environmental problems. The company is aware that operational activities can harm society and the environment, such as pollution, garbage, noise, smells, etc. Accounting plays a critical role in managing a good relationship between the environment and the company (Bebbington, 2001). Many of the world's industrial and service companies have implemented environmental accounting. These aim to increase the efficiency of environmental management by assessing environmental activities from the point of view of economic benefits and environmental costs. The application of environmental accounting to companies is necessary to work safely and not harm the community and the surrounding environment.

Utomo et al. (2020) state that environmental performance has a positive effect on firm value. Additionally, environmental performance has a positive effect on environmental disclosure. However, they find that environmental disclosure has no impact on company value. On the other hand, Lu & Taylor (2018) show that there are no stakeholder

expectations related to environmental performance or environmental disclosure. Stakeholders may have pointless expectations with regards to environmental disclosure. Thus, it is concluded that the internal stakeholder group does not significantly affect the company's environmental information disclosure. Based on research results that have been debated in relation to this research topic, this study is interested in examining how bibliometric studies on environmental performance articles relate to research topics that have been discussed on environmental performance, based on research variations and agendas for future research. The research purposes are to map the research topic as discussed by environmental performance researchers, identify variations in terms of definition, theory, methodology and research setting, and provide suggestions for further research. Several studies have taken different approaches regarding environmental performance using either qualitative, quantitative or mixed-method approaches. When using a quantitative approach, the increasing number of studies conducted on environmental performance, environmental disclosure, and firm value can increase the likelihood of variations in research conclusions or interpretations. Studies on the same topic often present conflicting results, creating problems when trying to use them as a basis for decision-making or constructing a comprehensive theory.

The novelty of this study lies in its comprehensive bibliometric analysis of research on environmental performance. It provides a systematic overview of the research topic, including keyword definitions, theoretical frameworks, research methodology, and geographical settings. The study's identification of three clusters on the VOSviewer map adds to its originality and contributes to identifying potential areas for future research. One of the expected key findings is the predominance of the environmental performance research topic in the red cluster, which is defined as the results of the organization in managing its environmental impact. The study also highlights the use of the theory of legitimacy and stakeholder as a theoretical perspective to explain this phenomenon. Furthermore, the results showed the prevalence of quantitative approaches to environmental performance research, and the dominance of USA and developed countries, which indicates the need for more investigation into different geographical settings.

METHODS

Bibliometric research is the type of research used in this study. The type of bibliometric analysis used is descriptive in nature, presenting an analysis of publications from scientific research in international electronic journals related to environmental performance (Nur et al. 2020). Bibliometric analysis can be utilized by various groups interested in literature studies, such as researchers, lecturers, students, doctors, journalists, educators, and writers, to increase the efficiency and effectiveness of their work. Accessing various forms and types of available data can be easily done through information technology systems, with Google Scholar being an example of an extensive database that can be accessed free of charge.

As with other literature study approaches such as meta-analysis and systemic review studies, bibliometric analysis with the help of software such as PoP, Mendeley, and VOSviewer allows researchers to gain insights about research topics that are being widely researched and topics that are still lacking attention from researchers. By using these three applications, researchers can efficiently perform various activities related to literature studies. Adequate literature studies can create a strong foundation for scientific development. The results of literature studies, according to Hult et al. (2004), can facilitate theory development, conclude research topics, and uncover required research topics, serving to obtain research gaps, both empirical,

theoretical, and methodological. Research gaps later lead to determining the topic or research problem.

Through bibliometric analysis, researchers can benefit from (1) identifying journals that are most dedicated to a research theme (Brookes, 1969), (2) identifying the most productive writers on the theme (Pritchard, 1969), (3) identifying the most cited research studies and key themes from these studies (Pritchard, 1969), and (4) producing scientific knowledge as production indicators. Bibliometric studies complement expert opinions and offer information in the field under study, as studies focusing on bibliometric analysis provide an overall view of research topics. Based on the disclosure theory, companies that perform excellent environmental performance are more likely to have good disclosure, and similarly, companies with good environmental performance are more likely to outperform in environmental disclosures (Zhang et al. 2019). Utomo et al. (2020) found that environmental performance positively affects firm value and environmental disclosure, while environmental disclosure does not affect firm value. A literature study with bibliometric analysis was conducted to map research topics and identify variations in the research obtained on environmental performance. By conducting a literature study using bibliometric analysis, researchers can map various studies regarding environmental performance and identify definitions, theories, methodologies, research settings, and future research agendas, as shown in the framework diagram in Figure 1.

