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BIBLIOMETRIC ANALYSIS OF GLOBAL RESEARCH FOCUS ON GREEN ECONOMICS USING SCOPUS DATABASE: WHAT WE KNOW AND WHAT IS UNKNOWN

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ABSTRACT

This bibliometric analysis aims to examine the research exposure on the hot issue of the green economy and, subsequently, how the macroeconomic indicators play a crucial role in its reformation. In order to analyze, this study uses the Scopus database, and there is no limit applied to the historical data from 1992 to Feb 2022. The outcomes of this study suggest that more work needs to be done to date on the global green economy. However, some work on green investment, trade, and the COVID-19 Pandemic has been witnessed. It is vital to note that to date, there is a significant gap in the existing literature on the issues of oil prices volatility and its transmission impact on the green economy, COVID-19 role in the production side of the export-led growth economies, and last but not least, the role of agriculture to enhance the green environment through environmental mitigation mechanism is a crucial area to explore.

JEL Classification: *O44, Q10, Q01, B17.*
Key Words: *Agriculture, environmental mitigation, green economy, trade.*

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1. INTRODUCTION

Green economics was first discussed in 1989 in a report presented by leading UK environmental economists as "Blueprint for Green Economy" (Pearce et al., 1989). This report aims to elaborate on the terms sustainable development that help sustain development through economic growth. The term Green Economy (GE) was later used in 1991 and 1994; however, the concept was again focused on sustained development and looked into several environmental issues. In 2008, the GE discussed in the context of several global crises where

financial crises are a big concern of recession; United Nations Environment Programme (UNEP) proposed an idea of "green stimulus" packages and elaborated a more extensive public investment that can start a "Green Economy" (Atkisson, 2012). In continuation of the new term, many countries have adopted this as part of their economic recovery efforts. In 2008, the UNEP formally introduced a GE initiative for investment in green-related projects and greening the unfriendly environmental sectors. The UNEP directed the original author of Blueprint for the green economy to establish a comprehensive report named "Global Green New Deal (GGND)," released in 2009, that comprises the way to uplift economic growth and, at the same time, ensure a sustainable environment.

The GGND further deliberated and asked the concerned countries to assign a good share of their funding to green sectors and outline three significant objectives: (i) poverty eradication, (ii) economic recovery, and (iii) reduction in carbon emission (UNEMG, 2011). In mid-2009, the United Nations (UN) climate conference in Copenhagen published a statement supporting the GE, a significant breakthrough in addressing many global crises. In early 2010, the General Assembly approved a GE for poverty eradication and sustainable development. According to the UNEP (2011), GE can be defined as "one that results in improved human well-being and social equity while significantly reducing environmental risks and ecological scarcities. It is a low carbon, resource-efficient, and socially inclusive". In addition, a GE is widely known as an economy aiming to reduce environmental risk and ecological insufficiencies. It is also important to cite that GE aims to boost sustainable development, not at the cost of degrading the environment. According to economists, the GE is a broader concept defined as an interface between nature, human beings, and the environment concurrently and helps each other.

2. LITERATURE REVIEW

Some work has been done on the issue of GE and its role in a sustainable environment. However, there is still a significant occasion to learn more about GE in a larger context and see how this concept is valid and crucial for different sectors of an economy. This study provides a detailed picture while looking into the work done so far concerning different pillars of an economy. The study of Aastvedt et al. (2021) examined the impact of green innovation on the financial performance of gas and oil firms in the case of US and EU firms. The study uses annual data from 2010 to 2018, and the outcomes of their study suggest that green innovation positively impacted the performance of EU and US firms; however, the oil price surge post an adverse impact. Ren et al. (2022) examine the relationship between green investment and its impact on environmental pollution. This study's outcomes revealed that environmental pollution declined due to green investment. It is further elaborated that green investment helps improve energy conservation, reduce emissions, uplift technological innovation, and update the industrial infrastructure.

It is well documented in the literature that climate changes affect the environment and human beings. Due to environmental degradation, economies incur losses that further translate into human well-being. Dalei and Heggde (2021) study examined three significant concepts such as growth, value, and the relationship from a green perspective. The findings suggest that green growth is vital for a sustainable environment that helps society and the ecological system. Wang and Wang (2021) examined how green finance impacts the industrial structure that yields sustainable development. The overall results of this study indicate that the green finance policy plays a crucial role in enhancing green technology,

stabilizing foreign exchange, and refining green finance infrastructure. Lee and Lee (2022) analyzed the impact of green finance on total factor productivity, and the outcomes suggest a strong association exists between green finance and the amount of green productivity. Similarly, LI et al. (2022) studied the green total factor productivity. Their findings show that carbon emission trading help reduce carbon emission; in the short term, carbon emission trading does not help improve green total factor products.

