sustainability

MDPI

Article

Bibliometric Analysis on Sustainable Supply Chains

Franklin Enrique Reyes-Soriano [1], Juan Carlos Muyulema-Allaica [1,2,*], Christina Michelle Menéndez-Zaruma [1], Jorge Manuel Lucin-Borbor [1], Isabel Del Roció Balón-Ramos [1] and Gerardo Antonio Herrera-Brunett [1]

[1] Industrial Engineering Research and Innovation Center, State University Santa Elena Peninsula, La Libertad 240204, Ecuador
[2] INGEPRO Research Group, Department of Transport and Projects and Processes Technology, University of Cantabria, 39005 Santander, Spain
* Correspondence: jmuyulema@upse.edu.ec

Abstract: In recent years, efforts have been expanded to create and adopt tools that contribute to mitigating the environmental impact caused by industrial development. In this sense, the objective of this article is twofold: (i) to identify the countries worldwide that have generated and disseminated the most information on sustainable supply chains (SSCs) and (ii) to recognize the organizations that have interacted most with each other to generate greater scientific contributions on SSCs. Methodologically, the starting point was a bibliometric scan, and a systematic review of the literature focusing on SSCs was carried out. The search engine used was the Dimensions platform, limited only to the years 2020, 2021 and 2022, and the articles had to belong to the categories of engineering and economics. For the network visualization, VOSviewer was used, as it allows the connections to be visualized in a network graph. The findings of this paper show the existing links between organizations worldwide whose purpose is the study and scientific dissemination of SSCs. The countries that have generated the greatest scientific contribution in the last three years with respect to SSCs were China, the United Kingdom, the United States, Italy and the Netherlands. In addition, the organizations that have interacted the most belong to the European Union.

Keywords: supply chains; environmental impact; engineering; sustainability; industrial development

Citation: Reyes-Soriano, F.E.; Muyulema-Allaica, J.C.; Menéndez-Zaruma, C.M.; Lucin-Borbor, J.M.; Balón-Ramos, I.D.R.; Herrera-Brunett, G.A. Bibliometric Analysis on Sustainable Supply Chains. *Sustainability* **2022**, *14*, 13039. https://doi.org/10.3390/su142013039

Academic Editor: Wu-Jang Huang

Received: 17 August 2022
Accepted: 8 October 2022
Published: 12 October 2022

1. Introduction

A supply chain is defined as a set of companies comprising suppliers, manufacturers and distributors. In this context, traditional supply chains have only one direction, i.e., they transform the raw material and the sale of the finished product ends at the end of the supply chain.

While a sustainable supply chain (SSC), like traditional supply chains, seeks to use resources efficiently and to ensure the satisfaction of customer needs, SSCs also implement an environmentally friendly philosophy and tools in an attempt to reduce the environmental impact as much as possible in all their links. The importance of adopting SSCs is to generate environmental awareness in a company's production systems as well as in transportation, in such a way that competitive advantages are obtained in the supply chain in the environmental field [1–3].

A relevant strategic driver (a tool that allows the elevation of a process, decision making or the implementation of methodologies and philosophies) for companies, that which also causes a positive impact on their economy, and in turn develops competitiveness, having as a priority the improvement of their practices in order to generate the least environmental impact, is the adoption of an SSC.

Not long ago, it was thought that the remains of industrial processes, be they fluids or solids, were materials that could no longer be used. This led to an increased demand for raw materials from non-renewable natural resources, thus driving the increase of waste and the generation of carbon emissions into the environment [4]. However, since the

definition of practices related to the circular economy (CE), waste from industrial processes is considered raw material for the development of other activities [5,6]. Following with the concept of the CE, Mogale et al. [7] pointed out that the term refers to the creation of value for recovered materials (used products). In this context, Ref. [8] highlights the relevance given to the implementation of secondary resources as part of the raw material used in production processes, which has been a key point as a driver of the CE and in the sustainability agenda within the framework of the UN's Sustainable Development Goals (SDGs). In this context, SDG 12 (Sustainable Consumption and Production) focuses on waste reduction by 2030.

In order to progress towards a sustainable, clean and CE, the European Union (EU) aims to contribute to the protection of the environment, preserving biodiversity and reducing carbon emissions [9,10].

It should be noted that the largest percentage of the environmental impact that a company generates comes from its logistics system [11]. In this context, the implementation of SSCs aims to direct the processes of the acquisition and transformation of raw materials, inventories, storage and transportation systems in environmentally friendly models, thus reducing excess gas emissions and waste of non-renewable resources and generating a lower impact on the economy, as well as on the social environment [12,13]. In the same vein, Geng et al. [14] stated that Sustainable Supply Chain Management (SSCM) includes the application of internal environmental practices, green procurement, supplier selection, investment recovery, implementation of green designs and cooperation with customers. Implementing SSCM in the industrial context results in obtaining several gains, such as: maximizing environmental performance, waste reduction, cost savings which translate to increased profits and market share objectives [15].

Putting SSCs or green supply chains into practice has led academia and supply chain professionals to show greater interest and conduct studies on this topic [16]. For Moreno-Miranda and Dries [17], the coordination between partners and traders is relevant in the social, economic and environmental spheres in the links of supply chains, which is why they suggest expanding research on the relationship between coordination and sustainability. For Xu et al. [18], the purpose of coordination between each individual interacting in the links of the supply chain is to promote initiatives in the management of supply chains, which will lead to a win-win situation throughout the supply chain. Schultz et al. [19] agree that in order to implement SSCs and circular supply chains, the participation of both NGOs and academia is important, since by collaborating with more organizations the line of sustainability can be covered, and by having more information it will be possible to implement new tools that will contribute to making the actions of companies more sustainable throughout their supply chain.