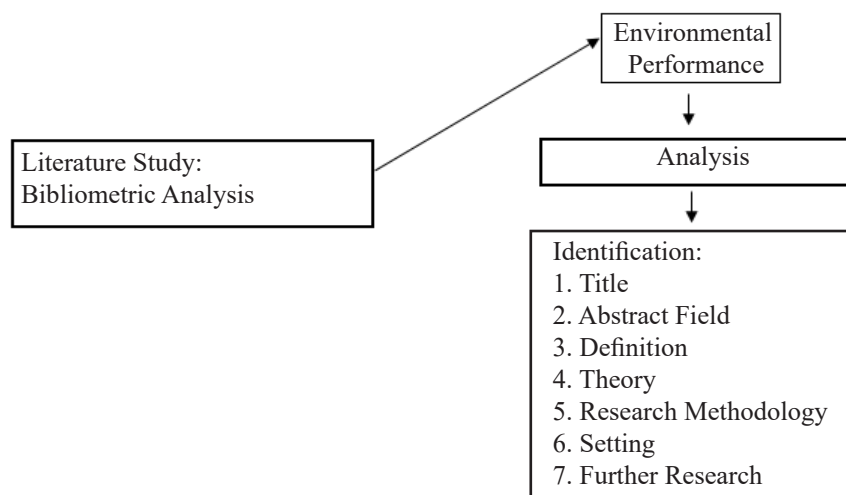


Figure 1. Framework diagram

The framework diagram used in this paper was developed through a literature review and a bibliometric analysis focused on the research topic of environmental performance. The analysis employed three tools, namely Publish or Perish (PoP), Mendeley, and VOSviewer, to identify the relevant literature, map the research topic, and explore its definition, theory, research methodology, and setting. Based on the analysis and identification, the researchers suggested further research directions. This study employed a bibliometric analysis design and collected data through a literature review of relevant journals. The type of data used was secondary data. The data analysis method used a bibliometric analysis approach, which comprised several steps, as illustrated in Figure 2.

In defining keywords, the research used the keyword “Environmental Performance.” PoP software with

the Environmental Performance database is used to collect data. Initially, researchers entered queries into the PoP software using the keywords “Environmental Performance” with special provisions for “journal,” “title word,” and year “0-0.” Researchers excluded newspapers, books, book reviews, and book chapters. From the Environmental Performance database, researchers obtained 500 articles in the initial search for the period from 1980-2021.

In examining the initial search results, the researcher found that the initial search did not specify a range of years to determine when the terms were relevant. The old journal (from 1999) the researchers found using the critical term “environmental performance” turned out to be irrelevant. Only ten articles that met the criteria are shown in Table 1. The oldest article (not listed) published in 1996 met the criteria.