It has been widely witnessed that many economies, irrespective of developing and developed, are harder hit by the COVID-19 Pandemic, and its impact can witness in any sector of the economy. In this regard study by Akhuno et al. (2021) indicates that due to the Pandemic, Russia's oil and gas sector was adversely impacted. The impact of COVID-19 is not limited, and it has impacted the trade sectors of many countries; however, it helps positively for environmental sustainability (Borojo et al., 2021). The world acts promptly and prepares well to deal with such pandemics in a much better way to protect the world economy (Eldelen & Richardson, 2021; Lahce et al., 2020). Borojo et al. (2021) evaluated the effect of COVID-19 on the production, trade, and quality of the environment and its possible impact on the green economy. The findings of this study suggest a negative relationship between the COVID-19 Pandemic and production and regional trade. The most important outcome of this research indicates a positive association between the COVID-19 Pandemic on the quality of the environment.

In order to examine the green growth pattern, the study of Wang et al. (2022) suggests that rich countries are witnessing low green economic growth compared with the poor. The outcome further stressed that focusing on research and development positively impacts green growth. In addition, economic, environmental, and social factors simultaneously impact green performance (Ates et al., 2021), and the pattern of green growth in European countries is uneven (Sneideriene et al., 2020). The study of Aastvedt et al. (2021) examined the role of green innovation in the financial efficacy of oil and gas firms, and their findings suggest that green finance directly impacts oil and gas firms across the US and Europe. In order to maintain sustainable development, green finance also plays a crucial role in small and large industrial sectors (Wang & Wang, 2021).

3. METHODS AND TYPES OF ANALYSIS

Bibliometric Analysis (BA) is an approach to provide a quantifiable pathway on a specific area and to identify the most recent research feedback available in the literature database. The present study analyzed the scientific literature through BA, which provides statistical direction to measure publication data about the topic under the microscope (Keathley-Herring et al., 2016; Rey-Martí et al., 2016). This research used the latest version (1.6.18) of VOSviewer, which provides scientific networking to available literature (Abad-Segura et al., 2019). In order to analyze literature data, this study uses the Scopus database, which is the most widely used and gives an enormous strength of data compared with other databases. Moreover, mainly in economics, the Scopus database always provides a wide range of papers that help researchers to go into depth and identify specific gaps to be filled (Ackerson & Chapman, 2014; Mingers & Lipitakis, 2010; Nascimento & Rodrigues, 2015). The analysis of the data was conducted in four following steps:

Table 1: Units and analysis.

Step-1	Identification	Article Title, Abstract, and Keyword 1. Green Economics 2. Green Economy Database: Scopus Type of Documents: Articles, Books, Book Chapters
Step-2	Inclusion and Exclusion Criteria	Total Record Retrieved: 575 Inclusion:507 Exclusion:68
Step-3	Visualization	Data Retrieval and its Analysis VOSviewer
Step-4	Analysis	Analysis of Scientific Literature Preparation of different kinds of Networks

The data for this research was retrieved in February 2022 through the Scopus database, and the main objective of this article is to examine the amount of work conducted on the Green economy around the globe. The entire data period considered starts from 1991 to 2022, and the below query[1] It has been adopted to extract relevant data. Based on this query, we received 507 after applying exclusion criteria, including specific subject areas, document-type articles, and source journals used. In addition to the main search criteria, this study also introduces sub-themes where we want to know how much work has been done along with green economics and are as follows: (i) "Green Economics" AND "Oil Prices," (ii) "Green Economics" AND "Stock Prices," (iii) "Green Economics" AND "Economic Growth," (iv) "Green Economics" AND "Economic Development," (v) "Green Economics" AND "Foreign Direct Investment," (vi) "Green Economics" AND "Remittances," (vii) "Green Economics" AND "Trade," (viii) "Green Economics" and "Export" and (ix) "Green Economics" AND "Agriculture ."There are chances of overlapping articles like they may fall in the "Green Economics" search. Therefore, we have removed common papers to avoid overlapping to report actual pictures.

Table 2: Sub theme and its output.

