

Review

# Is the Relationship between Corporate Social Responsibility, Environment and Energy Sufficiently Debated Nowadays?

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**Abstract:** The aim of this review was to analyze to what extent the relationship between corporate social responsibility (CSR), environment and energy has been addressed in the specialized literature and which are the deficient segments in this regard. VOSviewer was used for data extraction, mapping and grouping the articles from journals that have been indexed in Web of Science (WOS). A total of 102 papers were found approaching the topic of corporate social responsibility, environment and energy policy, 5192 research papers for CSR and the environment and 320 on CSR and energy policy. Following the bibliometric analysis, we can conclude that we are facing a shortage of works that analyze the relationship between the three fields together. The number of published articles was reduced to establish the direction of influence between the three variables, as well as the impact between them. However, the advantage that emerges from this lack of works is that there are many opportunities to find news on this subject and to discover solutions to improve the quality of life. This study can be used as an impetus for researchers to examine the trends of this research topic.

**Keywords:** bibliometric analysis; VOSviewer; Web of Science; corporate social responsibility; environment; energy



**Citation:** Badareu, G.; Doran, N.M.; Puiu, S.; Bădîrcea, R.M.; Manta, A.G. Is the Relationship between Corporate Social Responsibility, Environment and Energy Sufficiently Debated Nowadays? *Energies* **2023**, *16*, 3405. <https://doi.org/10.3390/en16083405>

Academic Editor: Bert Scholtens

Received: 14 March 2023

Revised: 7 April 2023

Accepted: 11 April 2023

Published: 12 April 2023



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## 1. Introduction

In order to reach the targets proposed in the 2030 Agenda, it is important that all participants in the economic activity, whether companies or public institutions, understand the importance of implementing social and environmental concerns measures into their business operations. Achieving a sustainable economic development cannot be carried out in a situation of social and environmental instability [1].

CSR plays an important role in addressing environmental issues and promoting sustainable energy use practices. Thus, it can contribute to a reduction in greenhouse gas emissions and other pollutants. Companies can reduce their carbon footprint and other emissions by adopting cleaner manufacturing practices, such as using renewable energy and more energy-efficient technologies. They can also promote green practices and reduce emissions through partnerships and collaboration with other companies, governments and communities.

CSR can also help to reduce waste and resource consumption. Companies can reduce their impact on the environment by adopting waste management practices and saving natural resources, such as recycling and using biodegradable or reusable packaging. Through their CSR policy, companies can promote the use of renewable energies by investing in projects of solar, wind, hydroelectric or other clean energy sources. They can also encourage the use of these energy sources through awareness campaigns. Companies can promote sustainable environmental and energy practices by involving local communities in their

business decisions. This can be achieved by consulting and working with local communities to better understand their needs and concerns and ensure a sustainable business approach.

Carroll's pyramid promotes the four essential aspects of CSR: economic, legal, ethical and philanthropic [2]. However, Mazur [3] argues that, when Carroll created the CSR pyramid, the perception of the environment as an important resource was not common. In addition, both Šikšnelytė and Stjepcevic [4] and Gigauri and Vasilev [5] confirm that the model presented by Carroll does not take into account the environmental dimension, which is vital for all fields, but especially for the energy industry.

Companies from the European Union have shown an increasing interest in the integration of social and environmental responsibility measures in the economic sectors in which they operate. They realized that social responsibility and environmental performance generate cost savings, a new image of the company and new business opportunities so that large multinational companies report on their sustainability performance. According to the KPMG study, almost 78% of the world's top companies included elements of corporate social responsibility in their annual reporting [6]. However, actions related to corporate social responsibility do not always produce beneficial effects on the environment [7].

At the global level, a series of schemes were initiated to guide companies in the implementation and reporting of social and environmental activities, such as the Global Reporting Initiative (GRI), the UN Global Compact, the OECD Guidelines for Multinational Enterprises and ISO 26000, so that CSR no longer represents an exception, but a rule in companies' activities [8]. The most important corporate social responsibility tool developed at the level of the European Union was EMAS (eco-management and audit scheme) [9]. It represented a voluntary environmental management system that companies could implement in order to evaluate, report and improve their environmental performance. At the same time, a considerable percentage of top companies considered the financial risk of climate change in their annual reports [1,10].

The European Alliance for CSR [11] aims to promote the renewed strategy of sustainable development, where there is a greater concern on the part of companies and public institutions regarding social and environmental responsibility in the sense of achieving sustainable consumption and production. In the conditions of the climate and energy threats that we face globally, companies are striving to identify solutions to reduce carbon emissions and protect the environment [12,13]. The relationship between the three concepts began to gain even more attention and research interest as a result of the awareness of the relationship and interdependencies between them, which cannot be neglected nowadays. Taking into account the effects of industrial and economic activities on the environment, the relationship between the three becomes even more important for both researchers and authorities. This was also noticed by Jacyno, who drew attention to the importance of environmental issues according to global CSR standards in the energy industry [14].

Several studies have examined the relationship between CSR, environment and energy. For example, Kolk and Pinkse [15] explored the factors that influence companies to adopt environmental and energy policies, finding that CSR played an important role in this decision-making process. Similarly, Bansal and Roth [16] argued that CSR could help companies to build competitive advantage by improving their environmental and social performance.

Other studies have focused specifically on the role of energy in CSR. For example, Uyarra et al. [17] examined the relationship between energy management and CSR in small and medium-sized enterprises (SMEs), finding that SMEs that implemented energy management practices were more likely to engage in CSR activities. Similarly, Dangelico and Pujari [18] argued that energy efficiency should be included as a key element of CSR, as it can help companies to reduce their environmental impact and improve their financial performance.

Despite the significant body of research on CSR, environment and energy, it is not clear whether this relationship is sufficiently debated in academic literature. There is no longer any doubt that environmental issues are considered increasingly important worldwide

today. The increasing pressure caused by environmental degradation motivated us to carry out a literature review on CSR, environment and energy to highlight the importance and necessity of studying the extent to which sustainable development among the economy, society and environment constitutes a strategic objective of social responsibility, especially for companies with a high energy consumption. This is despite the fact that more than half of the world's corporations disclose information related to CSR in their annual financial reports.

We considered it useful and even necessary to carry out the bibliometric analysis because it allows us to reveal the evolution of the CSR field, simultaneously with the illumination of some emerging areas with this field: environment and energy. However, the application of bibliometric analysis in business research is relatively new and, in many cases, underdeveloped [19]. It has gained popularity due to the use of software tools and the possibility of analyzing large volumes of data. At the same time, bibliometric analyses are quantitative analyses by nature, but are used for qualitative assessments of some fields, their purpose being to transform something intangible into a manageable entity [20]. Unlike classic reviews, with the help of the bibliometric method, the subjectivities of the sample selection are eliminated [21].

