Data Analytics on economic relationship between international trade and sustainable development: Scopus database 1990-2022

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Abstract

Purpose: By examining the economic relationship between international trade and sustainable development, this study intends to offer data analytics of Scopus database from 1990 to 2020. The purpose is to scrutinize and classify the literature linking these two economic variables.

Design/methodology/approach: This study used bibliometric approaches using R package for data analytics of a sample of 763 studies which were retrieved from the Scopus database during the time 1990 to 2022.

Findings: The results indicate that the economic relationship between international trade and sustainable development is strong as both the variables belong to the same cluster. This study highlights the temporal analysis, spatial distribution of articles, journal analysis, top cited literature linking international trade and sustainable development, authorship pattern, country wise distribution of articles, institution wise distribution of articles, chronological distribution, citation pattern, authorship pattern and thematic map.

Originality/Value: To the best of the authors' knowledge, there have been no such studies conducted that provide data analytics of Scopus database on economic relationship between international trade and sustainable development. This is the first attempt to accomplish the bibliometric analysis of this relationship for more than three decades, providing effective insights into the current dynamics and future direction in this field.

Keywords: *Scopus, Bibliometric analysis, international trade and Sustainable development, Data analytics, Citation Analysis*

JEL: Q01, Q55

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Introduction

International trade and sustainable development relationship study is very vital for the whole world. Many organisations and countries are working to achieve the goals of sustainability, but everyone efforts and determination is necessary to achieve the goal. According to Antonio Guterres, secretary general of the United Nations, "We must rise higher to rescue the sustainable development goals and stay true to our promise of world of peace, dignity and prosperity on a healthy planet." As we know whole globe interacting with various crises that endangering the survival of humankind's basic existence. The sustainable development goals address each of these issues comprehensively, including solutions for preventing and navigating them. Global cooperation will be needed if the globe is to be on path of sustainability(Liu Zhenmin, 2022).

A global approach that considers both economic and environmental issues are necessary for sustainable development(Sustainability | United Nations, 2022). International trade is anticipated to play an important role in accomplishing the SDGs. The universal policy agenda for sustainable development defined international trade as "an engine for inclusive growth and poverty reduction, that contributes to the promotion of sustainable development". Sustainability is defined by the United Nations Brundtland Commission as "meeting the needs of the present without compromising the ability of future generations to meet their own needs."

International trade is changing at a rapid speed but changes should be sustainable. We need to expand international trade to make it more sustainable, resilient, and inclusive. It is crucial for international trade, the environment, and the exploration of sustainable development while maintaining economic growth and social inclusion (WTO Trade and Environment Week, 2022). The prevailing opinion is that international trade promotes sustainable development among most international institutions, including the United Nations (UN) and the World Trade Organization (WTO). The WTO stated during the 2016 UN High-Level Political Forum on Sustainable Development that "Trade growth enhances a country's income generating capacity, which is one of the essential prerequisites for achieving sustainable development". The United Nations member states adopted an international policy framework for sustainable development on September 25, 2015. The SDGs, which are the cornerstone of the 2030 Agenda must be completed between 2016 and 2030, the sustainable development goals (SDGs) contain 169 objectives and 17 goals which are designed to encourage action over the next 15 years in five vital areas for humanity: people,

the planet. The SDGs puts a lot of emphasis on how sustainable development is connected to one another. To achieve sustainable development in all three areas simultaneously, the SDGs put a special emphasis on the links between the three pillars of sustainable development- economic, social, and environmental. As we know millions of people live on our planet and every individual is facing many problems like trying to escape poverty, struggling to feed themselves, battling with many epidemics, and facing the effects of climate change on daily basis. To overcome all these problems, we need to focus on sustainable goals and international trade. By achieving Sustainable development goals, we can transform the world into a better world. But for this, we need to make gradual changes at a national, regional and global level(Bringing Data to Life, 2022).