S #	Sub Themes	Total Search Output (No Limit)	Selected (After Limit to)
1	"Green Economics" OR "Green Economy" AND “Oil Prices”	14	4
2	"Green Economics" OR "Green Economy" AND “Stock Prices”	16	7
3	"Green Economics" OR "Green Economy" AND “Economic Growth”	158	158*

[1]TITLE-ABS-KEY (*"Green Economics"* OR *"Green Economy"*) AND (LIMIT-TO (DOCTYPE, *"ar"*)) AND (LIMIT-TO (SUBJAREA, *"ECON"*)) AND (LIMIT-TO (LANGUAGE, *"English"*)) AND (LIMIT-TO (SRCTYPE, *"j"*))

4	"Green Economics" OR "Green Economy" AND "Economic Development"	15	15
5	"Green Economics" OR "Green Economy" AND "Foreign Direct Investment"	0	0
6	"Green Economics" OR "Green Economy" AND "Remittances"	2	2
7	"Green Economics" OR "Green Economy" AND "Trade"	232	171*
8	"Green Economics" OR "Green Economy" and "Export"	84	62
9	"Green Economics" OR "Green Economy" AND "Agriculture"	215	55

**:* A separate file representing a complete network analysis on these issues; however, a complete fledge analysis still needs to be conducted due to fewer publications.

This study considered three main types of analysis[2] that includes citation, co-citation, and terms co-occurrence to understand the amount of work executed by the researchers.

4. RESULTS

This section explain in detail about the analysis carried out as per the order stated in the method section.

4.1 Analysis of citations

This section is entirely dedicated to citation analysis.

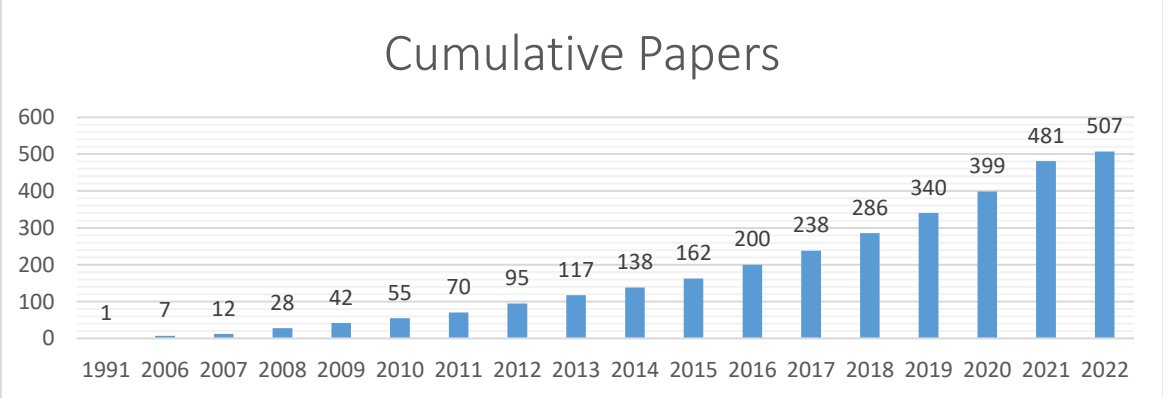

Figure 1: Cumulative papers.

Figure 1 represents the cumulative papers. It is shown that they are in increasing order and follow the same pattern. The array of this figure clearly illustrates that the researcher's interest in this field is gaining weight and scientific work is on an upward trend.

4.2 Citation-countries

[2] (Citation-Documents, Citation-Sources, Citation-Authors, Citations-Organization, Citation-Countries), (Co-Citation-Cited References, Co-citation- Cited Sources, Co-Citation-Cited Authors), (Terms co-occurrence within the title and in the abstract field)

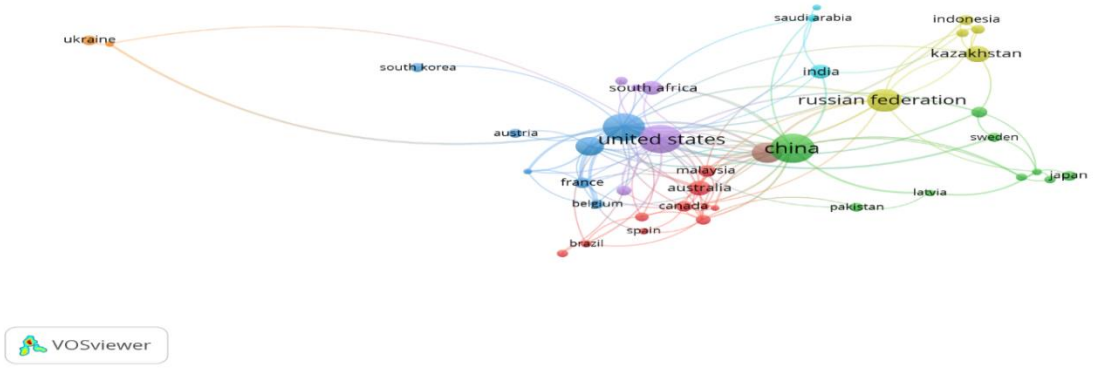

Figure 2: VOSviewer out for citations per country.