Under these conditions, the study's main purpose was to analyze to what extent the relationship between CSR, environment and energy has been addressed in the specialized literature and which are the deficient segments in this regard. This research is expected to help researchers in conducting and determining the research topic to be taken related to the linkage between CSR strategy, environment and energy policy. A bibliometric analysis can shed light on this question by examining the number of publications, citations and keywords related to this topic.

A bibliometric analysis of the relationship between CSR, environment and energy unravels several important contributions and offer novel insights into this field of research.

Firstly, such an analysis could offer a comprehensive overview of the existing literature on this topic. By identifying and synthesizing a large number of studies, it could provide a broad picture of the key themes, trends and debates within the field. This, in turn, could help to identify areas that require further research and guide future research efforts.

Secondly, a bibliometric analysis could help to identify gaps in the literature and highlight areas that require further investigation. For instance, it could reveal which specific topics within the broader field of CSR, environment and energy have received the most attention from researchers, and which areas have been relatively neglected. This, in turn, could help to guide future research efforts and help build a more comprehensive understanding of the complex relationships between CSR, environment and energy.

Thirdly, a bibliometric analysis could help to identify emerging topics and areas of research. By tracking changes in the literature over time, it could reveal which new topics are gaining attention and which areas are becoming less relevant. This, in turn, could help researchers and practitioners to stay up-to-date with the latest developments in the field and identify potential areas of future research.

Fourthly, a bibliometric analysis could offer insights into the impact of different types of CSR initiatives on environmental and energy outcomes. By synthesizing data from a large number of studies, it could help to identify which types of CSR initiatives are most effective at promoting sustainability in the energy sector, and which strategies are less effective. This, in turn, could inform the development of more effective CSR programs and sustainability policies.

Finally, a bibliometric analysis could facilitate interdisciplinary collaboration and knowledge exchange. By synthesizing research from a variety of disciplines, it could help to promote dialogue and collaboration between different fields of research and facilitate the transfer of knowledge across different sectors. This could ultimately contribute to more effective sustainability policies and practices and help to promote broader societal change.

## 2. Materials and Methods

Bibliometrics methods are statistical methods based on mathematical ways that can conduct a quantitative analysis of the research papers concerning one special topic [22]. The difference between the bibliometric method and the literature review is that the first one focuses on evaluating the structure of a particular research area and allows seeing how the publications show a trend in the period under review [23,24]. The bibliometric method is widely used in the literature to reveal the development of a particular subject or field and to explore the intellectual structure [19,25]. The bibliometric method is used to analyze parameters such as the year that the articles were published, author, institution, country, keywords, study titles and citation numbers [26].

A scientific software, VOSviewer, helps with data extraction, mapping and grouping the articles from data sets containing bibliographic fields (title, author, keywords, journal, affiliations, etc.) [27–33]. The article datasets used in this research were extracted from journals that have been indexed in the Web of Science (WOS). The WOS online database includes almost all of the important research papers, also providing built-in analysis tools to produce representative figures [34].

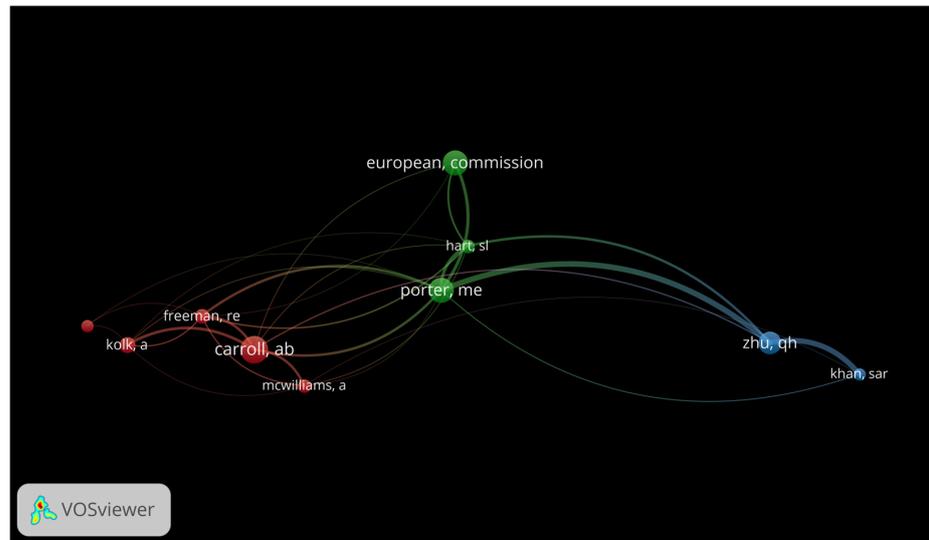
The software VOSviewer offers a graphical analysis of the bibliometric data and a visualization of the research results [35]. VOSviewer can show three visualizations of different mapping: the network, overlapped and density visualization. In the network, each keyword, author or country/organization is presented with a circle (node), whereas the circle dimension is proportional to the number of publications in which the analyzed unit is found [36].

Each color represents a group of analyzed units grouped, the length of the curved lines between the circles specifies the approximate connection of the analyzed unit repetition and the thickness shows the power of the thematic area pairs [37,38]. The clusters represent the relation between one topic and another. In our case, four types of analysis approaches can be applied. The first, co-author mapping, refers to the authors' interdependence, the second and the third ones indicate the countries and the institutions contributing to the research in the field and the last one is the co-occurrence, which refers to the relation between the keywords.