SSCM and greening imply the importance of the resilience of the supplier to an ecological production, this being a multidimensional ability in which company and supplier have to collaborate and improve their capacity to respond to environmental policies that may be implemented in order to reduce the environmental impact generated by their production systems. In this context, Martin-Breen and Anderies [20] define resilience as the capacity to redirect, recover and resist in the face of problems and changes, thus adopting improvement responses. However, managing an SSC also involves the flow of revenue costs [21].

A study of the relationship between SSC management practices and environmental performance by Geng et al. [14] shows that there is a strong correlation between eco-design, supplier integration and customer cooperation. Collaboration between the company and suppliers almost always proves to be a great advantage. In the field of sustainability, this collaboration is key to the development of new ideas and environmental tools; an example of this statement is the design and development of sustainable packaging and products. The collaboration of both parties in this process guarantees the connection between the parties, as well as work with favorable results, because both parties know what the objective is and that the success that the product obtains in the market will be translated into economic benefits and boost the competitiveness of the company [22].

This is why there is a need for collaboration between researchers and practitioners with expertise in SSC development, implementation and modeling. It is also important to collaborate with companies that have implemented SSCs by providing relevant and replicable data and information.

This study seeks to answer the following questions: Which countries worldwide have generated the greatest scientific contribution with respect to SSCs in the last three years? Which are the institutions that most interact with each other in the dissemination of information related to SSCs? Additionally, as a product of this research, it was possible to determine the continent that has made the greatest scientific contribution in the last three years with respect to SSCs.

In this sense, highlighting the countries that have contributed the most with information on SSCs will allow more interested parties to know in which countries the development of the data, application and study of SSCs has been exploited in order to identify where to direct the search for antecedents that allow maximum exploitation. This line of research, along with the information provided through this bibliometric analysis, will allow interested organizations to determine which organizations to generate interactions with in order to demonstrate how the adoption of SSCs transcends in different environments at a global level. In the same way, the interaction of more institutions can generate the evaluation of drivers and barriers of SSCs.

2. Materials and Methods

Methodologically, use was made of the systematic literature review (SLR) approach, which has been adopted by different authors [23–25]. This method was initially used to identify the orientations of existing articles and the information content they provided.

Subsequently, a bibliometric scanning approach was adopted by different authors [26–28] in order to delineate the elements of the article and the scope of the publication. This review focused on the area of SSCs, for which Dimensions was considered as the search engine, considering that this platform has a much broader and more complete data infrastructure that allows users to investigate links between a wide range of research data. For a more detailed search, the following filters were implemented: first, we filtered the documents that had titles or abstracts related to SSCs; the next filter was the selection of only open access articles (transparency and access of scientific material to the public without any type of economic barrier); the research was limited only to the years 2020, 2021 and 2022; and finally these articles had to belong to the categories of engineering and economics. VOSviewer was used for the network visualization, as it allows the connections to be visualized in a network graph.

Methodologically, exclusion and inclusion criteria were used, developed in a line of action that consisted of three phases: (i) planning of the review, which consisted of a previous review of issues related to industry and the CE, selection and study of the tool that would be applied for the development of the research and review of information related to sustainable supply chains, with the purpose of organizing and directing the study; (ii) execution of the review, for which information analysis was carried out in different search engines, using keywords such as "circular economy", "sustainable supply chains" and "tools and barriers for sustainable supply chains"; and (iii) bibliometric analysis, which involved selecting a search engine compatible with software for building bibliometric networks, filtering information (articles) according to the inclusion and exclusion criteria, analysis of the modeling results and description of the findings (Figure 1).

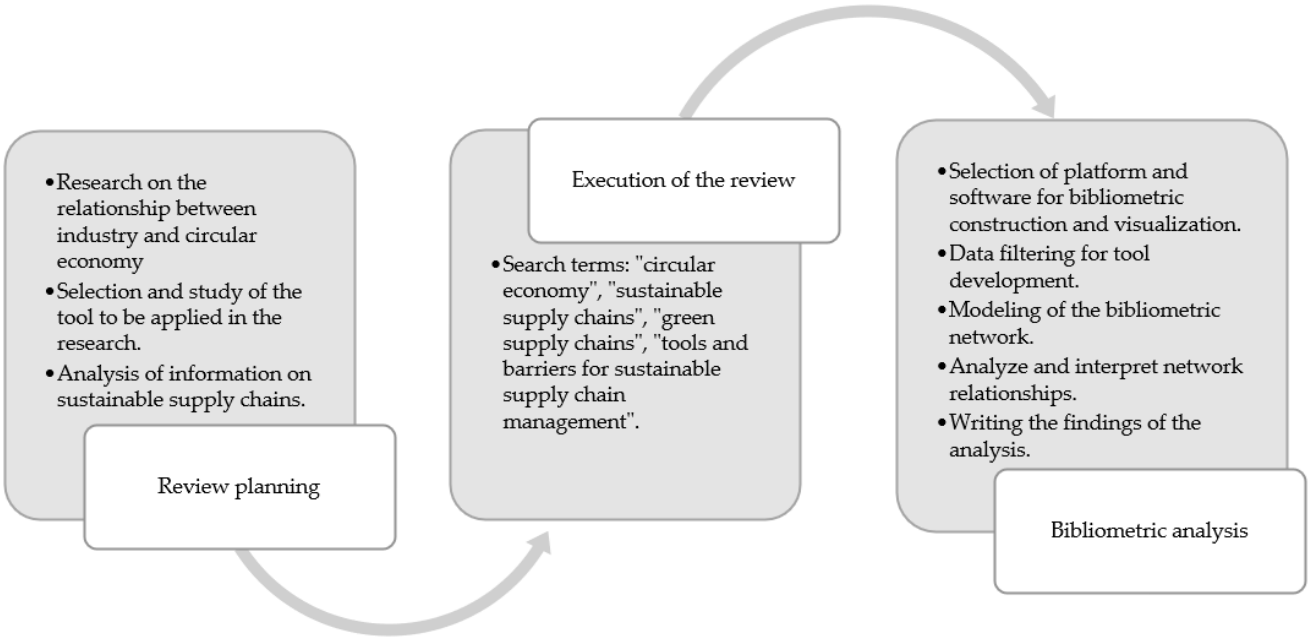

Figure 1. Line of action of the methodology.