Figure 2 is the VOSviewer output and represents citations per country for the green economy. It is exhibited that the highest number of work is done in China, followed by the United States, Russian Federation, Kazakhstan, South Africa, etc.

Table 3: Top 10 countries with highest citations.

Id	Country	Documents	Percentage per Doc	citations	Citations Per Doc	total link strength
1	China	72	11.09	1077	14.96	27
2	United States	70	10.79	1000	14.29	39
3	United Kingdom	67	10.32	856	12.78	67
4	Italy	37	5.7	535	14.46	20
5	India	16	2.47	457	28.56	9
6	Germany	30	4.62	351	11.7	18
7	Russian Federation	44	6.78	235	5.34	14
8	Australia	18	2.77	229	12.72	12
9	Portugal	7	1.08	220	31.43	5
10	Austria	7	1.08	178	25.43	2

Table 3 shows the countries with the highest number of citations and citations per document. It is clear from the table that the top three countries with the highest number of publications reported in China, the US, and the UK, respectively, follow the exact order in terms of total documents produced in this field. However, regarding the citation per document, the highest number of average citations was reported for Portugal, with only seven documents, followed by India, Austria, Italy, etc.

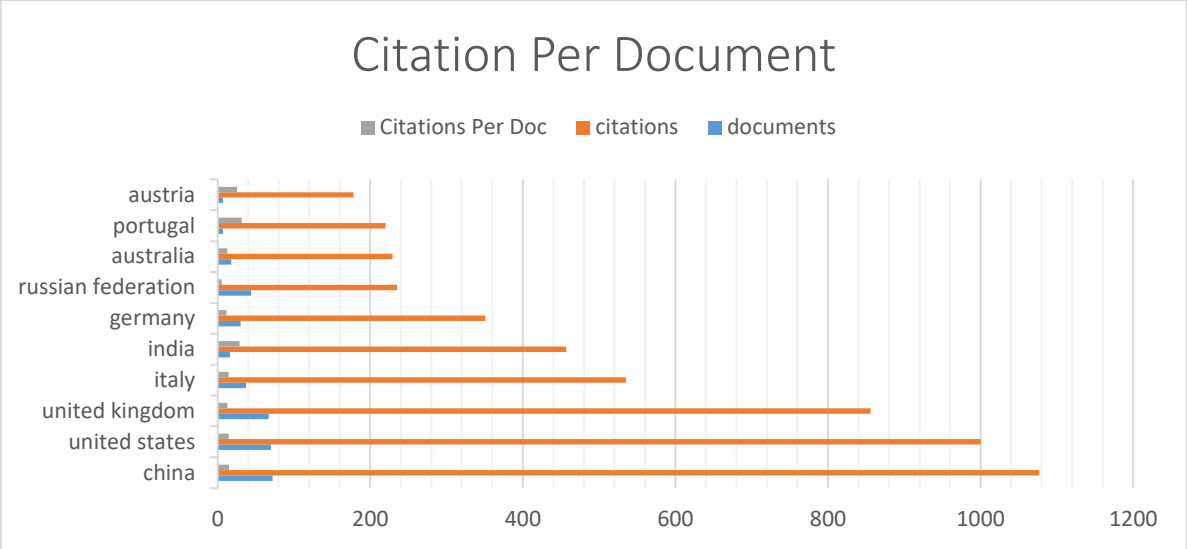

Figure 3: Citation per documents.

Figure 3 shows citations per document, and China is leading with the total number of documents published till February 2022, followed by the USA and UK, respectively.

4.3 Citation-organizations

Figure 4: VOSviewer out for citation per organization.

Figure 4 shows the citations per document of each top 5 organization, and it is noted that the link strength is almost absent between them. Similarly, Table 4 illustrates these top 5 organizations with the number of citations and citations per document—the highest number of on average citations reported for Australia National University, however, with no link strength.