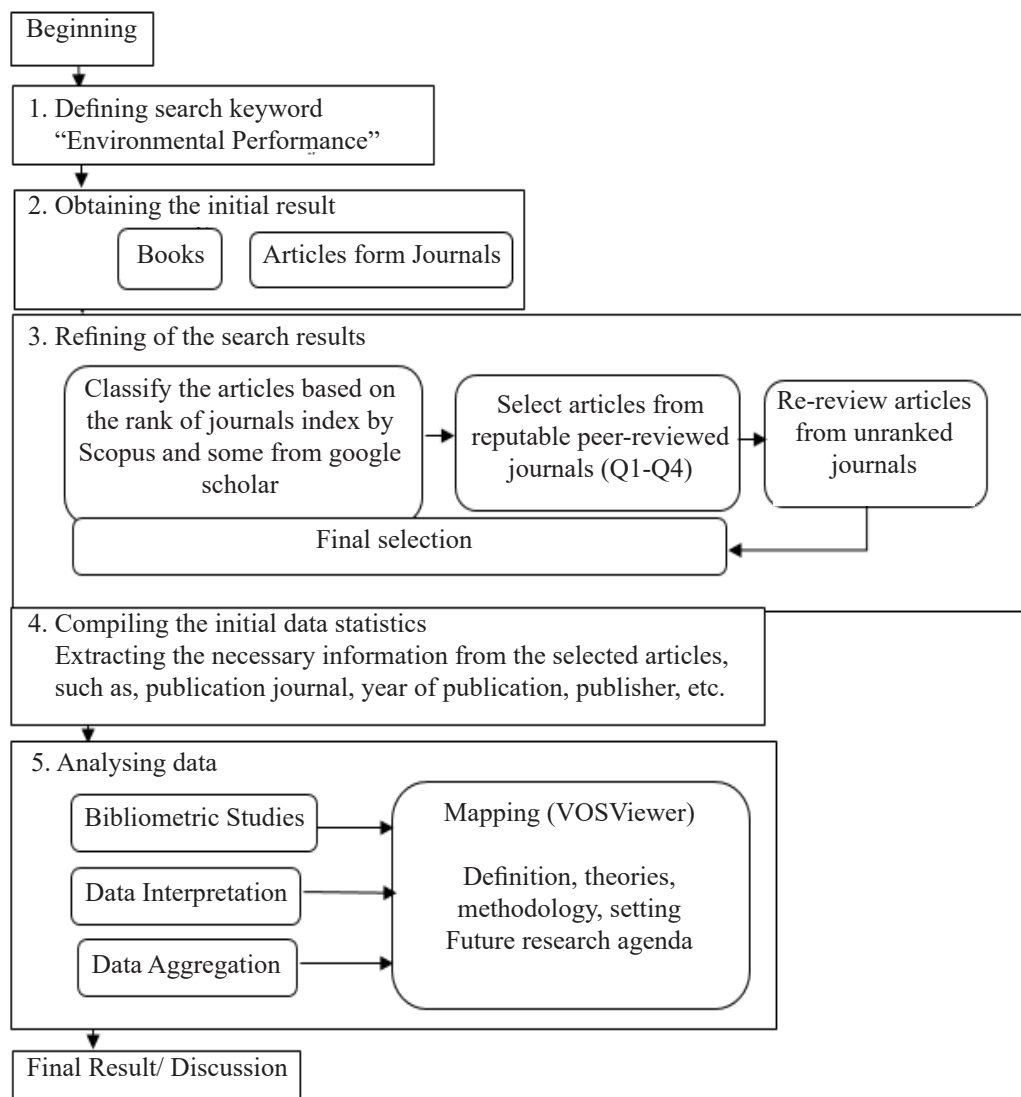


Figure 2. Bibliometric analysis process

In refining search results, the researcher excluded articles that did not fit the screening criteria. Table 2 showed the results of this screen. In compiling the initial data, the search is generated after the fix has been downloaded, and is then saved in Mendeley software before being exported to RIS format. This RIS format includes all critical information related to the article, such as the title, author name, abstract, keywords, and journal specifications (journal publication, year published, volume, issues, and pages). The data is then analysed so that articles can be classified by year and source of publication, as well as by publisher. From the queries using the maximum timeframe, PoP obtained 500 journal articles from 1980 to 2021. After verification, the diversity of journal publications was found to have a good reputation and were filtered by predetermined criteria.

This study provides a bibliometric analysis of the term “Environmental Performance.” A bibliometric review was conducted using PoP software, which was developed and launched in 2006 by Professor Anne Wil Harzing of Tarma Research Software Pty Ltd in Melbourne (Harzing, 2011). For this analysis, version 7.29.3156.7695 was used. The researcher conducted an initial data search on this software on February 25, 2021, which yielded 500 initial articles with 90,440 citations (2205.85 citations/year). The search for improved results resulted in 55 articles with 9195 citations and 224.26 citations/year. These findings indicate that Q1-Q4 journals have a more significant impact on citations than other journals, supported by changes in the h-index. The complete results from the comparison of metrics before and after the search for improvement are presented (Table 3).

Table 1. Top ten identifiable articles from PoP

Writer	Title	Years
A Hsu, A Zomer	Environmental performance index	2014
C Jasch	Environmental performance evaluation and indicators	2000
S Konar, MA Cohen	Does the market value environmental performance?	2001
R Fare, S Grosskopf, F Hernandez-Sancho	Environmental performance: an index number approach	2004
M Kortelainen	Dynamic environmental performance analysis: a Malmquist index approach	2008
P Zhou, BW Ang, KL Poh	Slacks-based efficiency measures for modelling environmental performance	2006
J Thoresen	Environmental performance evaluation-a tool for industrial improvement	1999
C De Villiers, V Naiker	The effect of board characteristics as an operations objective	2011
J de Burgos Jimenez, JJC Lorente	Environmental performance as an operations objective	2001
O Baboulet, M Lenzen	Evaluating the environmental performance of a university	2010

Table 2. Detailed search screening criteria

Screening Searching	Sum of Articles
Not Relevant	12
Not English (Indonesia, Malaysia)	-
Unidentified/ only citation link/ rejected by website	21
Double	1
Less than four pages	2
Editorial/ book review	4
none from scimagojr	137
Non-accounting topics	268
Q1/Q2/Q3/Q4	44
None from scimagojr but relevant	11
Total	500

Table 3. Comparisons metrics

Data Metrics	Initial Search	Refining search
Query	Journal, Environmental Performance	Journal, Environmental Performance from 1996 to 2020
Source	Google Scholar	Google Scholar
Papers	500	55
Citations	90440	9195
Years	2021-1980 = 41	2020-1996 = 24
Cites_Year	2205.85	224.26
Cites_Paper	180.88	-1.69
Cites_Author	42632.1	4323.47
Papers_Authors	225.86	26.45
Authors_Paper	2.78	-0.03
h_index	154	10
g_index	284	11
Hc_index	95	6
hI_index	59.59	5.31
hI_norm	105	7
AWCR	8743.33	956.63
AW_index	93.51	5.27
AWCRpA	3674.08	426.67
E_index	206.22	4.32
Hm_index	106.94	8.95
Query date	3/5/2021	3/6/2021
Cites_author_year	1039.8	105.45
hI_annual	2.56	0.17
h_coverage	73.2	-2.5
G_coverage	89.4	-2.4
Star_count	283	39
Year_first	1980	1996
Year_last	2021	2020
ECC	9044	9195

RESULTS

The first analysis conducted was to examine the bibliometric analysis of publication results, which are presented in Table 4. All articles were processed using the Publish or Perish (PoP) application. The number processing was carried out by calculating the frequency of one of the articles divided by the total frequency multiplied by 100. It was found that articles published in 2015 had the most significant percentage, namely 10.9%, while articles published in 1996, 1997, 1999, 2003, 2006, 2009, 2010, and 2012 had the smallest percentage, totalling 1.8%. Based on this information, the researchers concluded that there were more articles discussing environmental performance in the year 2015, due to the implementation of an environmental management system and ISO 14001. This trend continued in 2005, 2011, 2019, 2004, 2013, 2014,

2017, 2020, 2000, 2007, 2016, 2018, together with the years 1996, 1997, 1999, 2003, 2006, 2009, 2010, and 2012.