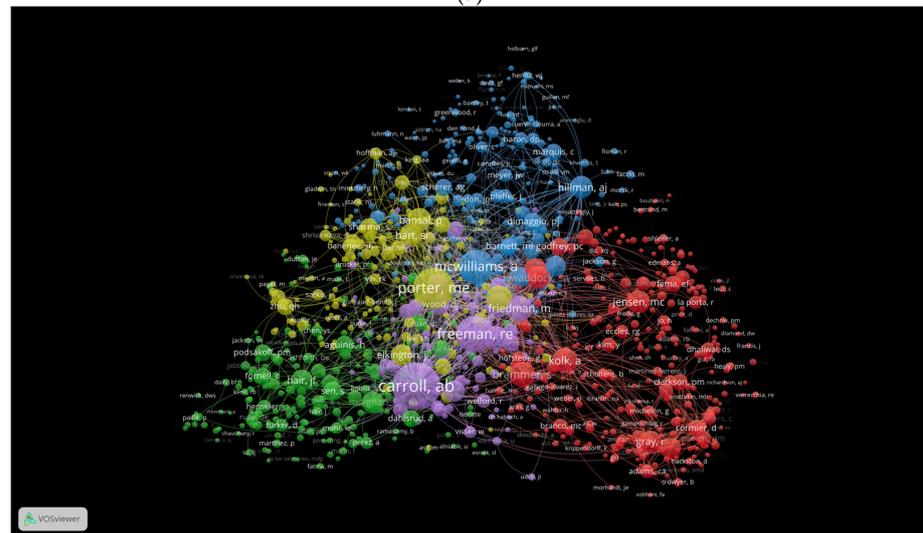
## 3. Results and Discussions

### 3.1. Author Co-Citation Network

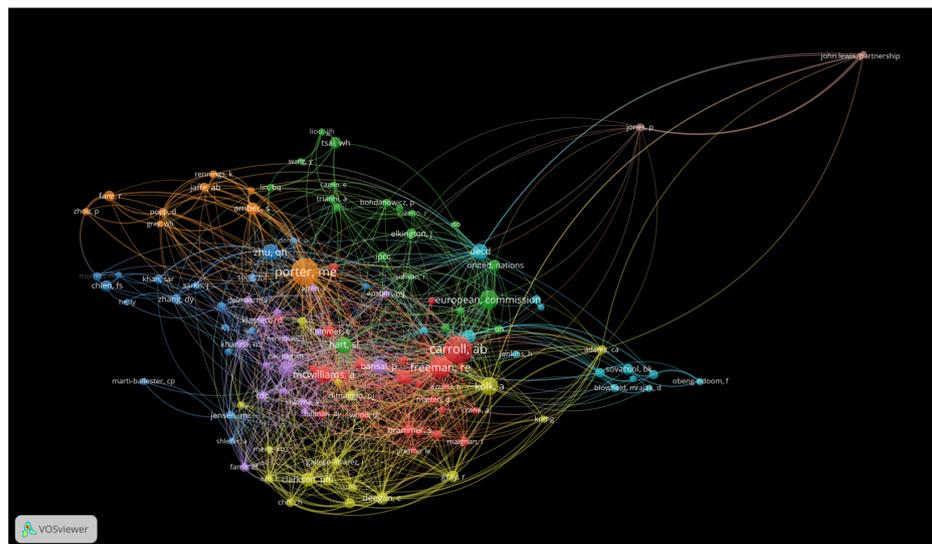
This section focuses on highlighting the main authors cited in the field of interest. Figure 1a shows the network of authors cited in the field of corporate social responsibility, environment and energy Policy through the Web of Science database. We notice from Figure 1a that, because of the reduced number of papers approaching all three variables combined, the map of the cited authors is simplified. Consequently, this proves that few papers are approaching and researching the interactions between these three variables. Thus, to better highlight the lack of research papers in this field, we compared the graph of the analyzed unit—in the present case, the cited authors—with the graphical representations of the papers approaching two of the three dimensions: CSR and environment; CSR and energy policy. According to the Web of Science database, there are 102 papers approaching the topic of corporate social responsibility, environment and energy policy, 5192 research papers for CSR and environment and 320 on CSR and energy policy. For all three maps, we used the same threshold: that of a minimum of 10 citations for each author.



(a)



(b)



(c)

**Figure 1.** (a). Author co-citation network on CSR, environment and energy policy. (b). Author co-citation network on CSR and environment.(c). Author co-citation network on CSR and energy policy.

As can be noticed from Figure 1a, there are three clusters regarding the cited authors, with a total number of 10 authors and 158 strong connections. From the total number of 4603 cited authors in this field, only 10 exceed the minimum threshold of ten citations. The first cluster (the red one) is the biggest one, comprising five authors, as well as the most representative one because it also includes the most cited author, Carroll, A.B. The second cluster (the green one) includes three authors, and the most cited author is Porter M.E., as well as the European Commission. The third cluster includes two authors, Zhu Q.H. and Khan Sar.

Figure 1b shows the main cited authors in the CSR and environmental papers. Of the 102,067 authors cited, 5333 meet the threshold we established for our analysis, and the graph includes the first 1000. In this case, six clusters formed, with a different number of items and a total number of 1,637,917 strong connections.

The first cluster (the red one) includes 325 authors, the most cited author in this cluster being Brammer S., with 649 citations and 23,406 strong connections. The second cluster (the green one) and the third one (the blue one) include an almost equal number of items, 216 and 215, respectively. Maigan I. has the highest number of citations in the second cluster (509), and McWilliams A. with 1076 citations dominates the third cluster. The fourth cluster (the yellow one) including 161 authors is represented by Porter M., an author with 1389 citations, the rest of the authors having a number of citations that is below the average. The fifth cluster (the purple one), also among the smallest ones with 92 authors, can be considered as the most representative one because it includes 2 of the most cited authors from our analysis: Carroll A.B., with 1826 citations, and Freeman R.E., with 1196 citations. The last cluster (the turquoise one) includes 1 author, Hull C.E., with 72 citations and 2887 strong connections.

In Figure 1c, the main authors cited in the field of CSR and energy policy are represented, as well as the connections between them. The total number of cited authors is 13,498, and 123 of them exceed the threshold that we established, that of 10 minimum citations, forming 8 clusters.

The first cluster (the red one) and the second one (the green one) are the biggest, and the former is also the most representative cluster because it includes the first two of the most cited authors in this field. In the case of the first cluster, the authors are Carroll A.B., the most cited author in the field (75 citations), and Freeman R.E. (52 citations), and the green cluster is represented by the European Commission, with 43 citations. The third cluster (the blue one) includes 19 authors, but with fewer citations compared to the previous ones, the most cited author in this cluster being Zhu Q.H., with 36 citations. The fourth (the yellow one) and the fifth clusters (the purple one) have the shortest distances between the nodes, which shows a strong connection between the authors in these groups. The yellow cluster is represented by Kolk A., with 40 citations, and the purple one by Lyon T.P., with 32 citations. The sixth cluster (the turquoise one) has 13 items, with an insignificant share. The seventh cluster (the orange one) has 9 authors, among them being Porter M.E., with 73 citations, occupying the second position at the top of the most cited authors. The last cluster (the brown one) is the smallest one (3 authors), but also the group with the longest connections, showing a weak connection with the other groups.

This bibliometric analysis, where we highlighted the authors with the highest number of citations, allows us to identify and rank the main authors cited in the field of interest. Thus, in the main field of interest, which is corporate social responsibility, environment and energy policy, even if there are not many papers written, we noticed that the main authors are: Carroll A.B., Porter M.E., the European Commission and Zhu Q.H. The CSR and environment domain includes the highest number of papers, with numerous citations. The ranking of the first four authors includes Carroll A.B., Porter M.E., Freeman R.E. and McWilliams A. In the last representation, we refer to the field of CSR and energy policy. In this field, authors such as Carroll A.B., Porter M.E., Freeman R.E. and Kolk A. distinguished themselves. Analyzing these rankings, we can notice that authors such as Carroll A.B., Porter M.E. and Freeman R.E. are the authors who appear in all three fields analyzed.

Consequently, we can conclude that these authors represent the pillars of the literature review regarding corporate social responsibility, environment and energy policy, being the most cited authors in these domains.