Table 4: Citation-Organization

Id	Organization	Doc	Citations	Citation Percentage Per Doc	Total link strength
1	Nanchang University, Nanchang, china	6	60	10.00	1
2	Australian national university, Australia	3	45	15.00	0
3	Kiel Institute for the world economy, Kiel, Germany	3	13	4.33	0
4	Kuban state technological university, Russian Federation	3	13	4.33	0
5	Murphy Institute, New York, NY, united states	4	3	0.75	0

4.4 Citation-authors

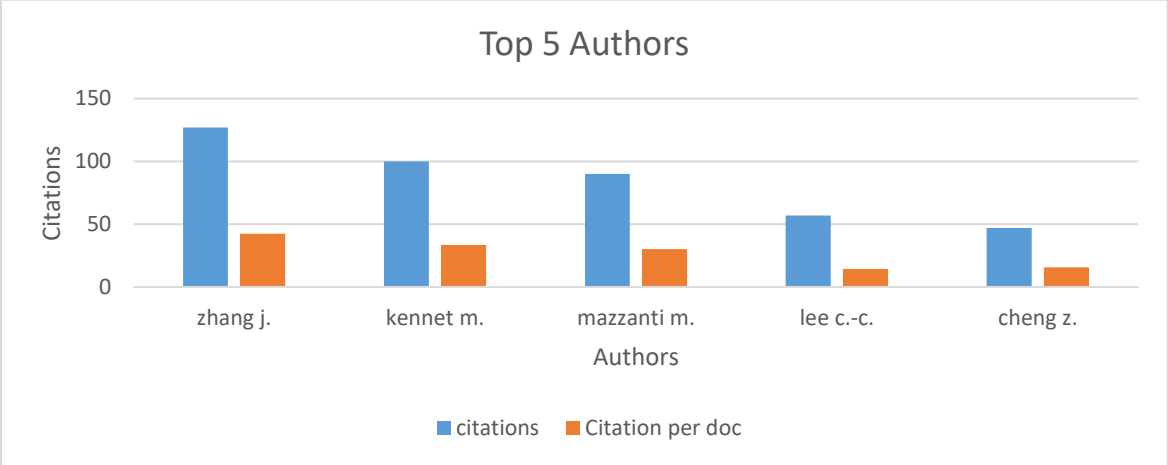

Figure 5: Top 5 Authors with highest citations.

Figure 5 shows the number of citations of each of the top 5 authors, and it shows the downward trend from left to right that indicates the highest to the lowest citation for each author.

Table 5: Top 5 authors with highest citations.

Id	Author	Doc	Citations	Citation per doc	Total link strength
1	zhang j.	3	127	42.33	0
2	Kennet m.	3	100	33.33	4
3	Mazzanti m.	3	90	30.00	0
4	lee c.-c.	4	57	14.25	2
5	cheng z.	3	47	15.67	2

The author's details concerning their published documents and their citation per document are stated in table 5. The results show that the highest citations follow the same trend from one to number 3, and number 5 has the fourth position.

4.5 Citations-Sources

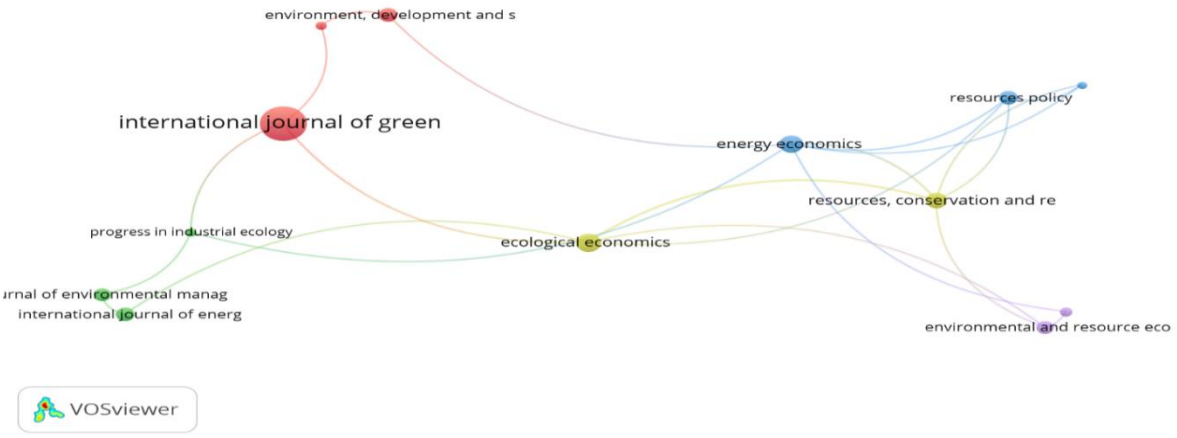

Figure 6: VOSviewer out for citation-sources.