3. Results

3.1. Countries and Their Number of SSC-Related Publications

The network diagram shows the distribution of publications of the 51 main producing countries during the period 2020–2022 (Figure 2).

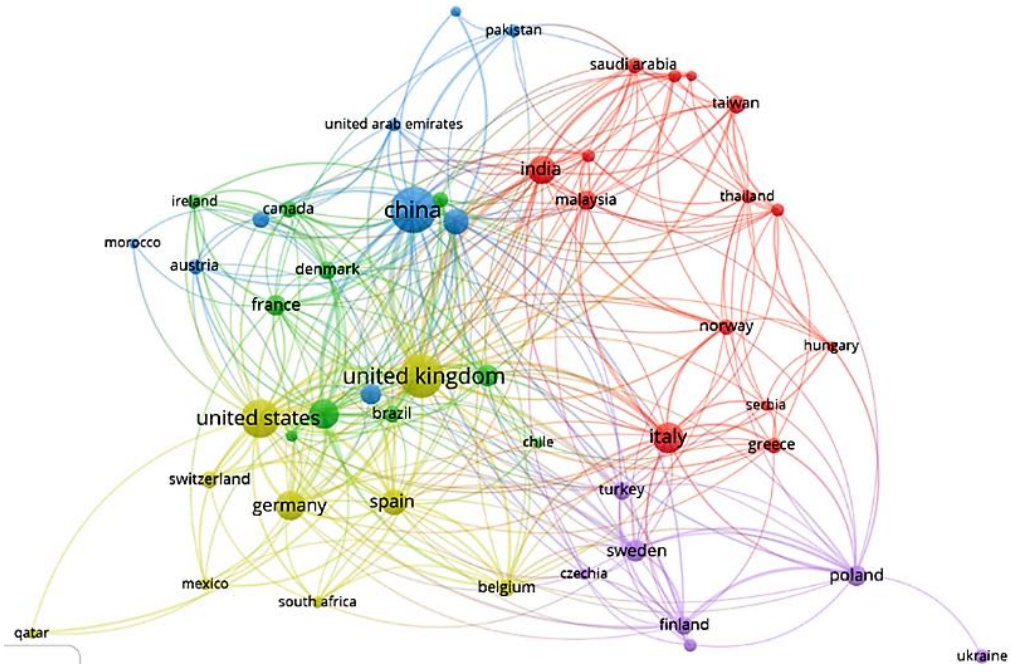

Figure 2. Network diagram of co-authorship–countries relationship.

The larger bubbles represent the countries with the highest number of article publications, with China being the country that has published the most articles (94); the largest yellow bubble represents the United Kingdom, which is one of the countries with the highest scientific contribution to SSCs, with a total of 83 publications in the last 3 years. The United States is represented in the graph by a medium-sized yellow bubble, representing a

total of 63 articles published by the North American country, followed by Italy, represented by a medium-sized red bubble, with a total of 41 publications, then by the Netherlands, with 39 published articles. The medium-sized yellow bubbles represent Germany with 37 publications and Spain with 29 published articles. India, with 36, is represented by a small red bubble.

Five groups (clusters) of countries are evident, each represented by a different color (Figure 2). The size of a country's label and circle is determined by the number of publications in the country and the weight of the article. The higher the number of posts a country has and the weight of an article, the larger the country label and circle will be. Graphically representing the network makes it easy to visualize the interactions between the five groups. Each group is determined by the size of the sphere and a characteristic color that interact depending on the level of collaboration. The larger the sphere, the greater the collaboration and number of publications in each of the countries taken for analysis. However, when one interacts with other countries belonging to other clusters, the proximity between the countries does not represent their geographical proximity, but instead the collaboration between them (Figure 3).