### 3.2. Countries Network

The 102 articles from the Web of Science database about CSR, environment and energy policy were written by authors in 46 countries. To obtain a representative map of the countries with the highest number of articles published and their citations, we established a minimum threshold of five articles and one citation per country. Thus, of the 46 countries, only 5 meet the requirements: China, Australia, the United Kingdom, Malaysia and the Czech Republic. We can see from Figure 2a that the countries were grouped into two clusters, the first one including China, Malaysia and the Czech Republic, and the second one including the United Kingdom and Australia. China contributes more than 49% of the total number of papers, publishing 32 articles, and was cited 451 times, it also being the country with the highest number of strong connections (7). China is followed by the United Kingdom and Malaysia, with 10 publications and 88 citations, and, respectively, 7 articles and 218 citations. The colors of the nodes for each country show the period in which the research was conducted. We can notice from Figure 2a that the first publications are from the Czech Republic in 2015 and the most recent articles are from China.

Keeping the same threshold, we created the map of the geographic distribution for CSR and environment, this map being more vast and complex because of the high number of articles published in this domain. According to the map, we notice that the highest number of publications was from China (821) and the USA (781), as well as the United Kingdom (468). Furthermore, co-authorship between the countries illustrated in Figure 2b shows that China has more research collaborations with authors from the USA, Australia and Pakistan. The USA had collaborations with China, as well as with the United Kingdom. If in the beginning, the first articles were from Nordic countries, mostly from Northern Ireland (2014), in the following years, the USA dominates the ranking regarding publications in this domain and the most recent articles are from Vietnam (2021), and with a significant number too (62). Thus, we notice an increased interest in the domain of CSR and environment in both developed and developing countries.

Figure 2c represents the map of the countries contributing to the domain of CSR and energy policy, taking into account the 320 articles available in the Web of Science database. Of the total number of 74 countries identified in the articles, only 28 met the requirements of the minimum threshold. As in the previous maps, China has the highest number of articles published (76), the most citations (1087) and also the most collaborations with authors from other countries (42), followed by the United Kingdom with 37 articles and the USA with 26 articles. The first articles are published in 2016 in Greece and the Czech Republic, and, in the following years, the United Kingdom and China distinguish themselves in the field; the most recent articles are published in Vietnam and Pakistan in 2021. As in the previous case, China collaborates with developed countries, such as the USA, Australia and the United Kingdom.

Analyzing and synthesizing the countries mapping, we can notice that the more developed countries dominated the rankings constantly and had more chances to produce and publish more papers because they had enough funds, the tools and equipment and an adequate structure [39]. Countries such as China, the USA and the United Kingdom, which have the necessary resources to conduct research, published the highest number of articles in the domain of interest.



### 3.3. Institutions Network

The following representations refer to the institutions' co-authorship in the analyzed domains. We see from Figure 3a that the map of the institutions that was published on the topic of CSR, environment and energy policy is rather simple, lacking connections between them, this showing an immature domain from the perspective of the approach and the studies conducted in this area. At a threshold of a minimum of 3 publications per institution, only 4 of the 174 in the database meet the requirement, and the 4 are Bucharest University of Economic Studies, Nanjing University, Taiyuan University of Science and Technology and the Technological University in Malaysia. This order indicates the average year of the publication: 2014, 2019, 2019 and 2021. The colors of the institutions' nodes indicate the time of the research.

The highest number of citations was for papers written by researchers affiliated with the Technological University in Malaysia, and none of the institutions has connections with the others. This map highlights once again that there were few research and publications regarding the relationship between CSR, environment and energy policy, and the need for approaching this domain is a significant one in order to identify the relationships and connections between these three variables.

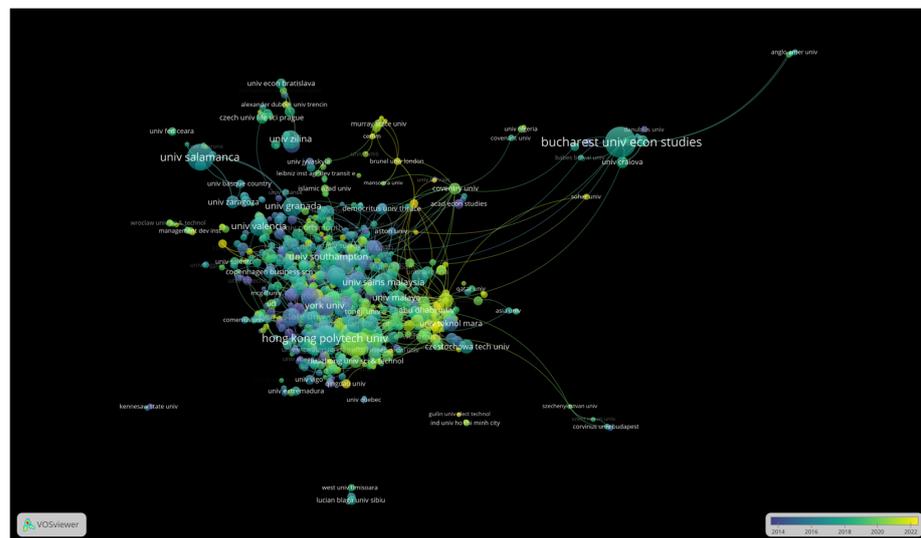
Figure 3b illustrates the map of the institutions' co-authorship regarding CSR and the environment. Using a threshold of a minimum of three papers published per institution, only 930 of the 3913 institutions meet the requirement, but the number is reduced to 851 because of the lack of connections between them. The Bucharest University of Economic Studies published 60 related papers and cooperates with 15 other institutions, such as the University of Craiova (with 12 published articles), Reading University, Metropolitan University in Prague and other universities in Romania. The highest number of papers was published in the second part of the year 2017. In the institutions' ranking regarding the number of published papers, Salamanca University ranks first, with 47 articles published, most of them at the end of 2016 and 10 as collaborations with other institutions. The Hong Kong Polytechnic University dedicates increased attention to this domain, publishing 42 papers and collaborating with at least 32 institutions in this field. The first articles were published by Emory University in 2009, and the most recent ones by Ahlia University in Bahrain in 2022.

As for the publications in the field of CSR and energy policy, the number of papers is lower, and, consequently, so is the institutions' co-authorship. There are 505 institutions with publications, but only 28 published more than the minimum threshold of three papers in this research field. As in the previous case, the lack of connections between the institutions reduces their number to only 4 significant institutions. The Bucharest University of Economic Studies, Colorado School of Mines, and Inha University are institutions with six, five, and four papers, respectively, published in this domain, but which do not have connections with the other institutions; thus, they were removed from the graphical representation. As a consequence, the institutions' ranking regarding the number of articles published is the following: Nanjing University has four publications in 2020 and two connections (with the Southwestern University of Finance and Economics and Chongqing University); the Southwestern University of Finance and Economics, Chongqing University and Asia University in Taiwan each have three publications and a maximum of two connections.