Table 1. Comparison of previous studies in this field and our study

Basis of comparison	**Study 1:** (N. Donthu et al. , 2021)	**Study 2:** (S. Khanra et al., 2021)	**Our study**
Focus of the study	How to conduct a bibliometric analysis: An overview and guidelines	Bibliometric analysis and literature review of ecotourism: Toward sustainable development	International trade and sustainable development relationship
Keywords	Science mapping Workflow, Cocitation, Scientometrics, Bibliographic databases, VOSviewer	Bibliometric analysis, Content analysis, Ecotourism, Nature-based tourism, Network analysis, Sustainable tourism	"International trade" or "trade" and "Sustainable development" or "Sustainable development goal"
Time period	1979-2020	1990-2019	1990-2022
Methodology	Bibliometric analysis	Bibliometric analysis and literature review	Bibliometric analysis and cluster analysis

Source: Author's analysis

Data and methodology

Bibliometric analysis is not a new concept it came into picture in 1969(Pritchard, 1981). Term "bibliometrics" was coined by the Alan Pritchard (1969). Previously the term "statistical

bibliography" proposed by the Wyndham in 1922, but it was not that much popular at that time(Witting, 1978). In bibliometric analysis we try to find relevant authors, authors affiliations, collaborations between authors and different countries, main keywords used in the specific field, relevance of particular research work etc. Our study tried to find out the answers of these questions.

Scholars might examine the number of papers available on the planned research field for study to evaluate whether the study's scope is sufficiently broad. A research field is deemed to be large enough to warrant the use of bibliometric analysis if there are a significant number of hundreds or thousands of articles. The study field is deemed to be small if there are only a few tens or low hundreds of publications. In this case, bibliometric analysis is not warranted because it would be excessive to apply it to such a small corpus. Meta-analyses and comprehensive literature reviews may be more appropriate review techniques in this situation(Donthu et al., 2021). In our study, we tried to find the relationship between "international trade" and "sustainable development".

Data preparation and tools

In this study Scopus database was used to retrieve data using the keywords "International trade" or "trade" and "Sustainable development" or "Sustainable development goal". On August 4, 2022 database query was done using the above-mentioned keywords for the previous 32 years in order to analyse the relationship between international trade and sustainable development. We got 1068 documents (articles, books, book chapter, conference paper, editorial, review, short survey) after using above mentioned keywords. Further, we have applied filters

We have taken the time period of our study from 1990 to 2022 because liberalisation and globalisation occurred at that time. Early in the 1980s, many developing countries began the process of liberalising trade and implementing market-based economic reform. In the 1990s, this approach gained momentum. Globalisation is defined as "the growing economic interdependence of countries worldwide through the increasing volume and variety of cross-border transactions in goods and services and of international capital flows, and also through the more rapid and widespread diffusion of technology" by the international monetary fund.

We retrieved data from Scopus database using the keywords "International trade" or "trade" and "Sustainable development" or "Sustainable development goal". Information regarding the

retrieved data is present in table 2. We got 1068 documents (articles, books, book chapter, conference paper, editorial, review, short survey) after using above mentioned keywords.

Table 2. Search strategy and Process of data retrieval	
Date	02-12-2022
Database	Scopus
Search string	International trade or trade and sustainable development or sustainable development goal
First stage filters	**Document Type:** Article; **Language:** English
Result	1068 journal articles in English
Second stage filters	**Subject area filters from Scopus categories applied** Economics, econometrics & Finance
Result	763 articles from relevant subject area

Source: Author's Calculation

Further, after applying filter of subject area "Economics, econometric & Finance" we got 763 documents. These 763 documents are analysed in our study using the "bibliometric R package". Table 3 shows the metainformation of retrieved data. Annual growth rate of documents in this area is 16.7 percent.

Table 3. Main information about data	
Description	**Results**
Timespan	1990:2022
Documents	763
Annual Growth Rate %	16.7
Document Average Age	6.35
Average citations per doc	26.45
References	39170
Document contents	
Keywords Plus (ID)	3103
Author's Keywords (DE)	2377
Authors	