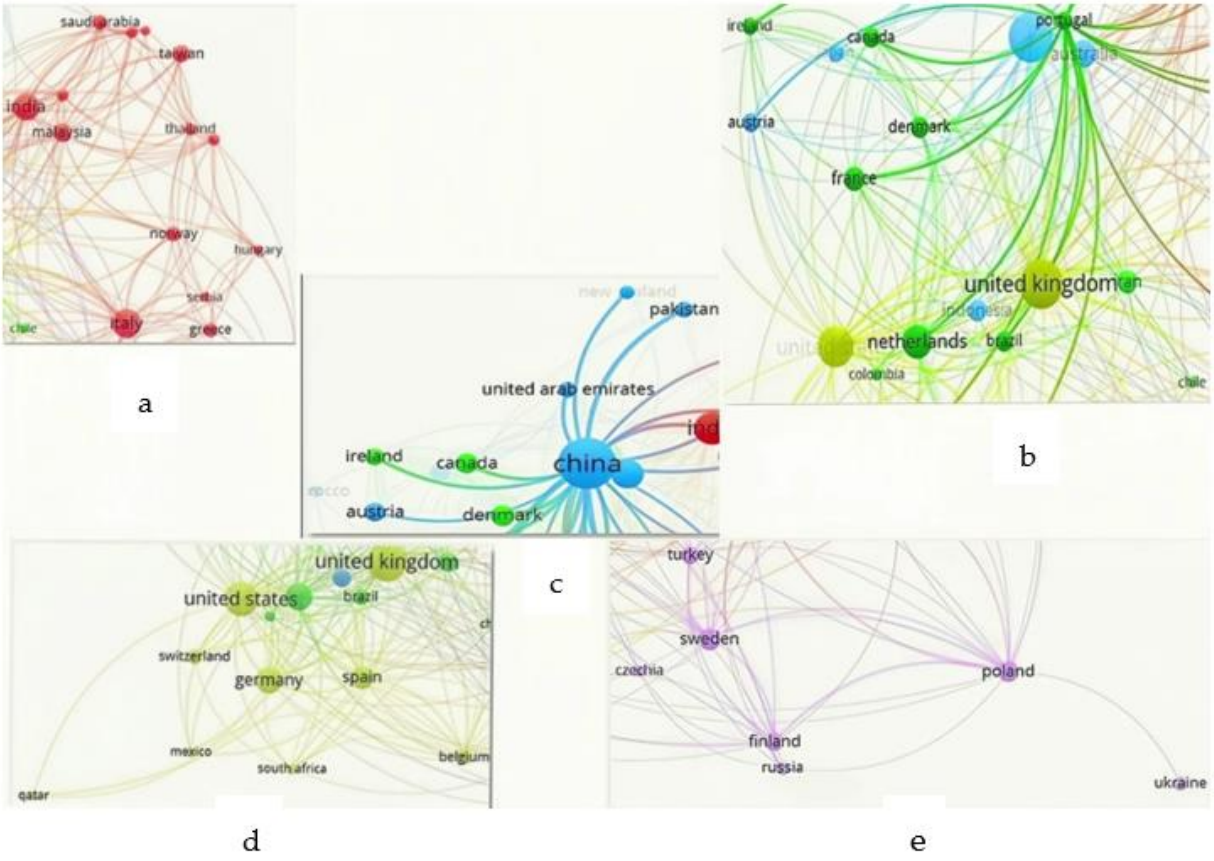

Figure 3. Network diagram analysis of the co-authorship–country relationship; (**a**) red cluster; (**b**) green cluster; (**c**) blue cluster; (**d**) yellow cluster; (**e**) cluster violet.

In cluster 1 (red), there are fourteen countries: Bangladesh, Egypt, Greece, Hungary, India, Italy, Malaysia, Norway, Saudi Arabia, Serbia, South Korea, Taiwan, Thailand and Vietnam, whose main research focus is related to SSCs in agribusiness and the COVID-19 pandemic, including emergencies in SCs due to the COVID-19 pandemic (Figure 3a).

In cluster 2 (green), there are ten countries: Brazil, Canada, Chile, Colombia, Denmark, France, Iran, Ireland, the Netherlands and Portugal, whose research is in the field of competitive strategies of SSCs and the resilience versus sustainability of SSCs (Figure 3b).

In cluster 3 (blue), there are nine countries: Australia, Austria, China, Indonesia, Japan, Morocco, New Zealand, Pakistan and the United Arab Emirates, characterized by the fact

that its research line focuses on issues related to SSC risk mitigation strategies, strategies to promote SSCs and SSC agility strategies (Figure 3c).

In cluster 4 (yellow), there are nine countries: Belgium, Germany, Mexico, Qatar, South Africa, Spain, Switzerland, the United Kingdom and the United States, countries whose main research focus is related to the application of Industry 4.0, the circular economy in SCs, drivers of SSCs and the barriers faced by SSCs (Figure 3d).

In cluster 5 (violet), there are seven countries: Czechia, Finland, Poland, Russia, Sweden, Turkey and Ukraine, whose research field is related to improvements in SSC performance, global changes in SCs and prioritization of strategies in SSCs (Figure 3e).

3.2. Co-Authorship–Countries

Table 1 shows the list of the top 51 countries with respect to SSC-related scientific dissemination, the number of publications per country, the total number of citations they have had and the total relevance of the links. The countries are listed in descending order with respect to the number of articles published.

Table 1. Related publication data in the top 51 countries.

Number	Country	Number of Items	Citations	Total Link Strength
1	China	94	972	79
2	United Kingdom	83	1412	117
3	United States	63	774	74
4	Italy	41	328	42
5	Netherlands	39	774	60
6	Germany	37	328	40
7	India	36	603	46
8	Spain	29	216	46
9	Australia	29	583	35
10	Iran	20	272	30
11	Sweden	20	534	27
12	France	19	145	32
13	Poland	19	241	31
14	Indonesia	18	200	13
15	Malaysia	16	202	27
16	Finland	15	33	32
17	Taiwan	15	417	31
18	Denmark	14	108	25
19	Turkey	14	144	21
20	Belgium	13	143	31
21	Canada	13	261	21
22	Brazil	13	118	17
23	Japan	12	368	14
24	Switzerland	12	101	12
25	Portugal	11	191	25
26	Saudi Arabia	11	60	20
27	Norway	11	69	17
28	Austria	11	129	13
29	Greece	10	160	18
30	Ireland	9	162	21
31	Ukraine	9	28	1
32	Pakistan	8	156	13
33	United Arab Hemispheres	8	189	113
34	Russia	8	30	10
35	South Korea	7	92	19
36	Vietnam	7	46	18
37	Thailand	7	20	15
38	Bangladesh	7	136	12

Table 1. *Cont.*

Number	Country	Number of Items	Citations	Total Link Strength
39	South Africa	6	26	13
40	Czech Republic	6	48	10
41	Mexico	6	26	9
42	Colombia	6	84	7
43	Hungary	5	35	12
44	Serbia	5	15	11
45	Egypt	5	49	10
46	Chile	5	22	7
47	New Zealand	5	179	6
48	Morocco	5	14	4
49	Qatar	5	90	4
50	Bulgaria	5	1	0
51	Romania	5	8	0

Based on the data provided by VOSviewer through a bibliometric analysis, the seven countries with the highest number of citations are: the United Kingdom with 1412 citations, China with 972 citations, the United States with 774 citations, the Netherlands with 603 citations, India with 583 citations, Australia with 534 citations and Malaysia with 417 citations.