In Figure 6, citations are reported concerning the sources, showing that the international journal of green economics is taking the lead, followed by Ecological Economics and Resources, conservation, and recycling.

Table 6: Top 10 sources with highest citations.

Id	Source	Doc	Citation	Avg Cit per Doc	Total link strength
1	Ecological Economics	29	930	32.07	10
2	resources, conservation, and recycling	23	879	38.22	11
3	Energy Economics	25	658	26.32	9
4	International journal of green economics	103	495	4.81	3
5	International environmental agreements: politics, law, and economics	6	226	37.67	3
6	environmental and resource economics	14	189	13.50	4
7	International journal of energy economics and policy	17	182	10.71	2
8	world development	8	159	19.88	0
9	resources policy	16	152	9.50	5
10	journal of environmental economics and management	8	112	14.00	2

Ecological Economics produced the highest number of publications, including Resource, Conservation, Recycling, Energy Economics, etc. The highest average citation of each document goes to Resource Conservation and recycling, followed by International Environmental Agreement and Ecological Economics, respectively. It is well noted that the journal listed at 5 has only six publications; however, it takes the second position in terms of average publication per document.

4.6 Citations-documents

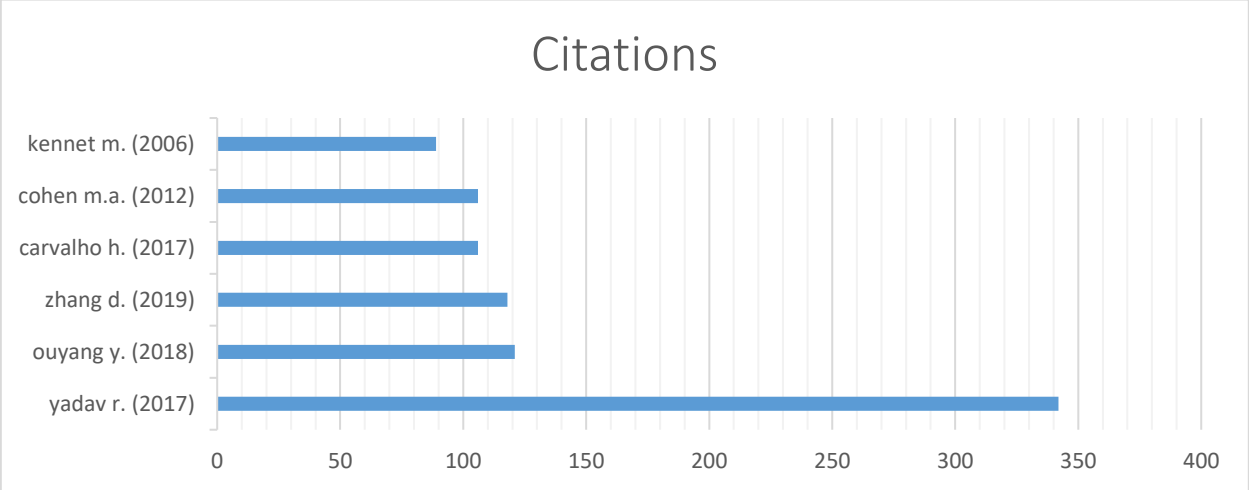

Figure 7: VOSviewer out for citation per documents.

Figure 7 represents the citation per document, showing that Yadav has the highest number of citations, followed by Ouyang, zhang, etc.

4.7 Co-citation-cited references

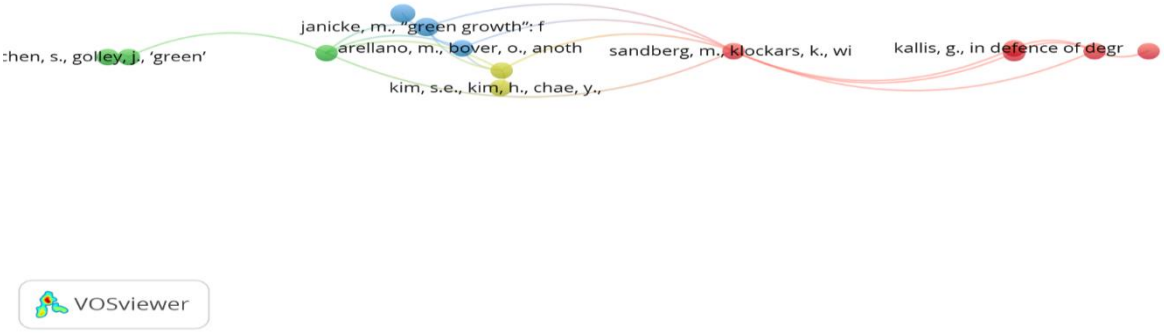

Figure 8: VOSviewer output for co-citation-cited references.