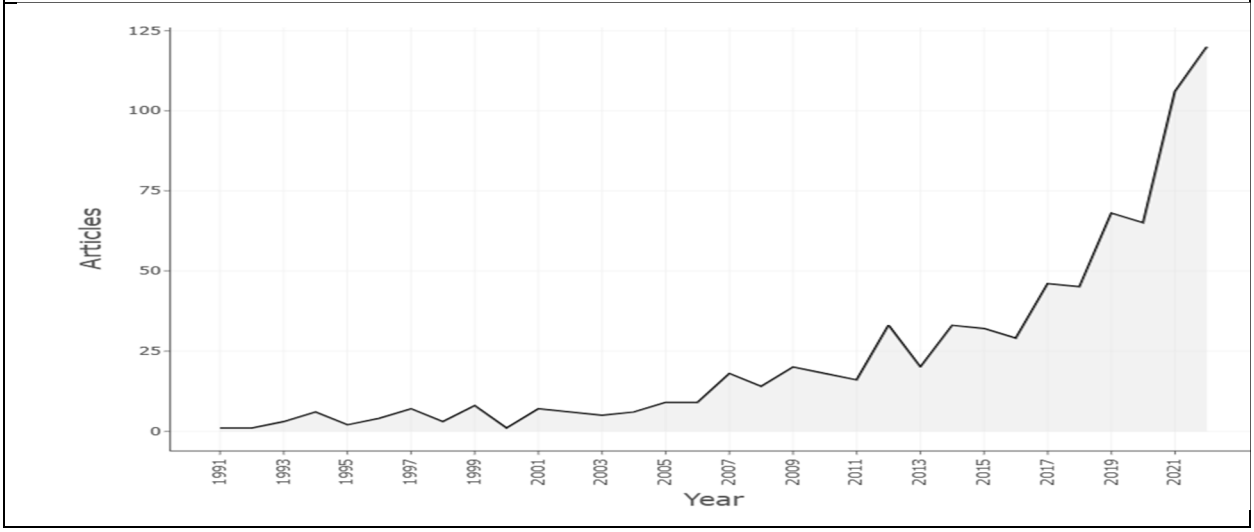
Authors	2041
Authors of single-authored docs	194
Authors collaboration	
Single-authored docs	208
Co-Authors per Doc	2.97
International co-authorships %	28.18
article	763

Source: Author's Calculation using Biblioshiny R

Temporal Analysis

Temporal evolution of scientific knowledge in this field (relationship between "international trade" and "sustainable development") has begun to be analyzed since 1990, when the first article was registered. Although, since the start of 2022, scholars' interest in examining this relationship has progressively grown.

Figure 1. Documents per year (Source: Scopus database)



Source: Author's Calculation using Biblioshiny R

Spatial Distribution of Publication and Document Affiliation

Table 4 shows the top ten country scientific production based on the international trade and sustainable development relationship. China has the highest publications (326), while USA (191

publications), UK (171 publications), Germany (114 publications), Canada (86 publications) is in the second, third fourth, and fifth positions, respectively.

Table 4. World Distribution of articles on international trade-Sustainable Development relationship	
Country	**Total Publication**
China	326
USA	191
UK	171
Germany	114
Canada	86
India	75
Australia	70
Netherlands	53
France	52
Spain	50

Source: Author's Calculation using Biblioshiny R

Table 5, shows the top ten countries, ranked by the citations, among which top 5 countries are USA (3008 citations), United Kingdom (1642 citations), China (1592 citations), Netherlands (1507 citations), and France (1394 citations) .

Table 5. Top 10 countries ranked by citation					
Country	**TC**	**AAC**	**Articles**	**SCP**	**MCP Ratio**
USA	3008	55.70	83	55	0.337
United Kingdom	1642	36.49	54	41	0.241
China	1592	19.18	207	172	0.169
Netherlands	1507	79.32	22	16	0.273
France	1394	53.62	29	20	0.31
Australia	964	43.82	23	19	0.174
Canada	904	31.17	45	31	0.311
Germany	583	25.35	26	15	0.423

Austria	445	37.08	12	8	0.333
Switzerland	390	30.00	13	8	0.385

Source: Author's Calculation using Biblioshiny R

TC Total citations, AAC average article per citations, SCP single country publications, MCP multiple country publications

Table 6, shows the top institution on the basis of publication of international trade and sustainable development relationship. With the 19 publications, University of British Columbia is on the top, after that on second number Tsinghua University with 18 publication, further Wageningen University (14 publications), China University of Geosciences (13 publication) and King Saud University (13).