There are two countries with a link strength above 100: the United Kingdom and the United Arab Emirates.

3.3. Co-Authorship–Organizations

Figure 4 shows the main institutions that have the greatest inter-collaboration with respect to scientific dissemination related to the sustainability of supply chains. These institutions, which have co-authorship among them, are as follows: the University of Southampton, University of Leiden, University of Twente, University of Utrecht, Vienna University of Economics and University of London. The University of Sydney and Sydney University of Technology belong to Oceania.

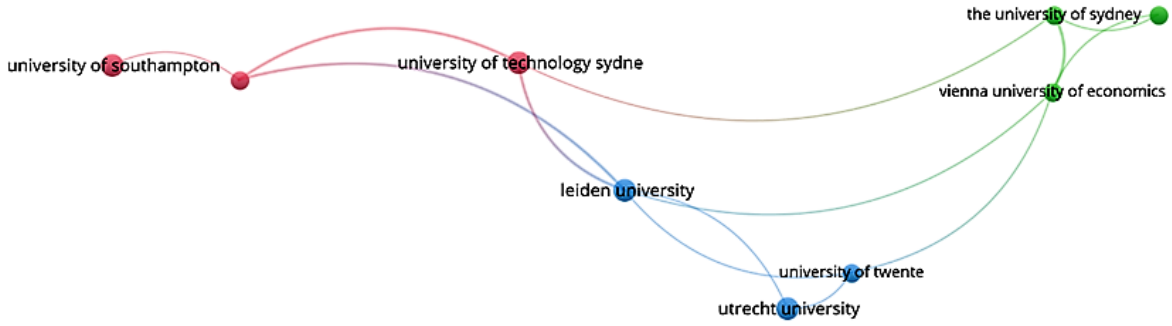

Figure 4. Co-authorship relationship organizations.

All of these universities are from the European continent, demonstrating that there is greater scientific collaboration on SSCs among European institutions.

3.4. Most Cited Institutions

Table 2 shows the 21 most productive institutions according to their publications, which are organized in descending order of number of publications.

The five most productive institutions are in Europe. The institutions ranked fifth, fourth and third, respectively, are: Utrecht University, Sydney University of Technology and Leiden University, having published six papers each. Wageningen University and

Research is in second place with 8 published papers, while the University of Sheffield is the leading institution with a total of 12 published papers.

Table 2. List of the twenty-one most productive institutions.

Number	Organization	Number of Items	Citations	Total Link Strength
1	University of Sheffield	12	301	4
2	Wageningen University and Research	8	40	1
3	Leiden University	6	94	7
4	University of Technology Sydney	6	180	5
5	Utrecht University	6	148	2
6	Eth Zurich	6	32	1
7	Imperial College London	6	78	1
8	University of Southampton	6	150	1
9	University of Groningen	6	34	0
10	Delft University of Technology	5	138	5
11	University of Vienna	5	91	5
12	Cranfield University	5	24	4
13	University of Sydney	5	101	4
14	Coventry University	5	175	3
15	National University of Malaysia	5	353	3
16	University of Twente	5	98	3
17	University of Oxford	5	55	2
18	UNSW Sydney	5	20	2
19	University of Manchester	5	14	1
20	Ghent University	5	80	0
21	University of Tehran	5	40	0

The citations of an article show its academic contribution. The more citations an article receives, the more relevant it is, and the institutions that publish them acquire a greater weight in the field of research, which allows the academic level of these institutions to be evaluated and classified.

Table 2 shows the number of citations of the 21 most productive institutions with respect to SSC research. The seven institutions with the highest number of citations are: the National University of Malaysia (353 citations), University of Sheffield (301 citations), Sydney University of Technology (180 citations), Coventry University (175 citations), University of Southampton (150 citations), Utrecht University (148 citations) and Delft University of Technology (138 citations).

Leiden University has a bond strength equal to 7, while the University of Technology Sydney, Delft University of Technology and University of Vienna have a bond strength equal to 5.

4. Discussion

The adoption of SSCs is currently a challenge that is developing more and more. Researchers, academia and companies are facing this challenge, with the aim of improving their practices, developing systems, generating tools and disseminating information on the sustainability of supply chains in such a way that they are extremely environmentally friendly. Although the level of adoption of sustainability in supply chains has increased in recent years, it is necessary for more companies to join the practice, as it is much easier to demonstrate the ecological and social relationship throughout supply chains. This is congruent with what has been demonstrated by [29].

Nowadays, industries have to promote and contribute to environmental sustainability from their productive activities, as carbon dioxide (CO_2) emissions, global warming and ozone layer degradation are clear evidence of how environmentally unfriendly industrial practices are directly affecting the quality of life and ecosystems around the world. The use of energy from non-renewable sources results in harmful CO_2 emissions, causing damage

to the environment, and in turn the presence of CO_2 in the environment is causing climate change [30]. This is why many companies have decided to relate the environmental impact they generate with their social and economic impact [31].

Business resilience in the face of green production systems is very limited, due to the lack of initiative and information that organizations have on this issue. However, there are studies such as the one by Joshi [32] which mention agile supply chains, green supply chains, robust supply chains, flexible supply chains, environmentally friendly supply chains and collaborative supply chains as elements of resilience and sustainability. Similarly, Moshood et al. [33] highlight that today's supply chains need to be agile and flexible to respond positively to changes. For a supply chain to be agile, the application of the following drivers is relevant: proper integration of supply chain flows and the willingness to share information between supply chain partners [34]. For Liu et al. [23], the existence of strong supplier flexibility would be a driver to ensure supplier flexibility in the face of the adoption of environmental tools and policies that customers propose as requirements.