Figure 8 represents the co-citation of the cited references. There are four kinds of clusters here; the red cluster represents more references cited, followed by blue, green, and yellow.

4.8 Co-citation-cited sources

Figure 9: VOSviewer output of co-citation-cited sources.

Figure 9 illustrates the cited sources, and it is evident that energy policy, ecological economics, journal of clean production, and energy economics are leading among all other sources.

4.9 Co-citation-cited authors

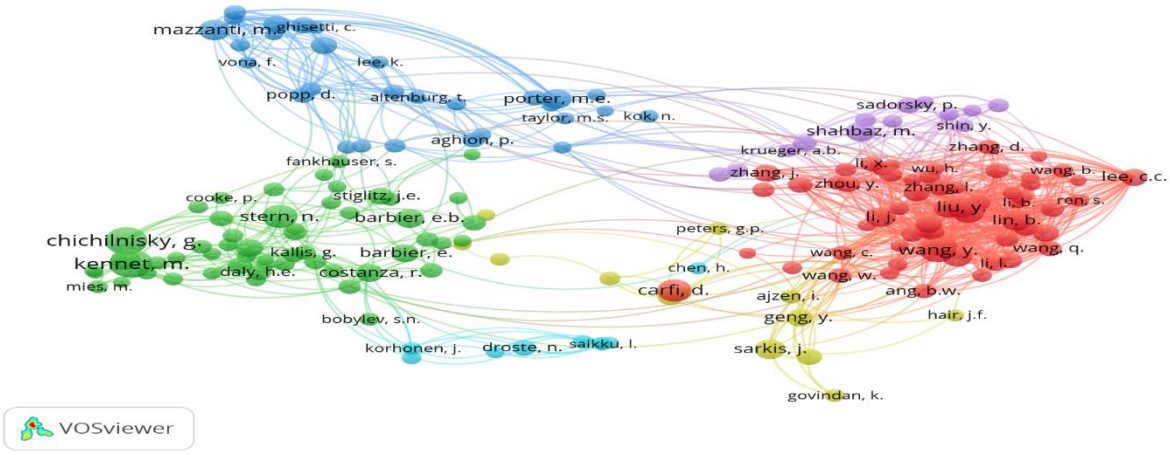

Figure 10: VOSViewer output for co-citation-cited authors

The co-citation of the cited authors comprises six different clusters, and the heaviest belongs to red, followed by green, dark blue, purple, and light blue, respectively.

4.10 Co-occurrence all keywords

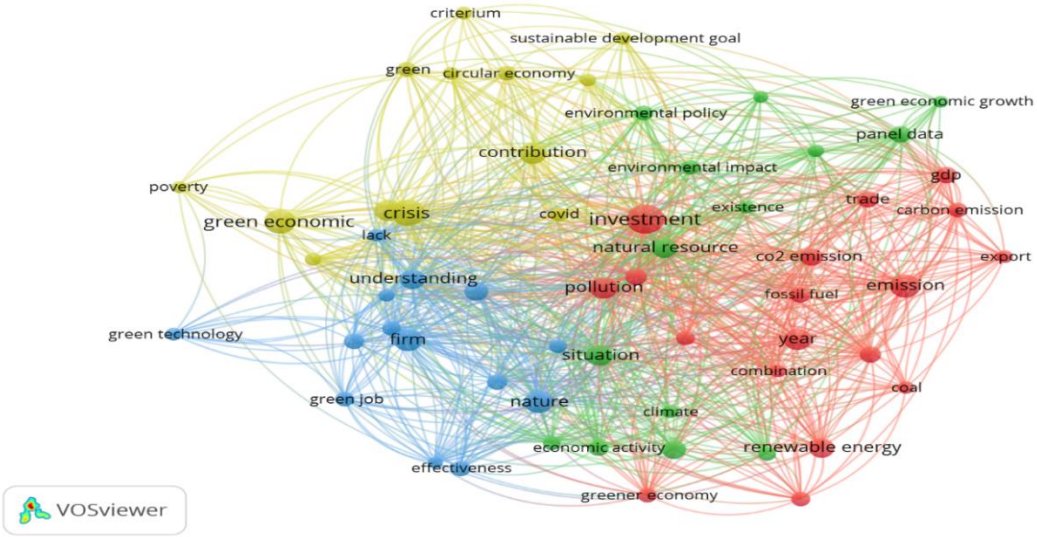

Figure 11: VOSviewer output for co-occurrence all keywords.