Table 6. Top institutions on international trade and sustainable development relationship

Affiliation	**Articles**
University Of British Columbia	19
Tsinghua University	18
Wageningen University	14
China University of Geosciences	13
King Saud University	13
Kiel University	12
Beijing Normal University	11
China	11
Newcastle University	11
Fudan University	10

Source: Author's Calculation using Biblioshiny R

Journal Analysis

Table 7 shows the number of publications, and total citation of articles in a journal. Ecological Economics has the maximum number of publication (62 publication), followed by Resources, Conservation and Recycling (60 publications), Resources Policy (36 publications), Marine Policy (35 publication), and International Journal of Production Economics (27 publication).

Table 7. Main journal of publications				
Element	**h index**	**TC**	**NP**	**PY start**
Ecological Economics	28	3348	62	1993
Resources, Conservation and Recycling	26	2463	60	2006
Resources Policy	17	684	36	1999
Marine Policy	16	942	35	2008
International Journal of Production Economics	20	2265	27	2004
Forest Policy And Economics	12	419	24	2004
Environment, Development and Sustainability	9	264	23	2005
World Development	16	2596	19	1991
Journal Of World Trade	7	133	17	2006
Energy Economics	8	457	13	2014

Source: Author's Calculation using Biblioshiny R; TC total publications, NP number of publication

Top cited articles

Table 8. Top cited articles on international trade and sustainable development relationship				
Author	Title	TC	Year	Source Title
Sharachchandra M. Lélé	Sustainable development: A critical review	1074	1991	World Development
David I. Stern, Michael S. Common, Edward B. Barbier	Economic growth and environmental degradation: The environmental Kuznets curve and sustainable development	973	1996	World Development
Blandine Ageron, Angappa Gunasekaran, AlainSpalanzani	Sustainable supply management: An empirical study	592	2012	International Journal of Production Economics
Jeroen C.J. Mvan den Bergh, Harmen Verbruggen	Spatial sustainability, trade and indicators: an evaluation of the 'ecological footprint'	449	1999	Ecological Economics

Nicky Gregson, Mike Crang, Sara Fuller & Helen Holmes	Interrogating the circular economy: the moral economy of resource recovery in the EU	322	2015	Economy and Society
Joyeeta Gupta & Courtney Vegelin	Sustainable development goals and inclusive development	286	2016	International Environmental Agreements: Politics, Law and Economics
T. Ibn-Mohammed, K.B. Mustapha, J. Godsella Z. Adamu, K.A. Babatunde, D. D. Akintade, A. Acquaye, H. Fujii, M.M. Ndiaye, F.A. Yamoah, S.C. L. Koh	A critical analysis of the impacts of COVID-19 on the global economy and ecosystems and opportunities for circular economy strategies	259	2021	Resources, Conservation and Recycling
Graciela Chichilnisky	An axiomatic approach to sustainable development	257	1996	Social Choice and Welfare volume
ShenggangRen, BaolongYuan, XieMa, XiaohongChen	International trade, FDI (foreign direct investment) and embodied CO2 emissions: A case study of Chinas industrial sectors	255	2014	China Economic Review
Cathy A. Roheim, Frank Asche, Julie Insignares Santos	The Elusive Price Premium for Ecolabelled Products: Evidence from Seafood in the UK Market	235	2011	Journal of Agricultural Economics

Source: Author's Calculation using Biblioshiny R

The titles which are constantly cited are presented in table 8. The most cited article is (Lélé, 1991), which discusses about the inadequacies and in inconsistencies in policy making which leads to the flaws in sustainable development mainstream. International trade, agriculture, and forestry are used to illustrate how these flaws can result in inadequacies and inconsistencies in policymaking.

It is recommended that politically convenient fuzziness will have to be abandoned if we want to see sustainable development.