Encouraging the application of SSCs generates a great enhancement for the company that implements it, since this leads to its growth, a search for information and the adaptation and creation of new circular logistics systems, thus generating innovation in supply chains. Nilsson and Göransson [35] highlight influential factors in the creation of innovation for supply chains, thus providing information to move from a linear supply chain to a sustainable one. Ref. [36] points out that, in order to generate greater impact on business systems, more information and studies on the Theory of Ecological Modernization (TEM), which, when developed together with other theories, can generate innovation in supply chain management industries, must be influenced and carried out. Bearing in mind these references, it should be noted that the generation of more information related to environmental sustainability in supply chains worldwide allows the companies that implement these practices to stand out and increase their benefits.

It is important that there are more studies related to companies that have decided to implement sustainable logistics systems, models, tools and theories that contribute to the sustainability of supply chains. Chauhan et al. [37] also refer to the scarcity of studies related to the selection of collaborative partners in supply chains, the implementation of collaborative transportation, logistics and the role of technology in SSCs. Other organizations that have not yet decided to implement SSC models should propose to do so, based on scientific evidence, which, together with the experiences of companies that have decided to generate sustainable logistics, should provide accurate information and generate more innovation initiatives. Even Assumpção et al. [38] emphasize that there is a lack of information to perform SSC modeling, which leads to the use of simulated data to carry out the modeling; this generates a gap at the time of application in a real environment, since it is obvious that when applying the modeling it will generate variability.

The main limitations to the application of SSCs are: the lack of information exchange between organizations, transparency and visibility; another limiting factor for the application of sustainability in supply chains is the lack of product traceability, and the lack of interest on the part of partners in implementing sustainability practices in their companies [39]. Similarly, Ayati et al. [40] emphasize the existence of obstacles when trying to implement SSCs: a lack of technology; lack of information, data or studies related to the subject; lack of knowledge; and lack of skills development for the implementation of environmental tools. Other limitations include the absence of economic and financial elements, challenges that must be faced to find a market that implements recovered materials in its production processes and the absence of support and governmental regulations regarding sustainable practices.

The adoption of environmentally friendly production, design and logistics systems reduces the environmental impact generated by these practices; moreover, the implementation of an environmentally friendly philosophy not only benefits the ecosystem, but also generates economic and competitive growth for companies [41]. In order to carry out the adoption of SSCs, some alternatives are proposed:

1. Carbon tax: at this point, emphasis is placed on the application of standards that require payment according to the environmental footprint generated.

2. Incentives for green certification: motivating organizations to direct their practices towards sustainability could be achieved through the granting of incentives for companies that have a sustainability certification.

3. Programs in which employees are trained towards sustainability: this alternative promotes that workers obtain information related to sustainability, so that they are transmitters of this knowledge and thus achieve a social impact regarding sustainability.

4. Implement training for the organization's managers and directors: this initiative is intended to generate interest and instruct senior management on the benefits of implementing sustainable practices, and at the same time generate social responsibility within the company.

5. Promote environmental awareness through campaigns: attracting customer interest through the dissemination of information on sustainability using different mechanisms and spaces will generate customer interest in sustainable products and organizations that develop environmentally friendly practices in their processes.

6. Process management with technology of things (IT): To plan strategies and obtain information in real time, IT is important when implementing SS.

7. Implement environmental management systems: this refers to the adoption of environmental management programs that govern the environment, such as ISO 14001.

8. Generate fair trade practices: this refers to motivating trade from raw material producers to wholesalers and retailers of the finished product.

9. Incorporate worker safety programs: this is intended to emphasize that worker health and safety is relevant throughout the supply chain.

10. Provide incentives for collaboration in sustainability: it is important to emphasize that collaboration in supply chains contributes to reducing the whip effect, thereby ensuring customer satisfaction. For this reason, the implementation of contribution incentives would lead to benefits such as economic sustainability (circular economy) [42].

While it is true that the lack of information on SSCs is a limiting factor for more companies to decide to innovate in logistics, this study contributes with information on the countries that have developed the most SSC-related studies. This study contributes by providing information on the countries that have developed the most studies related to SSCs. The information shown in this study was obtained with the application of a bibliometric analysis, in which the filtration of scientific articles was performed only in the years 2020, 2021 and 2022, from the Dimensions digital platform, in such a way that it is possible to demonstrate that, despite the restrictions that the whole world had in the face of the COVID-19 pandemic, more information and business resilience continues to emerge in the face of sustainability practices in the supply chain.

Knowing the incidence of SSCs in the development of research directed to the subject shows the impact they have generated. Despite the barriers faced by companies for the implementation of SSCs, the intent of this study was to show which countries and organizations have decided to invest resources in the generation of information on the subject. Under this environment, the present study sought to contribute with updated information that refers to an interrelated network showing the relationship between the countries that have most studied and developed topics related to SSCs; additionally, the organizations where these studies were carried out were established, to serve as a consultation instrument in order to determine which countries are at the vanguard regarding SSCs, in such a way that those who are interested in the subject know the organizations with which collaborations can be carried out for investigative purposes.

The literature review presented can be used for future research in which the drivers and barriers that SSCs have and how these affect the adoption of SSCs in different scenarios are evidenced.

5. Conclusions

In this study, a bibliometric analysis was used to identify which countries and institutions have generated and disseminated information related to sustainable supply chains.

As a result of the research, it was determined that China is the country that has generated the greatest contribution, followed by the United Kingdom and the United States.

When comparing the countries with the highest number of citations for their articles, we found that the top three were the United Kingdom, China and the United States.

When comparing the correlation between institutions, it was found that 21 institutions were the most productive in terms of publications on sustainable supply chains: Sheffield University, Wageningen University and Research, Leiden University, University of Technology Sydney, Utrecht University, Eth Zurich, Imperial College London, University of Southampton, University of Groningen, Delft University of Technology, University of Vienna, Cranfield University, University of Sydney, Coventry University, National University of Malaysia, University of Twente, University of Oxford, UNSW Sydney, University of Manchester, Ghent University, University of Tehran.