The following analysis was to perform bibliometric analysis of publications. From the search results of the Publish or Perish application on the Scopus and Google Scholar queries, it was revealed that publications containing research topics on environmental performance have 500 articles, consisting of 200 articles from Scopus and 300 articles from Google Scholar, originating from international journals from 1996 to 2020. The most published environmental performance articles are journals published by Elsevier, with 18 articles. The second rank is Emerald with eight articles, followed by Springer with five articles, then Researchgate for three articles, Wiley for three articles, Informa for two articles, John Wiley & Sons for two

articles, and each other publisher has one journal. The analysis resulted in a diagram as shown in Figure 3.

Figure 3 shows that out of the 55 articles, the majority of published articles on environmental performance were journals published by Elsevier, with 18 articles. Emerald ranked second with eight articles, followed by Springer with five articles, Researchgate with three articles, Wiley with three articles, Informa with two articles, John Wiley & Sons with two articles, and others with one article each. Using the maximum timeframe queries, PoP obtained 500 journal articles published between 1980 and 2021. After verification, the diversity of journal publications had an excellent reputation, and they were filtered based on the criteria outlined in Table 4. Table 4 shows that only articles published from 1996 to 2020 were considered, spanning 24 years. Figure 4 shows the number and distribution of publications per year.

Furthermore, the map depicting the results of network visualization analysis on VOSviewer utilizes data collected from the title and abstract fields, which form

the basis for bibliometric analysis mapping. The analysis presented in this study focused on the essential terms captured by the VOSviewer artificial intelligence software in the articles. The results are displayed in Figure 5, which depicts bibliometric studies on environmental performance research topics using Artificial Intelligence from the application, divided into three clusters: red, green, and blue. The research topic pertaining to environmental performance is located in cluster 1, represented by red. Research topics on the VOSviewer map depict the essence of mapping related to ten items identified by VOSviewer’s artificial intelligence software, namely company, environmental information disclosure, environmental performance, firm value, environmental management, financial performance, firm, performance, environmental disclosure, and disclosure. Additionally, an overlay visualization map of environmental performance research topics is generated based on the keywords used from 1996 to 2020, with the results of the analysis presented in Figure 6.

Table 4. Article grouping

Data Collect Criteria	Data Grouping	Number of Articles	Percentage (%)
Publication Year	1996	1	1.8%
	1997	1	1.8%
	1999	1	1.8%
	2000	2	3.6%
	2003	1	1.8%
	2004	3	5.4%
	2005	4	7.2%
	2006	1	1.8%
	2007	3	5.4%
	2008	5	9.09%
	2009	1	1.8%

Data Collect Criteria	Data Grouping	Number of Articles	Percentage (%)
	2010	1	3.6%
	2011	4	7.2%
	2012	1	1.8%
	2013	3	5.4%
	2014	3	5.4%
	2015	6	10.9%
	2016	2	3.6%
	2017	3	5.4%
	2018	2	3.6%
	2019	4	7.2%
	2020	3	5.4%

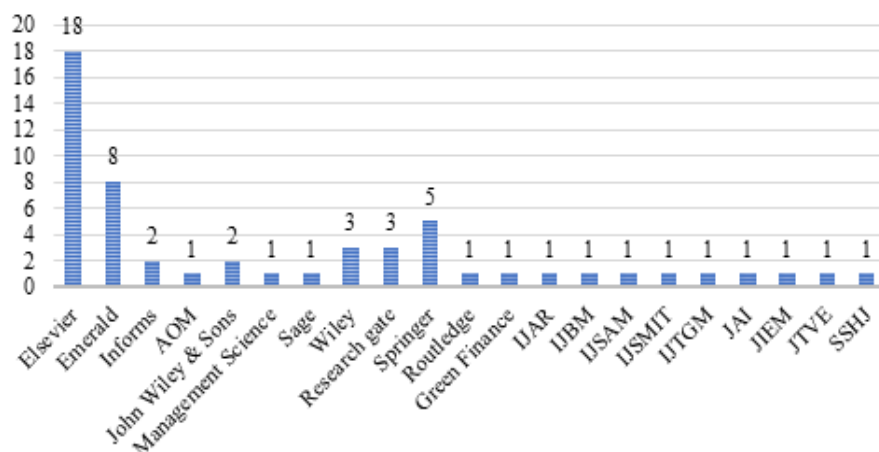


Figure 3. Number of journals containing publications on environmental performance