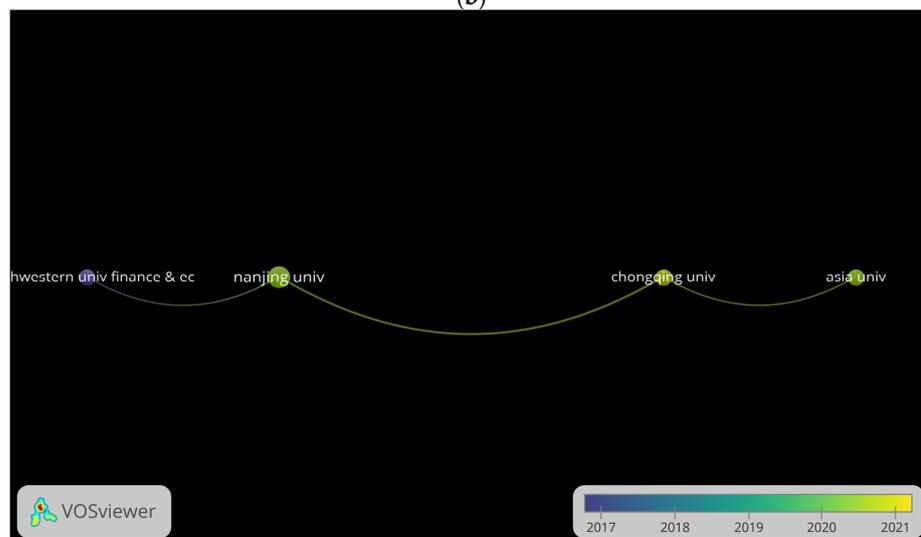
The main institutions that dedicated increased attention to these domains are the Bucharest University of Economic Studies, Nanjing University and Taiyuan University of Science and Technology. Thus, we notice that Asian countries grant higher attention to these studies, as well as Romania. If we analyze the maps in Figures 2 and 3 together, we see that, even if China and the USA were the countries with the highest number of publications, only Nanjing University stood out as the most interested in this domain.



(a)



(b)



(c)

**Figure 3.** (a). Institutions’ co-authorship network regarding CSR, environment and energy policy. (b). Institutions’ co-authorship network regarding CSR and environment. (c). Institutions’ co-authorship network regarding CSR and energy policy.

### 3.4. Keywords Network

All of the keywords that helped in the process of identifying the number of publications were considered as an element of the analysis for the co-occurrence mapping. There were 393 in the analysis of the relation between CSR, environment and energy policy. However, in order to obtain a more precise result, we established a minimum threshold of five occurrences for a keyword.

Thus, the number of keywords can be adjusted by removing the not-so-relevant keywords. As a consequence, only 4 of the 393 keywords meet the criteria. According to Guo et al. [40], the connections refer to the co-occurrence of an item (for example, a keyword) with another, and the total strength of connections corresponds to the total references cited between an article and the others. Moreover, the occurrences represent the number of articles in which the keyword has been found. Figure 4a represents the visualization of the network that appeared in scientific papers. The keywords are grouped in two clusters of two keywords each. The first cluster (the red one) includes the keywords environment and sustainability, with 9 and 10 occurrences, respectively. The second cluster (the green one) includes the keywords corporate social responsibility and sustainable development, with 26 and 13 occurrences, respectively. In conclusion, the most used keyword in this field is corporate social responsibility, which is also present in the title of the main topic that we analyzed.

Figure 4b analyzes the keywords regarding CSR and the environment. The software analyzes each keyword by computing the connections, the total strength of connections and their co-occurrence with other keywords. The occurrences represent the number of articles in which the keyword is identified. Due to the high number of papers, 10,478 keywords were identified, but only 655 meet the threshold of a minimum of five occurrences. Thus, this led to the formation of 19 clusters: the first 2 are the most extended, having the highest shares, but also the keywords with the most occurrences.

The red area (the first cluster) consists of topics related to corporate social responsibility (1730 occurrences and 606 connections), environment and organizational. The main element of corporate social responsibility is developing economic activities in conditions that allow the company to be socially responsible toward itself and the other stakeholders, including the community [41]. Another representative keyword for our analysis is sustainability, present in the third cluster (the blue one), with 532 occurrences and 391 connections. The CSR abbreviation is included in the second cluster (the dark green one), with 356 occurrences and 327 connections. Other clusters, such as clusters 7, 11 and 13, are significant from the perspective of the keywords with the most occurrences. The others have keywords with shares and occurrences that are not significant compared to the ones mentioned above (under 200 occurrences). Cluster 7 (the orange one) includes three items, among which there is the keyword environment, with 312 occurrences and 283 connections. Cluster 11 (the light green one) is represented by sustainable development, which has a total number of occurrences of 374 and 328 connections. The depth of the research can be seen in Figure 4b. The more focused the colors, the higher the interest of the researchers in conducting research on the topic. Corporate social responsibility, sustainability, sustainable development, social responsibility and corporate governance are extensively debated topics. The curved lines between the nodes of the keywords closed-loop supply chain and mergers and acquisitions are the longest compared to the other keywords, showing a weak connection of those keywords' repetition.

In mapping the keywords' co-occurrence in Figure 4c, six clusters formed. At a minimum threshold of five occurrences for a keyword, 28 keywords of a total of 1124 were selected from 320 articles, forming six clusters. As in the previous situations, each keyword was analyzed using the software that calculated the connections, the total strength of connections and the keyword's co-occurrence with other keywords. Corporate social responsibility, sustainability, sustainable development and climate change were among the most common keywords, with occurrence shares (the total strength of connections) of 81 (52), 26 (28), 29 (27) and 17 (16), respectively. The keywords' co-occurrences were also



Regarding the keywords network, the dimension of the nodes and the text in each group represents the strength of their co-occurrence with the other keywords, whereas the distance of the elements and lines shows the relation and the connections between the keywords. The most representative cluster is the second one because it includes the keywords with the most occurrences: corporate social responsibility, sustainability and climate change.

Carroll A.B. is a prominent scholar in the field of corporate social responsibility (CSR) and has argued that businesses have a responsibility to go beyond economic performance and also consider their impact on society and the environment. In the context of a bibliometric analysis of the relationship between CSR, environment and energy, Carroll's views may be relevant in identifying the key themes and issues that researchers have examined in this area. His work could also inform discussions around the role of businesses in promoting sustainability, and how CSR initiatives can be designed to address environmental and energy concerns.

Porter M.E. is an economist and business strategist who has written extensively on the relationship between business and the environment. He has argued that environmental concerns can be addressed in ways that are beneficial to both businesses and society through the development of more efficient and innovative technologies. In the context of a bibliometric analysis of the relationship between CSR, environment and energy, Porter's views may be relevant in identifying the ways in which businesses can promote sustainability and reduce their environmental impact. His work could also inform discussions around the role of technology in addressing energy and environmental challenges.