In this regard, according to the number of publications they have generated, European universities lead the list.

However, in the present study it was possible to identify that the countries at the top of the list with the highest scientific contribution and the institutions with a strong correlation link are located in the European continent.

Author Contributions: Conceptualization: F.E.R.-S. Data c ration: J.M.L.-B. and G.A.H.-B. Formal analysis: I.D.R.B.-R. Funding acquisition: F.E.R.-S. Investigation: J.C.M.-A. Methodology: C.M.M.-Z. Project administration: J.M.L.-B. Software: C.M.M.-Z. Supervision: J.C.M.-A. Validation: C.M.M.-Z. Visualization: G.A.H.-B. Writing—original draft: C.M.M.-Z. Writing—review & editing: J.C.M.-A. 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. Jamshidi, R.; Ghomi, S.F.; Karimi, B. Multi-objective green supply chain optimization with a new hybrid memetic algorithm using the Taguchi method. *Sci. Iran.* **2012**, *19*, 1876–1886. [CrossRef]
2. Geng, R.; Lam, H.K.S.; Stevenson, M. Addressing modern slavery in supply chains: An awareness-motivation-capability perspective. *Int. J. Prod. Econ.* **2022**, *42*, 331–356. [CrossRef]
3. Chen, C.-C.; Shih, H.-S.; Shyur, H.-J.; Wu, K.-S. A business strategy selection of green supply chain management via an analytic network process. *Comput. Math. Appl.* **2012**, *64*, 2544–2557. [CrossRef]
4. Menon, R.R.; Ravi, V. Analysis of barriers of sustainable supply chain management in electronics industry: An interpretive structural modelling approach. *Clean. Responsible Consum.* **2021**, *3*, e100026. [CrossRef]
5. Stahel, W. The circular economy. *Nature* **2016**, *531*, 435–438. [CrossRef]
6. Tedesco, S.; Montacchini, E. From Textile Waste to Resource: A Methodological Approach of Research and Experimentation. *Sustainability* **2020**, *12*, 10667. [CrossRef]
7. Mogale, D.; De, A.; Ghadge, A.; Aktas, E. Multi-objective modelling of sustainable closed-loop supply chain network with price-sensitive demand and consumer's incentives. *Comput. Ind. Eng.* **2022**, *168*, 108105. [CrossRef]
8. Yamamoto, T.; Merciai, S.; Mogollón, J.M.; Tukker, A. The role of recycling in alleviating supply chain risk–Insights from a stock-flow perspective using a hybrid input-output database. *Resour. Conserv. Recycl.* **2022**, *185*, 106474. [CrossRef]
9. Cifuentes-Faura, J. European Union policies and their role in combating climate change over the years. *Air Qual. Atmosphere Health* **2022**, *15*, 1333–1340. [CrossRef] [PubMed]
10. Rizos, V.; Elkerbout, M.; Egenhofer, C. Circular economy for climate neutrality: Setting the priorities for the EU. CEPS Place du Congrès, 22 November 2019. Available online: www.ceps.eu (accessed on 2 August 2022).
11. de Souza, E.; Kerber, J.; Bouzon, M.; Rodriguez, C. Performance evaluation of green logistics: Paving the way towards circular economy. *Clean. Logist. Supply Chain* **2022**, *3*, 100019. [CrossRef]
12. Becerra, P.; Mula, J.; Sanchis, R. Green supply chain quantitative models for sustainable inventory management: A review. *J. Clean. Prod.* **2021**, *328*, 129544. [CrossRef]