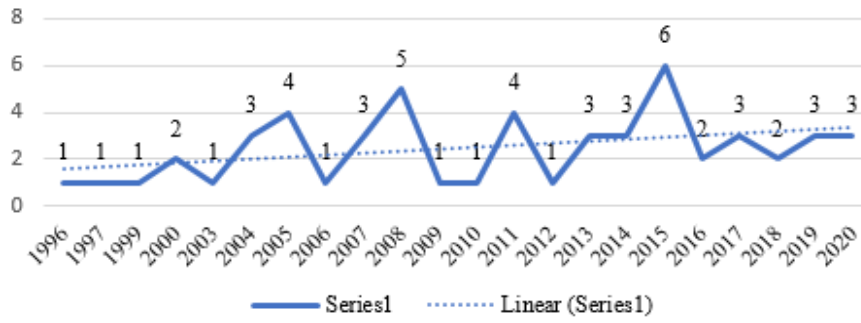


Figure 4. The number and distribution of publications per year

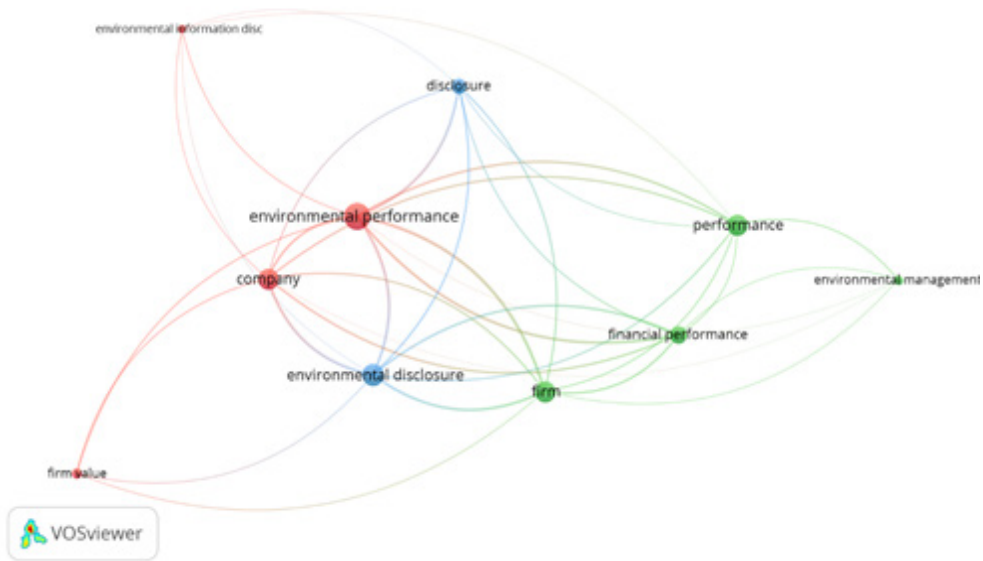


Figure 5. Visualization of research network topics of environmental performance

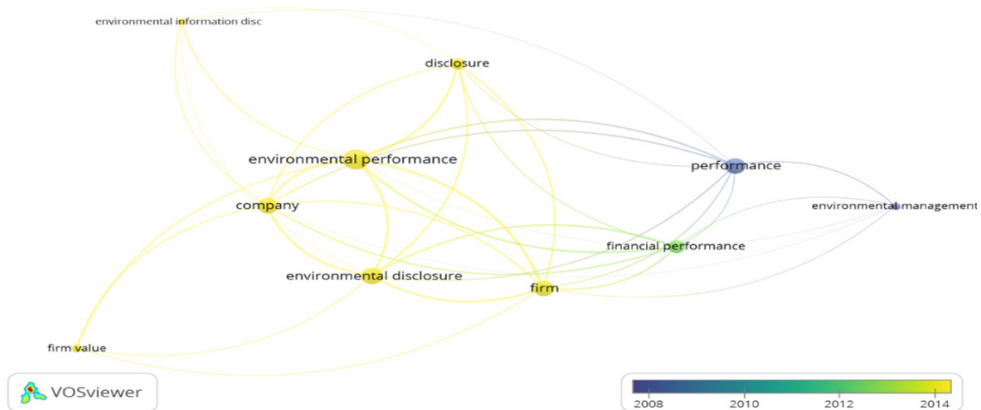


Figure 6. Visualization of research overlay topics of environmental performance

According to the keywords used between 1996 and 2020, an overlay visualization map was created to show environmental performance research topics, as depicted in Figure 6: Visualization of Research Overlay on Environmental Performance Topics. Figure 6 indicated that the most recent publications were represented by the color gradient from purple to yellow. Several studies focused extensively on environmental performance, environmental disclosure, performance, firms, and companies. The frequency of occurrence of each keyword was represented by the size of the circles, whereas the distance between the circles indicated the correlation between them. The overlay visualization revealed that a significant number of studies were centered on environmental performance, environmental disclosure, performance, firms, and companies. The density visualization map had item points depicting the color-coded density of each point, as illustrated in Figure 7.

Figure 7 illustrates that the color of the points on the VOSviewer map is dependent on the number of items associated with other items. In density visualization, researchers can interpret the most frequently used keywords in a publication. Analyzing the important parts of the items is helpful in obtaining an overview of the general structure of the bibliometric map in the density field. The VOSviewer mapping of the density field shows the results of analysis using all environmental performance articles, both related and unrelated. The tighter the links, the more yellow the color, while rarer links are represented with green.

The results obtained demonstrate that a bibliometric study on the topic of environmental performance research exists. This result is in line with the mapping in the VOSviewer software, which extracts interconnected item points based on network visualization, overlay visualization, and density visualization. Overall, the results obtained from the VOSviewer software's artificial intelligence consist of 10 items, 3 clusters, 35 links, and 2142 total link strength. Environmental Performance belongs to cluster 1 in red with a total link strength of 873, an accuracy of 98, and nine links related to the company, environmental information disclosure, and firm value in the red zone. The main topic on the VOSviewer map is the research topic, which relates to ten other items such as Environmental Disclosure and Disclosure for the blue zone, as well as Firm, Performance, Practice, Environmental Management, and Financial Performance for the red zone.