The European Commission is a political institution of the European Union that has taken a leading role in promoting sustainability and energy efficiency. In the context of a bibliometric analysis of the relationship between CSR, environment and energy, the European Commission's policies and initiatives could be relevant in identifying key trends and debates in this area. The Commission's work could also inform discussions around the development of more effective sustainability policies and initiatives.

Freeman R.E. is a business scholar who has developed the concept of stakeholder theory, which argues that businesses should consider the interests of all stakeholders, including customers, employees, suppliers and communities, in their decision-making processes. In the context of a bibliometric analysis of the relationship between CSR, environment and energy, Freeman's views may be relevant in identifying the ways in which businesses can balance economic performance with their responsibilities to society and the environment. His work could also inform discussions around the role of stakeholder engagement in promoting sustainability.

McWilliams A. and Kolk A. are scholars who have examined the relationship between CSR and environmental performance, and have argued that there is a positive correlation between the two. In the context of a bibliometric analysis of the relationship between CSR, environment and energy, McWilliams and Kolk's views may be relevant in identifying the ways in which CSR initiatives can contribute to more sustainable energy practices. Their work could also inform discussions around the development of more effective CSR programs in the energy sector.

China, the USA and the United Kingdom are countries with significant energy consumption and production, and have all taken steps to promote sustainability and energy efficiency. In the context of a bibliometric analysis of the relationship between CSR, environment and energy, these countries' policies and initiatives could be relevant in identifying key trends and debates in this area. Their work could also inform discussions around the development of more effective sustainability policies and initiatives at the national level.

Bucharest University of Economic Studies, Nanjing University and Taiyuan University of Science and Technology are universities with expertise in the fields of business, economics and energy. In the context of a bibliometric analysis of the relationship between CSR, environment and energy, these universities' research could be relevant in identifying key

themes, trends and debates in this area. Their work could also inform discussions around the development of more effective CSR initiatives and sustainability policies.

Tang et al. [42] conducted a bibliometric analysis of research on the relationship between CSR, environment and energy. They argue that this topic has received increasing attention in recent years, with a growing number of studies examining the ways in which businesses can promote sustainability and reduce their environmental impact.

According to Tang et al., the main theoretical contributions of research in this area include the identification of key factors that influence businesses' adoption of CSR initiatives and the development of frameworks that can guide the design and implementation of these initiatives. They also note that there is a growing emphasis on the role of stakeholders, such as customers and employees, in promoting sustainability and energy efficiency.

In terms of practical implications, Tang et al. argue that the findings of research on CSR, environment and energy can inform the development of more effective policies and initiatives aimed at promoting sustainability and reducing environmental impact. For example, their analysis highlights the importance of government regulation and incentives in encouraging businesses to adopt sustainable practices.

Overall, Tang et al. emphasize the importance of continued research in this area, as businesses and governments around the world seek to address pressing environmental and energy challenges. They suggest that future research could focus on identifying best practices in CSR and sustainability, examining the effectiveness of existing policies and initiatives and exploring the role of technology and innovation in promoting sustainability and energy efficiency.

#### 4. Conclusions

The debate on the effects of corporate environmental responsibility has sparked the interest of academics and practitioners, suggesting a change in the way that businesses implement environmental standards [43]. This literature review aimed to examine whether the relationship between CSR, environment and energy is sufficiently debated in academic literature, using a bibliometric analysis for the period 2000–2021. The analysis revealed that the number of publications on the topic of CSR, environment and energy has increased steadily over time, with a significant increase in the last decade. The most prolific journals in this area were the *Journal of Cleaner Production*, *Corporate Social Responsibility and Environmental Management* and *Renewable and Sustainable Energy Reviews*. The analysis revealed that the most commonly used terms in this area were sustainability, corporate social responsibility, energy efficiency, renewable energy and environmental management. This suggests that the relationship between CSR, environment and energy is an important and active area of research, with a focus on sustainable and socially responsible practices.

In conclusion, the bibliometric analysis suggests that the relationship between CSR, environment and energy is an important and active area of research. While there has been a significant increase in publications on this topic over the past decade, further research is needed to fully explore the relationship between CSR, environment, energy and its implications for sustainable and socially responsible practices. David A. Brown [44] argues that, while the relationship between CSR, environment and energy has been extensively researched, there is still a need for more comprehensive and integrated approaches to studying this relationship. Brown suggests that scholars should adopt a systems-thinking approach that considers the interconnections between different aspects of sustainability, including environmental, social and economic factors. Another author [45] argued that CSR can play an important role in shaping the transition to a more sustainable energy system. Rothenberg contends that companies can contribute to the development of a more sustainable energy system by investing in renewable energy technologies, advocating for policy changes that support sustainability and engaging in collaborative initiatives with other stakeholders. Michael Hopkins [46] also wrote extensively on the topic of CSR and energy. In his book *The Planetary Bargain: Corporate Social Responsibility Comes of Age*, Hopkins (2003) argues that CSR has the potential to help businesses to move toward a more

sustainable energy system by encouraging them to adopt more responsible practices and invest in renewable energy technologies.

Overall, these authors and others suggest that, while the relationship between CSR, environment and energy has been studied extensively, there is still a need for more comprehensive and integrated approaches to understanding this relationship. Furthermore, many authors [47–51] argue that CSR can play an important role in shaping the transition to a more sustainable energy system by encouraging companies to adopt more responsible practices and invest in renewable energy technologies.

The contribution of the work based on the bibliometric analysis to the improvement of the literature can be justified by several reasons. First of all, we identified three groups of works in the literature: a group that is based on the analysis of the links between CSR and the environment, a group of works that aims at the links between energy and the environment, which is otherwise the most consistent, and a group of works that emphasize the relationships between CSR and energy. Secondly, the analysis carried out allows us to identify the countries, institutions and scientists who were particularly influential in the analyzed fields. A third contribution of the paper is the fact that future research directions are proposed because bibliometric analyses are a real engine for highlighting and motivating the academic impact of research based on certain themes [40].