13. Younis, H.; Sundarakani, B.; O'Mahony, B. Investigating the relationship between green supply chain management and corporate performance using a mixed method approach: Developing a roadmap for future research. *IIMB Manag. Rev.* **2019**, *32*, 305–324. [CrossRef]
14. Geng, R.; Mansouri, S.A.; Aktas, E. The relationship between green supply chain management and performance: A meta-analysis of empirical evidences in Asian emerging economies. *Int. J. Prod. Econ.* **2017**, *183*, 245–258. [CrossRef]
15. Gandhi, S.; Mangla, S.K.; Kumar, P.; Kumar, D. Evaluating factors in implementation of successful green supply chain management using DEMATEL: A case study. *Int. Strateg. Manag. Rev.* **2015**, *3*, 96–109. [CrossRef]
16. Gonzalez, C.; Agrawal, V.; Johansen, D.; Hooker, R. Green supply chain practices: The role of institutional pressure, market orientation, and managerial commitment. *Clean. Logist. Supply Chain* **2022**, *5*, 100067. [CrossRef]
17. Moreno-Miranda, C.; Dries, L. Integrating coordination mechanisms in the sustainability assessment of agri-food chains: From a structured literature review to a comprehensive framework. *Ecol. Econ.* **2022**, *192*, 107265. [CrossRef]
18. Xu, S.; Tang, H.; Lin, Z.; Lu, J. Pricing and sales-effort analysis of dual-channel supply chain with channel preference, cross-channel return and free riding behavior based on revenue-sharing contract. *Int. J. Prod. Econ.* **2022**, *249*, 108506. [CrossRef]
19. Schultz, F.C.; Everding, S.; Pies, I. Circular supply chain governance: A qualitative-empirical study of the European polyurethane industry to facilitate functional circular supply chain management. *J. Clean. Prod.* **2021**, *317*, 128445. [CrossRef]
20. Martin-Breen, P.; Anderies, J.M. Resilience: A Literature Review. The Bellagio Initiative: The Future of Philanthropy and Development in the Pursuit of Human Wellbeing. 2011. Available online: http://opendocs.ids.ac.uk/opendocs/handle/123456789/3692 (accessed on 5 August 2022).
21. Tseng, M.-L.; Lin, Y.-H.; Tan, K.H.; Chen, R.-H.; Chen, Y.-H. Using TODIM to evaluate green supply chain practices under uncertainty. *Appl. Math. Model.* **2014**, *38*, 2983–2995. [CrossRef]
22. Castiglione, C.; Alfieri, A. Economic sustainability under supply chain and eco-industrial park concurrent design. *Procedia CIRP* **2020**, *90*, 19–24. [CrossRef]
23. Franchina, L.; Calabrese, A.; Inzerilli, G.; Scatto, E.; Brutti, G.; Bonanni, M.V.d.L. Thinking green: The role of smart technologies in transforming cities' waste and supply Chain's flow. *Clean. Eng. Technol.* **2021**, *2*, 100077. [CrossRef]
24. Rad, F.F.; Oghazi, P.; Palmié, M.; Chirumalla, K.; Pashkevich, N.; Patel, P.C.; Sattari, S. Industry 4.0 and supply chain performance: A systematic literature review of the benefits, challenges, and critical success factors of 11 core technologies. *Ind. Mark. Manag.* **2022**, *105*, 268–293. [CrossRef]
25. Muyulema-Allaica, J.C.; Ruiz-Puente, M.C. Framework proposal for the design of lean circular production systems based on case studies. *DYNA* **2022**, *97*, 515–521. [CrossRef]
26. Anugerah, A.R.; Muttaqin, P.S.; Trinarningsih, W. Social Network Analysis in Business and Management Research: A Bibliometric Analysis of the Research Trend and Performance from 2001 to 2020. *Heliyon* **2022**, *8*, e09270. [CrossRef] [PubMed]
27. Monteiro, J.; Barata, J. Artificial Intelligence in Extended Agri-Food Supply Chain: A Short Review Based on Bibliometric Analysis. *Procedia Comput. Sci.* **2021**, *192*, 3020–3029. [CrossRef]
28. Malacina, I.; Teplov, R. Supply chain innovation research: A bibliometric network analysis and literature review. *Int. J. Prod. Econ.* **2022**, *251*, 108540. [CrossRef]
29. Govindan, K.; Hasanagic, M. A systematic review on drivers, barriers, and practices towards circular economy: A supply chain perspective. *Int. J. Prod. Res.* **2018**, *56*, 278–311. [CrossRef]
30. Karthick, B.; Uthayakumar, R. Impact of carbon emission reduction on supply chain model with manufacturing decisions and dynamic lead time under uncertain demand. *Clean. Logist. Supply Chain* **2022**, *4*, 100037. [CrossRef]
31. Menon, R.R.; Ravi, V. Analysis of enablers of sustainable supply chain management in electronics industries: The Indian context. *Clean. Eng. Technol.* **2021**, *5*, 100302. [CrossRef]
32. Joshi, S. A review on sustainable supply chain network design: Dimensions, paradigms, concepts, framework and future directions. *Sustain. Oper. Comput.* **2022**, *3*, 136–148. [CrossRef]
33. Moshood, T.D.; Nawanir, G.; Mahmud, F.; Sorooshian, S.; Adeleke, A. Green and low carbon matters: A systematic review of the past, today, and future on sustainability supply chain management practices among manufacturing industry. *Clean. Eng. Technol.* **2021**, *4*, 100144. [CrossRef]
34. Oliveira-Dias, D.; Maqueira-Marín, J.M.; Moyano-Fuentes, J. The link between information and digital technologies of industry 4.0 and agile supply chain: Mapping current research and establishing new research avenues. *Comput. Ind. Eng.* **2022**, *167*, 108000. [CrossRef]
35. Nilsson, F.; Göransson, M. Critical factors for the realization of sustainable supply chain innovations—Model development based on a systematic literature review. *J. Clean. Prod.* **2021**, *296*, 126471. [CrossRef]
36. Assumpção, J.J.; Campos, L.M.; Plaza-Úbeda, J.A.; Sehnem, S.; Vazquez-Brust, D.A. Green Supply Chain Management and business innovation. *J. Clean. Prod.* **2022**, *367*, 132877. [CrossRef]
37. Chauhan, C.; Kaur, P.; Arrawatia, R.; Ractham, P.; Dhir, A. Supply chain collaboration and sustainable development goals (SDGs). Teamwork makes achieving SDGs dream work. *J. Bus. Res.* **2022**, *147*, 290–307. [CrossRef]
38. Tavana, M.; Kian, H.; Nasr, A.K.; Govindan, K.; Mina, H. A comprehensive framework for sustainable closed-loop supply chain network design. *J. Clean. Prod.* **2021**, *332*, 129777. [CrossRef]
39. Roy, T.; Garza-Reyes, J.A.; Kumar, V.; Kumar, A.; Agrawal, R. Redesigning traditional linear supply chains into circular supply chains–A study into its challenges. *Sustain. Prod. Consum.* **2022**, *31*, 113–126. [CrossRef]

40. Ayati, S.M.; Shekarian, E.; Majava, J.; Wæhrens, B.V. Toward a circular supply chain: Understanding barriers from the perspective of recovery approaches. *J. Clean. Prod.* **2022**, *359*, 611–621. [CrossRef]
41. Alzubi, E.; Akkerman, R. Sustainable supply chain management practices in developing countries: An empirical study of Jordanian manufacturing companies. *Clean. Prod. Lett.* **2022**, *2*, 100005. [CrossRef]
42. Hussain, M.; Awasthi, A.; Tiwari, M.K. Interpretive structural modeling-analytic network process integrated framework for evaluating sustainable supply chain management alternatives. *Appl. Math. Model.* **2016**, *40*, 3671–3687. [CrossRef]