After extracting from the title and abstract fields, a full count was obtained with the minimum occurrence set to 10, resulting in 1624 terms and 25 items that met the threshold. Ten common words emerged: issue, practice, paper, China, sustainability, literature, research, sample, impact, and effect. The keywords in each cluster represent the stream of Environmental Performance research, with specific terms representing their respective discussions. The results are presented in Table 5.

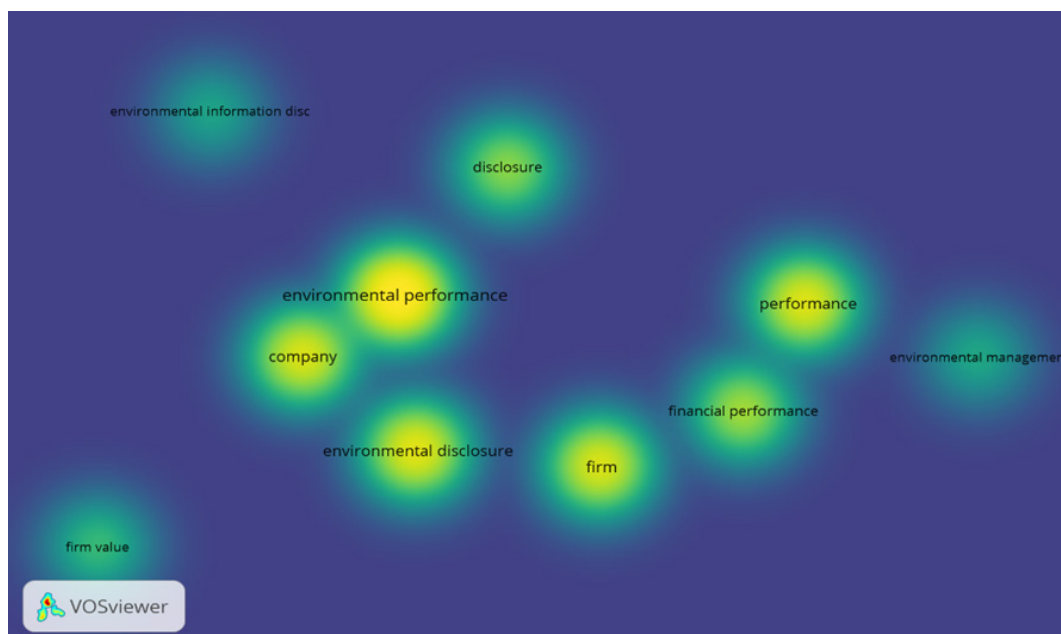


Figure 7. Visualization of research density topics of environmental performance

Table 5. Articles whose keywords appear the most

Cluster	The most frequent keywords	Keywords	Articles
Cluster 1 (4 items)	Environmental Performance (Occurrences 98)	Company; Environmental information disclosure; Environmental performance; firm value	Environmental Performance (D.Klassen & McLaughlin, 1996); (Al-Tuwaijri et al. 2004); (Clarkson et al. 2008); (Alexopoulos et al. 2011); (Arafat et al. 2012); (Iatridis, 2013); (AFAGACHIE, 2013); (Iqbal & Assih, 2013); (Meng et al. 2014); (Qi et al. 2014); (L. Chang et al. 2015); (K. Chang, 2015); (Ariesanti, 2017); (Sarumpaet et al. 2017); (Haninun et al. 2018); (L. W. Lu & Taylor, 2018); (Ikram & Siddiqui, 2019); (Baalouch et al. 2019); (Nur Utomo et al. 2020); (Johnstone & Hallberg, 2020)
Cluster 2 (4 items)	Performance (Occurrences 63)	Firm; environmental management; financial performance; firm	Performance (Jansen et al. 2006); (Hult et al. 2004)
Cluster 3 (2 items)	Environmental Disclosure (Occurrences 66)	Environmental disclosure; Disclosure	Environmental Disclosure (Nur Utomo et al. 2020); (Mutalib et al. 2020); (Baalouch et al. 2019); (L. W. Lu & Taylor, 2018); (Y. Lu & Abeysekera, 2017); (Gatimbu & Wabwire, 2016); (Cormier et al. 2015); (Fontana et al. 2015); (Meng et al. 2014); (Iqbal & Assih, 2013); (Iatridis, 2013); (Arafat et al. 2012); (Dawkins & Fraas, 2011); (Shariful et al. 2009); (Clarkson et al. 2008); (Al-Tuwaijri et al. 2004)

According to the disclosure theory, high environmental performance results in high environmental disclosure. Several definitions are used to define the keyword in Table 5, which vary based on the context and aspect of researchers' focus. In cluster one, environmental performance is a measurable result of an environmental management system related to environmental control (ISO 14004, ISO 14001). In cluster two, Mangkunegara (2000) argues that performance is the result of work in quality and quantity achieved by a person in carrying out duties in accordance with their responsibilities. In cluster three, Wayman (2020) states that environmental disclosure is the process of making facts or information known to the public. Proper disclosure by corporations is the act of making its customers, investors, and any people involved in doing business with the company aware of pertinent information.