A bibliometric analysis of the relationship between CSR, environment and energy has several theoretical and practical implications. Firstly, from a theoretical perspective, such an analysis could help to identify gaps in the existing literature and highlight areas that require further research. For instance, it could reveal which specific topics within the broader field of CSR, environment and energy have received the most attention from researchers, and which areas have been relatively neglected. This, in turn, could guide future research efforts and help to build a more comprehensive understanding of the complex relationships between CSR, environment and energy. Secondly, a bibliometric analysis could help to identify key trends and patterns in the literature. For example, it could reveal which authors and institutions are most active in the field, which journals publish the most articles and which keywords are most commonly used. This information could help researchers and practitioners to stay up-to-date with the latest developments in the field and identify potential collaborators or sources of funding. Thirdly, a bibliometric analysis could help to inform policy and practice. For instance, it could provide insights into the impact of different types of CSR initiatives on environmental and energy outcomes or help to identify the most effective strategies for promoting sustainable practices in the energy sector. Policymakers and practitioners could use this information to design more effective regulations and incentives or to develop CSR programs that are better aligned with broader sustainability goals. Fourthly, a bibliometric analysis could help to identify potential areas of collaboration between different stakeholders. For example, it could reveal which industries or sectors are most involved in CSR initiatives related to the environment and energy and which non-governmental organizations (NGOs) or other civil society groups are most active in advocating for sustainability. This information could help to promote collaboration between different actors and foster more effective partnerships. Finally, a bibliometric analysis could help to raise awareness about the importance of CSR, environment and energy among a broader audience. By synthesizing and visualizing a large body of research, it could help to make complex concepts more accessible and facilitate knowledge transfer across different disciplines and sectors. This could ultimately help to promote a more widespread adoption of sustainable practices and contribute to broader societal change.

**Author Contributions:** Conceptualization, R.M.B. and N.M.D.; methodology, G.B. and N.M.D.; software, G.B.; validation, A.G.M. and R.M.B.; formal analysis, S.P.; investigation, A.G.M.; resources, R.M.B.; data curation, G.B.; writing—original draft preparation, N.M.D. and S.P.; writing—review and editing, S.P.; visualization, A.G.M.; supervision, R.M.B.; project administration, N.M.D. and G.B. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Data Availability Statement:** Not applicable.

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

1. Lu, J.; Ren, L.; Yao, S.; Qiao, J.; Strielkowski, W.; Streimikis, J. Comparative Review of Corporate Social Responsibility of Energy Utilities and Sustainable Energy Development Trends in the Baltic States. *Energies* **2019**, *12*, 3417. [CrossRef]
2. Carroll, A.B. Corporate social responsibility: Will industry respond to cutbacks in social program funding. *Vital Speeches Day* **1983**, *49*, 604–608.
3. Mazur, B. Corporate Social Responsibility in Poland: Businesses' Self-Presentations. *Procedia Soc. Behav. Sci.* **2015**, *213*, 593–598. [CrossRef]
4. Stjepcevic, J.; Siksnelyte, I. Corporate social responsibility in energy sector. *Transform. Bus. Econ.* **2017**, *16*, 21–33.
5. Gigauri, I.; Vasilev, V. Corporate Social Responsibility in the Energy Sector: Towards Sustainability. In *Energy Transition: Economic, Social and Environmental Dimensions*, 1st ed.; Springer: Singapore, 2022.
6. KPMG. Survey of Corporate Responsibility Reporting 2017: "The Road Ahead". Available online: <https://www.integratedreporting.org/resource/kpmg-the-road-ahead-the-kpmg-survey-of-corporate-responsibility-reporting-2017/> (accessed on 8 January 2023).
7. Fukuda, K.; Ouchida, Y. Corporate social responsibility (CSR) and the environment: Does CSR increase emissions? *Energy Econ.* **2020**, *92*, 104933. [CrossRef]
8. European Commission. Towards a Sustainable Europe by 2030. 2019. Available online: [https://commission.europa.eu/system/files/2019-02/rp\\_sustainable\\_europe\\_30-01\\_en\\_web.pdf](https://commission.europa.eu/system/files/2019-02/rp_sustainable_europe_30-01_en_web.pdf) (accessed on 10 January 2023).
9. Regulation (EC) No 761/2001 of the European Parliament and of the Council of 19 March 2001 Allowing Voluntary Participation by Organisations in a Community Eco-Management and Audit Scheme (EMAS). 2001. Available online: <http://data.europa.eu/eli/reg/2001/761/oj/legislation> (accessed on 10 April 2023).
10. Bădîrcea, R.M.; Manta, A.G.; Pîrvu, R.; Florea, N.M. Corporate Social Responsibility: An Analysis of Romanian Banks. In *Essential Issues in Corporate Social Responsibility. CSR, Sustainability, Ethics & Governance*; Idowu, S., Sitnikov, C., Eds.; Springer: Cham, Switzerland, 2020. [CrossRef]
11. Implementing the Partnership for Growth and Jobs: Making Europe a Pole of Excellence on Corporate Social Responsibility. 2006. Available online: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0136:FIN:en:PDF> (accessed on 5 January 2023).
12. Meghisan-Toma, G.M.; Puiu, S.; Florea, N.; Meghisan, F.; Bădîrcea, R.; Manta, A. Sustainable Transformation of Romanian Companies through Industry 4.0, Green Production and Environment Commitment. *Amfiteatru Econ.* **2022**, *24*, 46–60. [CrossRef]
13. Shahbaz, M.; Karaman, A.S.; Kilic, M.; Uyar, A. Board attributes, CSR engagement, and corporate performance: What is the nexus in the energy sector? *Energy Policy* **2020**, *143*, 111582. [CrossRef]
14. Jacyno, M.; Korkosz-Gębska, J.; Maj, M.; Milewski, J.; Trębacz, D.; Wójcik, G. Społecznie odpowiedzialna energetyka. *Rynek Energii* **2013**, *6*, 3–12.
15. Kolk, A. Trajectories of sustainability reporting by MNCs. *J. World Bus.* **2010**, *45*, 367–374. [CrossRef]
16. Bansal, P.; Roth, K. Why Companies Go Green: A Model of Ecological Responsiveness. *Acad. Manag. J.* **2000**, *43*, 717–736. [CrossRef]
17. Uyerra, E.; Flanagan, K.; Magro, E.; Wilson, J.R.; Sotarauta, M. Understanding regional innovation policy dynamics: Actors, agency and learning. *Environ. Plan. C Politics Space* **2017**, *35*, 559–568. [CrossRef]
18. Dangelico, R.M.; Pujari, D. Mainstreaming green product innovation: Why and how companies integrate environmental sustainability. *J. Bus. Ethics* **2010**, *95*, 471–486. [CrossRef]
19. Donthu, N.; Kumar, S.; Mukherjee, D.; Pandey, N.; Lim, W.M. How to conduct a bibliometric analysis: An overview and guidelines. *J. Bus. Res.* **2021**, *133*, 285–296. [CrossRef]
20. Wallin, J.A. Bibliometric Methods: Pitfalls and Possibilities. *Basic Clin. Pharmacol. Toxicol.* **2005**, *97*, 261–275. [CrossRef] [PubMed]
21. Baker, H.K.; Kumar, S.; Pandey, N. Thirty years of the Global Finance Journal: A bibliometric analysis. *Glob. Financ. J.* **2021**, *47*, 100492. [CrossRef]
22. Chen, C.; Dubin, R.; Kim, M.C. Emerging trends and new developments in re-generative medicine: A scientometric update (2000–2014). *Expert Opin. Biol. Ther.* **2014**, *14*, 1295–1317. [CrossRef]
23. Block, J.; Fisch, C. Eight tips and questions for your bibliographic study in business and management research. *Manag. Rev. Q.* **2020**, *70*, 307–312. [CrossRef]
24. Al, U.; Soydal, İ. Dergi kendine atfının etkisi: Energy education science and technology örneği. *Türk Kütüphaneciliği* **2012**, *26*, 699–714.
25. Verma, S.; Gustafsson, A. Investigating the emerging COVID-19 research trends in the field of business and management: A bibliometric analysis approach. *J. Bus. Res.* **2020**, *118*, 253–261. [CrossRef]
26. Zupic, I.; Čater, T. Bibliometric methods in management and organization. *Organ. Res. Methods* **2015**, *18*, 429–472. [CrossRef]