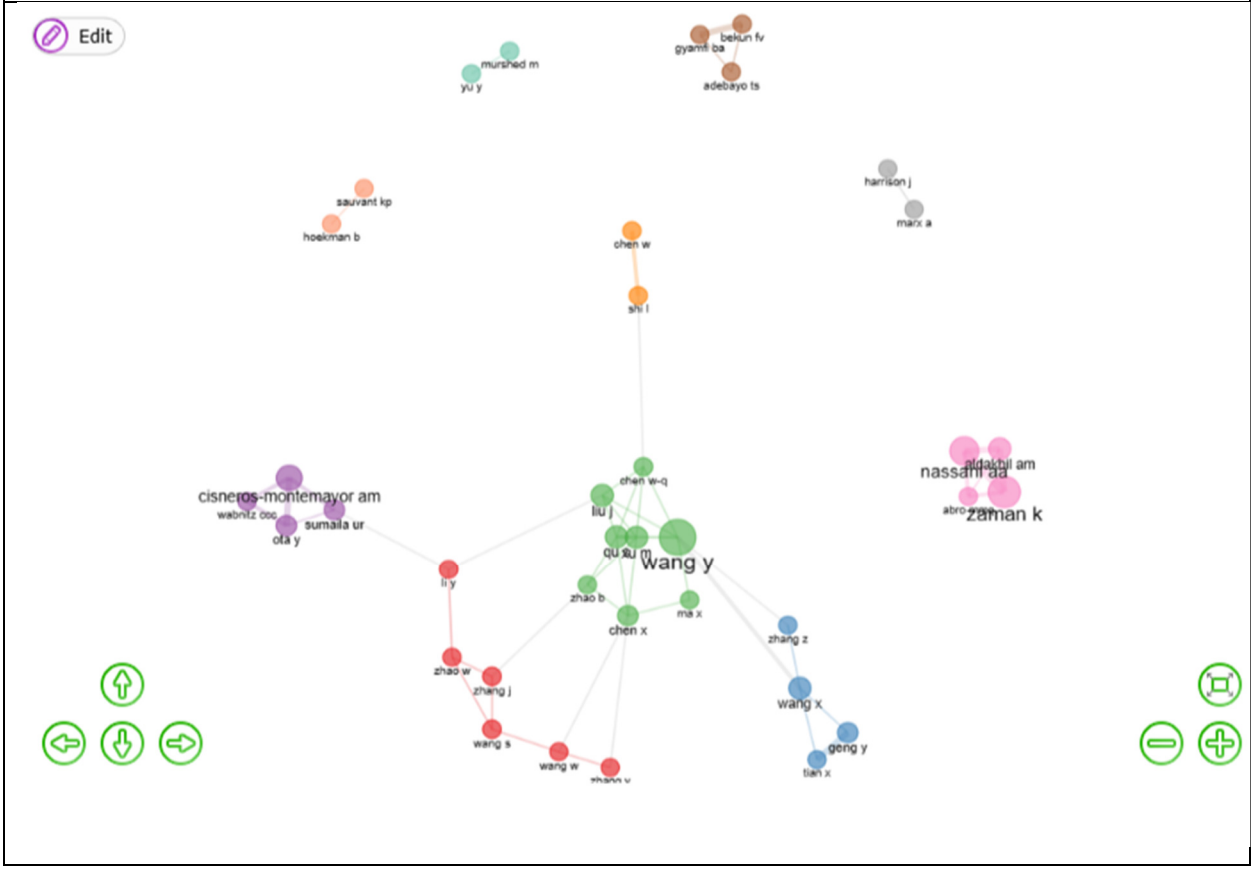
(Stern et al., 1996) was the second most cited paper titled as “Economic growth and environmental degradation: The environmental Kuznets curve and sustainable development”. The study is analyzed the relationship between environment degradation and income per capita using the environmental Kuznets curve. (Ageron et al., 2012), with the 592 citations holds the third position in highest cited publication. This study is focused on the sustainability of supply management. The next publication of (Van Den Bergh & Verbruggen, 1999) received highest citations. The study titled “Spatial sustainability, trade and indicators: an evaluation of the ‘ecological footprint’” discussed about the spatial sustainability and regional development.(Gregson et al., 2015) discussed about the concept of circular economy, green economy and sustainable development in the European Union. The next highest cited publication titled as “Sustainable development goals and inclusive development”. This study is focused on the inclusive development, social inclusiveness, environmental inclusiveness, relational inclusiveness in achieving sustainable development goals(Gupta & Vegelin, 2016).