The pros and cons of environmental performance research topics are proven by the VOSviewer map, which shows that the research topic is in the red zone on network visualization. In the red zone, environmental performance discusses environmental information disclosure, company, and firm value. In the green zone, environmental performance discusses the company's performance (performance), its environmental management, the company's financial performance, and companies that use environmental performance. In the blue zone, environmental performance discusses

environmental disclosures and disclosures. The field of overlay visualization shows an indicator that the latest publications start from bronze to yellow, starting from 1996 to 2020. Finally, the field of density visualization shows that the yellow points of items on the map are the links between items displayed by artificial intelligence. VOSviewer is getting closer and closer. Meanwhile, the green color indicates the rarer or more distant relationship between items. It already discusses the highest level of item depth. The relationship between keywords is on the research topic, namely environmental performance, followed by other keywords such as environmental disclosure, performance, company, firm, disclosure, financial performance, firm value, environmental information disclosure, and environmental management.

Next, to define Research Keyword, based on the 55 articles reviewed in this study, several definitions are used by researchers to define environmental performance. The general definition used to define environmental performance is adopted from Ikhsan (2009); environmental performance is a measurable result of an environmental management system related to environmental control (ISO 14004, ISO 14001). Meanwhile, according to ISO 14001 in Yasser et al. (2012), several other studies define environmental performance as the relationship between an organization and the environment, including the

environmental impacts of resource consumption, the environmental impacts of organizational processes, and the environmental impacts of products and services.

To classify research theory, the selected large variety of theories in the articles for research indicates that environmental performance is related to the social, environmental, and economic fields. The better the environmental performance, the better it is for the social sector. The community's social life is not disturbed by air pollution, liquid or solid waste, garbage, etcetera. Conversely, the better the human (social) resources, the better the surrounding environment will be. Furthermore, by harmonizing in such a rhythm, the economy is more likely to facilitate the sustainability of environmental integration. The percentage of the 17 variations in the theory used in the 55 articles is shown in Table 6.

Table 6 shows that the legitimacy theory is the most frequently used theory at 29.7%, followed by the Stakeholder theory at 23.4%, and the Voluntary Disclosure theory at 8.51%. Additionally, Agency theory, Resource-Based Theory, Economic theory, and Political theory together make up 4.25%, while the remaining theories constitute 2.12%. Based on Laan's (2009) study as cited in Ariesanti (2017), Stakeholder theory and Legitimacy theory share similarities in their approach to the integration between a company and

its environment, but differ in application. Stakeholder theory emphasizes the relationship between the organization and its stakeholders, whereas Legitimacy theory emphasizes the organization's efforts to maintain society's perception of its ethical standards and norms. To analyze the research methodology, five study approaches have been carried out in the articles to be reviewed, and Figure 8 presents the comparison of these analyses.

Figure 8 presents a comparison of the various methodologies used in the articles that were studied. The majority of research on the topic of environmental performance employs a quantitative study approach, with as many as 40 articles using SPSS as a statistical analysis tool, Market Value Added (MVA), Ordinary Least Square (OLS), and other methods. In addition, there were 9 articles that used a qualitative study approach, with techniques like observation, surveys, and secondary data. Additionally, two articles used a mixed-method study approach, which combines both qualitative and quantitative study approaches in analysing research. Other methods used included literature review studies with 3 articles, and meta-analyses with 1 article. To classify the research setting, bibliometric studies that analysed the environmental performance research topic in each article reviewed were also used based on the research setting or continent of origin, which is presented in Table 7.

Table 6. Theory Variation Percentage

Theory used	The number of theories used	Percentage
Stakeholder Theory	11	23.4%
Agency Theory	2	4.25%
Resource-Based Theory	2	4.25%
Index Theory	1	2.12%
Conceptual Theory	1	2.12%
Development Theory	1	2.12%
Voluntary Disclosure Theory	4	8.51%
Legitimacy Theory	14	29.7%
Traditionally Classical Theory	1	2.12%
Discretionary Disclosure Theory	1	2.12%
Economic Theory	2	4.25%
Political Theory	2	4.25%
Signalling Theory	1	2.12%
Neo-Classic Theory	1	2.12%
Neo-Institutional Theory	1	2.12%
Resource Dependence Theory	1	2.12%
Human Capital Theory	1	2.12%
Total	47	100%

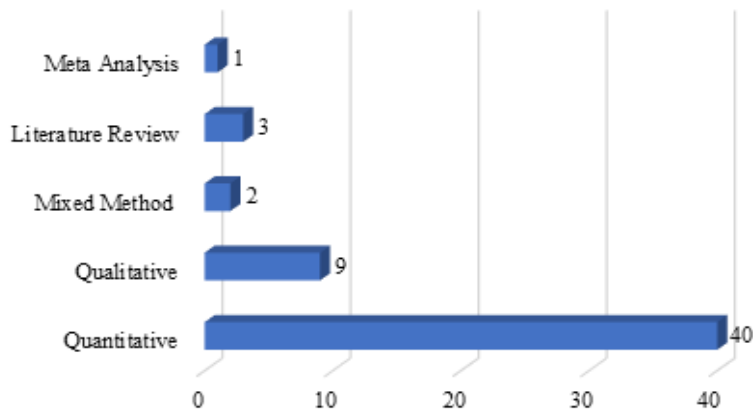


Figure 8. Research methodology on environmental performance topics

Table 7. Research setting environmental performance studies

Research Topics "Environmental Performance" based on continent origin	Countries of the studies		
	Developing	Developed	Total (%)
Asia	15	3	18 (32.7%)
Europe	2	10	12 (21.8%)
America	2	16	18 (32.7%)
Africa	3	-	3 (5.45%)
Australia	-	4	4 (7.27%)
Total Articles (%)	22 (40%)	33 (60%)	55 (100%)