27. Van Eck, N.J.; Waltman, L. Citation-based clustering of publications using CitNetExplorer and VOSviewer. *Scientometrics* **2017**, *111*, 1053–1070. [[CrossRef](#)] [[PubMed](#)]
28. Al Husaeni, D.F.; Nandiyanto, A.B.D. Bibliometric using Vosviewer with Publish or Perish (using google scholar data): From step-bystep processing for users to the practical examples in the analysis of digital learning articles in pre and post COVID-19 pandemic. *ASEAN J. Sci. Eng.* **2022**, *2*, 19–46. [[CrossRef](#)]
29. Hamidah, I.; Sriyono, S.; Hudha, M.N. A Bibliometric analysis of Covid-19 research using VOSviewer. *Indones. J. Sci. Technol.* **2020**, *5*, 209–216. [[CrossRef](#)]
30. Orduña-Malea, E.; Costas, R. Link-based approach to study scientific software usage: The case of VOSviewer. *Scientometrics* **2021**, *126*, 8153–8186. [[CrossRef](#)]
31. Xie, L.; Chen, Z.; Wang, H.; Zheng, C.; Jiang, J. Bibliometric and visualized analysis of scientific publications on atlantoaxial spine surgery based on Web of Science and VOSviewer. *World Neurosurg.* **2020**, *137*, 435–442.e4. [[CrossRef](#)] [[PubMed](#)]
32. Yu, Y.; Li, Y.; Zhang, Z.; Gu, Z.; Zhong, H.; Zha, Q.; Yang, L.; Zhu, C.; Chen, E. A bibliometric analysis using VOSviewer of publications on COVID-19. *Ann. Transl. Med.* **2020**, *8*, 816. [[CrossRef](#)] [[PubMed](#)]
33. Nandiyanto AB, D.; Al Husaeni, D.N.; Al Husaeni, D.F. A bibliometric analysis of chemical engineering research using VOSviewer and its correlation with Covid-19 pandemic condition. *J. Eng. Sci. Technol.* **2021**, *16*, 4414–4422.
34. Van Eck, N.J.; Waltman, L. Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics* **2009**, *84*, 523–538. [[CrossRef](#)]
35. Bădîrcea, R.M.; Florea, N.M.; Manta, A.G.; Puiu, S.; Doran, M.D. Comparison between Romania and Sweden Based on Three Dimensions: Environmental Performance, Green Taxation and Economic Growth. *Sustainability* **2020**, *12*, 3817. [[CrossRef](#)]
36. Kuzior, A.; Sira, M. A Bibliometric Analysis of Blockchain Technology Research Using VOSviewer. *Sustainability* **2022**, *14*, 8206. [[CrossRef](#)]
37. Wang, X.; Xu, Z.; Škare, M. A bibliometric analysis of economic research-ekonomiska istrazivanja (2007–2019). *Econ. Res. Ekon. Istraž.* **2020**, *33*, 865–886. [[CrossRef](#)]
38. Lobonț, O.R.; Țăran, A.M.; Costea, F. E-Government Research Still Matter? A Bibliometric Analysis. *Ann. Univ. Dunarea Jos Galati Fascicle I Econ. Appl. Inform.* **2020**, *26*, 58–63. [[CrossRef](#)]
39. Mörschbacher, A.P.; Granada, C.E. Mapping the worldwide knowledge of antimicrobial substances produced by *Lactobacillus* spp.: A bibliometric analysis. *Biochem. Eng. J.* **2022**, *180*, 108343. [[CrossRef](#)]
40. Guo, Y.M.; Huang, Z.L.; Guo, J.; Li, H.; Guo, X.R.; Nkeli, M.J. Bibliometric analysis on smart cities research. *Sustainability* **2019**, *11*, 3606. [[CrossRef](#)]
41. Guo, Z.; Zhang, Y.; Lu, W. Attention guided graph convolutional networks for relation extraction. *arXiv* **2019**, arXiv:1906.07510.
42. Khan, A.; Goodell, J.W.; Hassan, M.K.; Paltrinieri, A. A bibliometric review of finance bibliometric papers. *Financ. Res. Lett.* **2022**, *47*, 102520. [[CrossRef](#)]
43. Tsendsuren, C.; Yadav, P.; Kim, S.; Han, S. The Effects of Managerial Competency and Local Religiosity on Corporate Environmental Responsibility. *Sustainability* **2021**, *13*, 5857. [[CrossRef](#)]
44. Brown, D.A. Corporate social responsibility and sustainability: The new bottom line? *J. Bus. Leadersh. Res. Pract. Teach.* **2015**, *11*, 29–36.
45. Rothenberg, S. Corporate social responsibility and the transition to sustainable energy. In *Encyclopedia of Corporate Social Responsibility*; Idowu, S.O., Capaldi, N., Zu, L., Das Gupta, A., Eds.; Springer: Berlin, Germany, 2013; pp. 568–572.
46. Hopkins, M. *The Planetary Bargain: Corporate Social Responsibility Comes of Age*; Earthscan Publications: London, UK, 2003.
47. Jonker, J.; Janssen Groesbeek, M. Corporate social responsibility as radical innovation: A research agenda. *J. Clean. Prod.* **2015**, *107*, 42–50.
48. Heskett, J.L. Can corporate social responsibility drive energy innovation? *Harv. Bus. Rev.* **2014**, *92*, 34–35.
49. Preuss, L.; Tavares, S. Corporate social responsibility and regulation: Prospects and limitations in the energy sector. *J. Bus. Ethics* **2017**, *144*, 727–743.
50. Panwar, R.; Jain, S. The role of corporate social responsibility in promoting renewable energy in India. *Renew. Sustain. Energy Rev.* **2018**, *81*, 1002–1010.
51. Buzogany, A.; Walske, J. The role of corporate social responsibility in promoting energy efficiency in commercial real estate. *J. Sustain. Real Estate* **2015**, *7*, 83–97.

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