(Ibn-Mohammed et al., 2021) this study focused on the positive and negative impact of COVID-19 pandemic on achieving sustainable development goals. The next title to have high citation (Chichilnisky, 1996), is entitled as “An axiomatic approach to sustainable development”. The author purposed the two theorems for sustainable preferences and welfare criterion.(Ren et al., 2014)discussed the about the repercussions of the FDI, trade openness, exports, imports and per capita income on CO_2 emission in the China.(Roheim et al., 2011) is the last publication with 235 citations. The study is about the sustainable forestry and fishery products. As per the author analysis incentives for the market differentiation and certification programme are essential for sustainable seafood practices.

Author analysis

In Figure 2, co-authorship network demonstrates that the writers' global collaboration was crucial in boosting the impact of their publications. It is also clear that Wang Y, Zaman K, Cisneros-montemayor am, and nassam aa have the greatest number of international collaborations and the strongest links.

Figure 2. Collaboration network of top authors (1990-2022)



Source: Author's Calculation using Biblioshiny R

Keyword analysis

To address this research the research question, what is the intellectual structure of current research on international trade and sustainable development. We have analysed the titles, abstract and keywords generated from the Scopus database (1990-2022). Using the R software, table of keywords has been generated and ordered to the frequency of occurrence I shown in the table 8.

Table 9. Keywords (source: author analysis, based on R software bibliometrix)

Words	Occurrences
Sustainable Development	447
International Trade	107
Sustainability	99

China	83
Economic And Social Effects	78
Environmental Economics	74
Commerce	70
Trade-Off	64
Article	62
Environmental Impact	52
Recycling	52
Economic Growth	49
Decision Making	40
Climate Change	39
Trade-Environment Relations	37

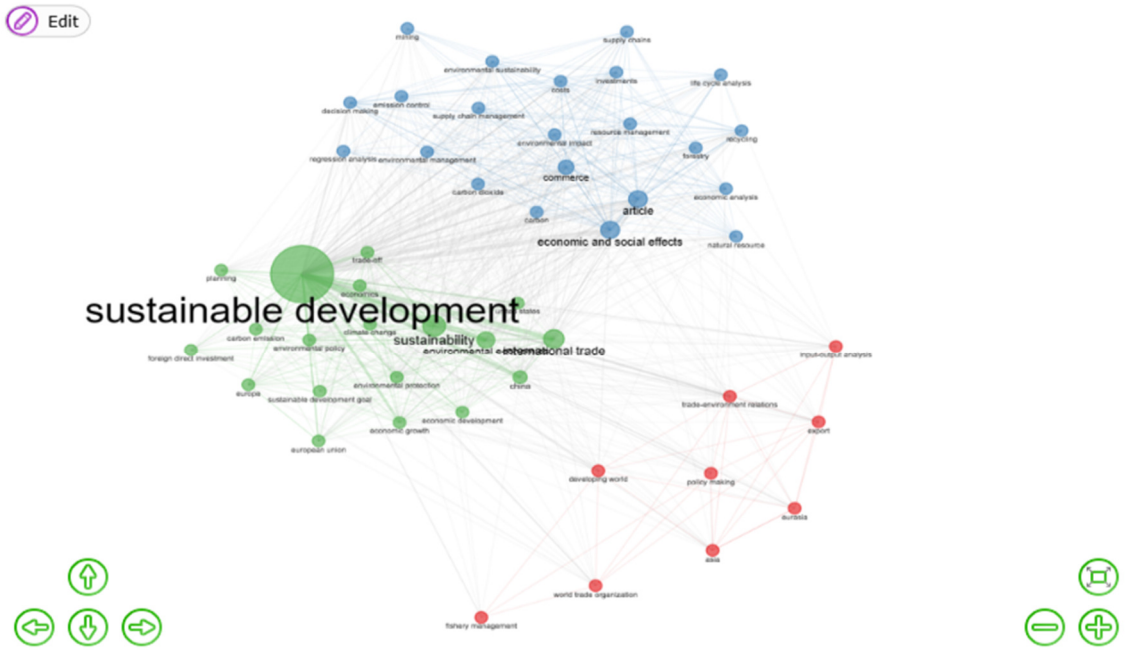
Source: Author's Calculation using Biblioshiny R

The cluster analysis of keywords performed using biblioshiny. The bibliometric analysis of all keywords used in the Scopus database from 1990-2022 provides a structured assessment of this domain, as presented in Figure 3. A total of three clusters were obtained, which are represented by green, red, and blue color for cluster 1,2 and 3 respectively. The first cluster represented by green color focuses on international trade with strong association with sustainable development. The second cluster in red color focuses on trade- environment relations and third cluster of blue color focuses on economic and social effects. It can be observed from the cluster that cluster 1 is prominent cluster with the strong link with keywords from other clusters.