Fifty-five articles on research topics related to environmental performance were analyzed, and it was found that the highest percentage, at 32.7%, represented Asia and America, as shown in studies by Iqbal and Assih (2013), Ariesanti (2017), Haninun et al. (2018), Meng et al. (2014), Al-Tuwaijri et al. (2004), Hervani et al. (2005), Boyd and Banzhaf (2007), and Hult et al. (2004). This was followed by the European continent at 21.8%, with studies conducted in countries such as the United Kingdom, Denmark, the Netherlands, and Sweden. Australia represented 7.27% of the articles, with studies conducted in Melbourne, among others. Finally, the African continent represented 5.45%, with studies conducted in countries such as Tunisia, South Africa, Nairobi, and Kenya.

These findings confirm the relevance of the research topic of environmental performance from a legitimacy and stakeholder theory perspective. Legitimacy theory involves the management of companies with regards to society, government, individuals, and community groups (Gray et al. 1996). The results of this research show that studies on environmental performance are primarily conducted in developed countries such as the United States, Canada, Sweden, Switzerland, the United Kingdom, and the Netherlands, among others.

However, developing countries such as Indonesia, Malaysia, China, South Africa, Tunisia, Kenya, and others are also making efforts to improve their environmental performance. Alfitman et al. (2019) stated that compared to traditional literature review methods, the literature study approach with bibliometric analysis using three software PoP, Mendeley, and VOSviewer is more efficient and effective. Bibliometric analysis can identify and process data in various formats such as *.csv or *.ris extensions, making it more powerful than other approaches like systemic review studies or meta-analysis in handling various types of data in literature studies.

Managerial Implications

Bibliometric analysis allows researchers to explore the existing scientific literature on a particular topic and summarize and map the progress of science within a certain period. This analysis provides information about the development of science in a specific field of study, which can be used to determine scientific productivity. The main requirement for bibliometric analysis is to collect publications related to the field of study. One source for document search is the Google Scholar database, which provides access to various

documents from different fields of study. According to Alfitman et al. (2019), the Google Scholar database is a suitable reference for bibliometric analysis, as the PoP application is designed to work with it. Literature studies are essential in building a strong foundation for scientific development. Webster and Watson (2002) argue that literature studies can facilitate theory development, identify heavily researched topics, and identify research gaps (empirical, theoretical, and methodological). These research gaps guide researchers in defining research topics or problems to investigate.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The bibliometric analysis concludes that the VOSviewer mapping divides the research into three clusters - red, green, and blue. The red zone focuses on environmental information disclosure, company and firm value, the green zone investigates company performance, environmental management, financial performance, and companies using environmental performance. The blue zone discusses environmental disclosures and disclosures. In the field of density visualization, the level of linkage between keywords is based on environmental performance, followed by other keywords such as environmental disclosure, performance, company, firm, disclosure, financial performance, firm value, environmental information disclosure, and environmental management. The keyword definition of 'environmental performance' is the measurable outcome of the environmental management system relating to the organization's control over environmental aspects, environmental policies, goals, and objectives. This study categorizes the theory used in the articles, with legitimacy theory (29.7%) and stakeholder theory (23.4%) being the most dominant. Most environmental performance research topics are quantitative, and the majority of research on environmental performance is conducted in developed countries such as the United States. However, environmental performance is also being carried out in developing countries like those in Asia.

Recommendations

With the utilization of relatively complex analysis in this study by various groups to increase their work's efficiency and effectiveness, the results are applicable

as references for academics and practitioners, such as lecturers and students conducting bibliometric analysis literature studies (PoP, Mendeley, VOSviewer). The study is expected to provide new information and additional references to knowledge in accounting, specifically in environmental performance. Ultimately, it is hoped that it will become a basis for policymaking and increase the scope of diversity in research writing. With the rapid development of information technology systems, bibliometric analysis can be expanded and applied to various contexts and scientific disciplines. This study has several limitations. First, since the data comes from the Publish or Perish (PoP) software, selecting articles must be precise and detailed, including the title, author name, year, page, volume, abstract, keywords, and DOI. Second, the findings indicate that Scopus indexed publications are limited in types. Since this study only includes Scopus indexed articles, other types of publications have only a few articles. The limitations of this research call for future research to sort articles for mapping in the VOSviewer software faster and more precisely, ensuring faster and more accurate analyses in determining policies and making decisions based on the mapping results. Future systematic reviews should also consider other databases and other types of publications to broaden the scope and depth of the literature studied. It is also suggested to use systematic analysis to provide a different perspective.

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