Suppose we closely focus on the co-occurrence of all the keywords in the database under study. In this case, the most common keywords are natural resources, investments, green economics, sustainable development goals, renewable energy, green technology, etc.

4.11 Term co-occurrence – all keywords

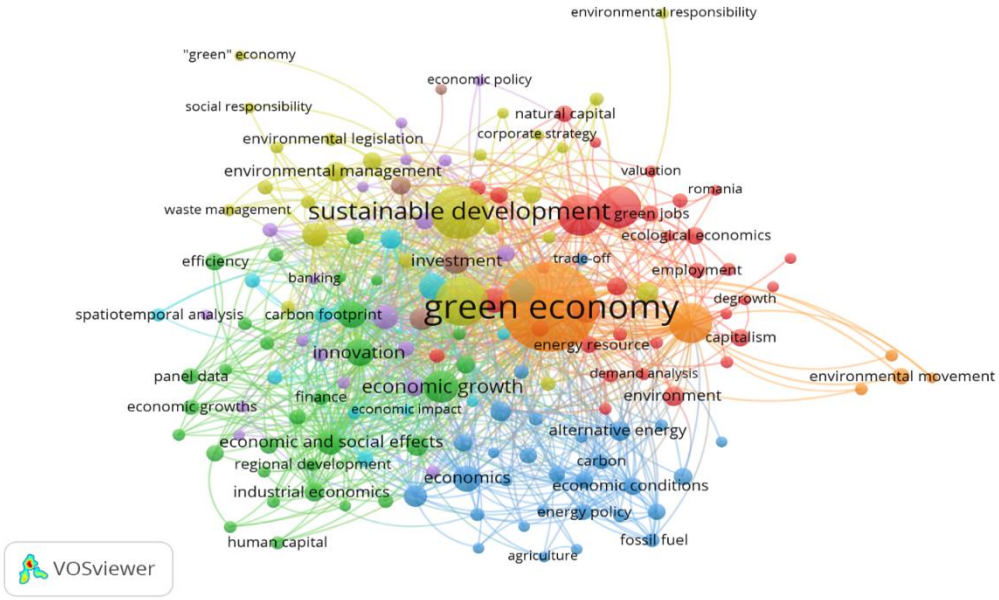

Figure 12: VOSviewer output for terms co-occurrence.

The above represents most of the bibliometric analysis, and while looking into the terms co-occurred in the database currently under review. There are different clusters are representing in Figure 12. It is well noted that the three highly co-occurred terms are green economy, Sustainable development, and environmental economics.

5. CONCLUSION AND RESEARCH GAP

The main objective of this study is to examine the broadness of green economics and to what extent the work has been done to date. The extensive study uses a Scopus database with limited restrictions to limit work on economics. The data period investigated starts from 1992 to Feb 2022. In total, 507 pieces of research have been conducted on the global green economy, mostly belonging to China, the UK, and the USA, respectively. The central theme of this research is to find output against the green economy, subdivided into nine combinations with the most important macroeconomic indicators. After reviewing them, it has been witnessed that only a few works have been done to date on that issue, except a few works observed when the search goes with agriculture and trade though the amount is less than 200. This study identified four prominent journals publishing a high level of work with significant citation and co-citation, such as energy policy, ecological economics, energy economics, and the international journal of green economics. In addition, the terms that co-

occurred most frequently across the analysis are green economics and sustainable development.

This study identified some work on the stock markets, green investment, green finance, green growth, and the COVID-19 pandemic issues. However, a thorough review of this database suggests a lot to do on these issues, which are crucial to the green and sustainable economy. These areas are potentially hot topics that need to be studied in detail to boost their economy according to global green environmental commitment. The work is minimal on the fluctuations of the oil prices and how they translate their impact on the green economy (green growth) concerning the oil-exporting and importing countries. The geopolitical risks, possibly specific to the oil-exporting countries, would flavor the impact of oil price volatility on the green economy.

It is also worth filling the gap by studying the impact of COVID-19 on the production sides of developing countries heavily dependent upon export. A pre-post-COVID-19 impact provides a solid platform for policymakers to know where they were, what they bore during COVID, and where they are heading to maintain the green economy. This study also explored an unexplored area about how a sustainable digital economy flourishes through the medium of trade-adjusted C02 emissions. Moreover, the agriculture sector activities that play a critical role in agree-based countries are primarily ignored, and more work needs to be conducted to date. Studying how agriculture employment and export help mitigate environmental issues is an important area to discover.

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