Thematic network

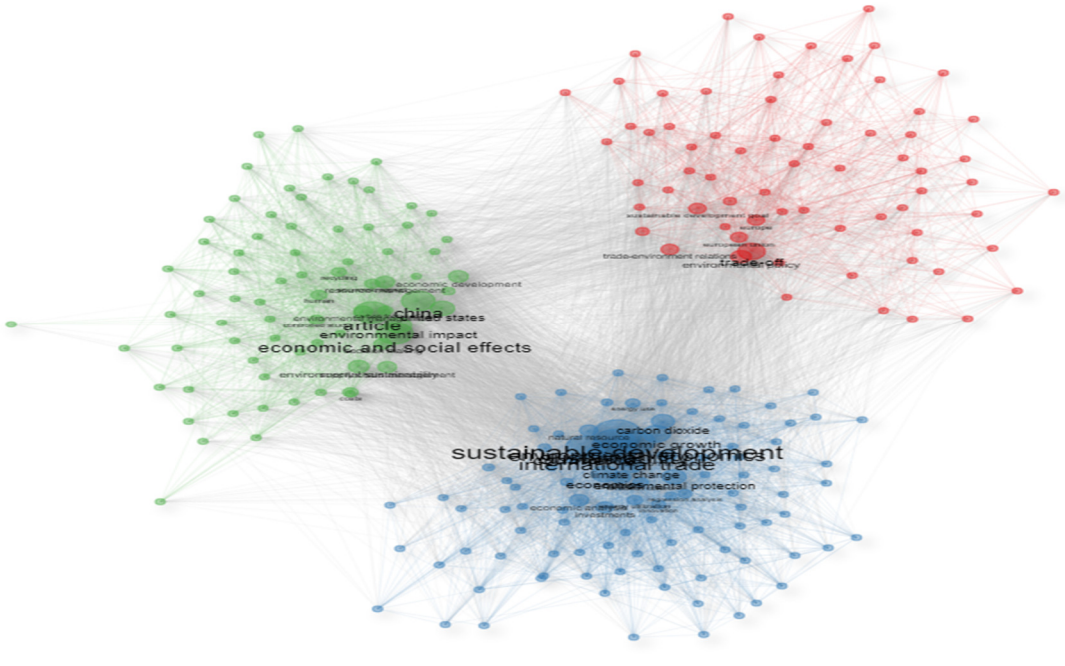
Figure 4 shows the thematic network of keywords. By performing bibliometric analysis, we got the three clusters, shown in green, red and blue colour. The first cluster in blue colour shows the association between international trade and sustainable development. Red colour cluster (second cluster) shows the relationship between trade-off, sustainable development goals, trade-environment relations and environment policy. The third cluster is in green colour focuses on economic and social effects, environmental impact, and environmental sustainability.

Figure 3. Keyword Cluster (Source: Scopus Database, 1990-2022)



Source: Author's Calculation using Biblioshiny R

Fig 4. Thematic network (Source: Scopus Database, 1990-2022)



Source: Author's Calculation using Biblioshiny R

Conclusion

A bibliometric analysis of 766 documents was done for this study, and the results showed a substantial correlation between international trade and sustainable development. The clustering of relevant keywords indicates a considerable link between these two disciplines, suggesting that international trade is an essential variable in increasing sustainability.

Even though a lot of study has been done in this field, substantial advancement in sustainability policy implementation is necessary. Our analysis points to areas that need further research, implying that more study may yield insightful information that would be helpful to decision-makers trying to balance trade internationally with goals for sustainable development.

It is crucial to remember that the Scopus database is the only source of data for our investigation. Additional databases, including PubMed and Web of Science, could be added to this study in the future to explore alternative viewpoints and findings. Overall, our findings contribute to a clearer understanding of the intersection between international trade and sustainable development, emphasizing the substantial research opportunities that still exist in this critical area.

Disclosure Statement

No potential conflict of interest to declare.

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